(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 919 907 B9**

(12) **CORRECTED EUROPEAN PATENT SPECIFICATION**

(15) Correction information:
Corrected version no 2 (W2 B1)
Corrections, see
Description Paragraph(s) 25, 132, 133
Claims EN 1, 2

(48) Corrigendum issued on:
15.08.2012 Bulletin 2012/33

(45) Date of publication and mention of the grant of the patent:
23.02.2011 Bulletin 2011/08

(21) Application number: **06797580.5**

(22) Date of filing: **31.08.2006**

(51) Int Cl.:
C07D 409/12 *(2006.01)* ***C07D 333/54*** *(2006.01)*
C07D 407/12 *(2006.01)* ***C07D 413/12*** *(2006.01)*
C07D 417/12 *(2006.01)* ***A61K 31/559*** *(2006.01)*
A61P 25/00 *(2006.01)*

(86) International application number:
PCT/JP2006/317704

(87) International publication number:
WO 2007/026959 (08.03.2007 Gazette 2007/10)

(54) HETEROCYCLIC COMPOUND

HETEROZYKLISCHE VERBINDUNG

COMPOSE HETEROCYCLIQUE

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR

(30) Priority: **31.08.2005 JP 2005251055**

(43) Date of publication of application:
14.05.2008 Bulletin 2008/20

(60) Divisional application:
10188671.1 / 2 287 161
10188683.6 / 2 287 162
10188688.5 / 2 284 169

(73) Proprietor: **OTSUKA PHARMACEUTICAL CO., LTD.**
Tokyo 101-8535 (JP)

(72) Inventors:
- **YAMASHITA, Hiroshi**
  c/o OTSUKA PHARMACEUTICAL CO., LTD., Tokushima-shi
  Tokushima 771-0192 (JP)
- **MATSUBARA, Jun**
  c/o OTSUKA PHARMACEUTICAL CO., LTD.
  Tokushima-shi
  Tokushima 771-0182 (JP)
- **KURODA, Hideaki**
  c/o OTSUKA PHARMACEUTICAL CO., LTD., Tokushima-shi, Tokushima 771-0192 (JP)
- **ITO, Nobuaki**
  c/o OTSUKA PHARMACEUTICAL CO., LTD., Tokushima-shi
  Tokushima 771-0192 (JP)
- **MIYAMURA, Shin**
  c/o OTSUKA PHARMACEUTICAL CO., LTD., Tokushima-shi, Tokushima 771-0192 (JP)
- **TANAKA, Tatsuyoshi**
  c/o OTSUKA PHARMACEUTICAL CO., LTD., Tokushima-shi
  Tokushima 771-0192 (JP)
- **TAIRA, Shinichi**
  c/o OTSUKA PHARMACEUTICAL CO., LTD., Tokushima-shi
  Tokushima 771-0182 (JP)
- **FUKUSHIMA, Tae**
  c/o OTSUKA PHARMACEUTICAL CO., LTD.
  Tokushima-shi
  Tokushima 771-0192 (JP)
- **TAKAHASHI, Haruka**
  c/o OTSUKA PHARMACEUTICAL CO., LTD., Tokushima-shi
  okushima 771-0192 (JP)
- **KURODA, Takeshi**
  c/o OTSUKA PHARMACEUTICAL CO., LTD., Tokushima-shi
  Tokushima 771-0192 (JP)
- **OSHIMA, Kunio**
  c/o OTSUKA PHARMACEUTICAL CO., LTD.
  Tokushima-shi, Tokuschima 771-0192 (JP)

EP 1 919 907 B9

(74) Representative: **HOFFMANN EITLE**
Patent- und Rechtsanwälte
Arabellastrasse 4
81925 München (DE)

(56) References cited:
WO-A-2005/019215

Description

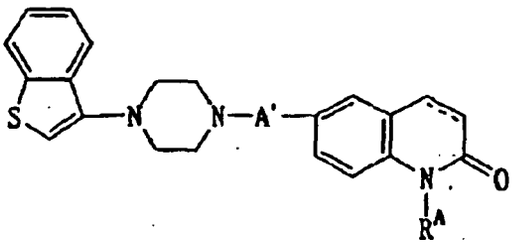
TECHNICAL FIELD

[0001] The present invention relates to a novel heterocyclic compound.

BACKGROUND ART

[0002] Since causal factor of schizophrenia as well as of bipolar disorder, mood disorders and emotional disorders is heterogeneous, it is desirable that a drug has multiple pharmacological effects so as to develop wide treatment spectrum.

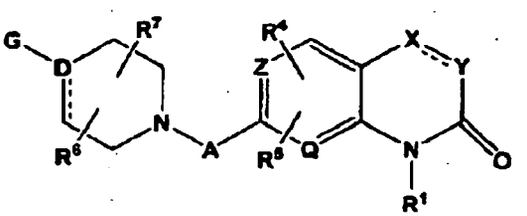
[0003] WO2004/026B69A1 discloses that a carbostyril derivative represented by the general formula:



(wherein A' represents $-(CH_2)_mCH_2-$, $-(CH_2)_mO-$, etc. ; m represents an integer of 1 to 4; and R^A represents a hydrogen atom, a C_{1-4} alkyl group which may be substituted with 1 to 3 fluorine atoms, etc.) has D_2 receptor antagonist activity and serotonin 2A ($5\text{-}HT_{2A}$) receptor antagonist activity and it is effective for treatment of schizophrenia and other central nervous system disorders).

[0004] However, there is no description in WO2004/026864A1 that carbostyril derivatives described in the document have D_2 -receptor partial agonist activity, 5'-HT_{2A} receptor antagonist activity, α_1 receptor antagonist activity and serotonin uptake inhibitory activity together and have a wide treatment spectrum.

[0005] WO 2005/019215 A1 discloses the compounds represented by the following formula:



(wherein A is $-(CH_2)_mCH_2-$, $-(CH_2)_mO-$ or the like; m is an integer of 2 to 5; D is N, C or the like; Z and Q are independently N, C or CH, provided that at least one of Z and Q is N; X and Y are independently C, N or the like, and the bond between X and Y is a single or double bond; R^1 is hydrogen, (C_1-C_3)alkyl group or the like; R^4, R^5, R^6 and R^7 each represents hydrogen, alkyl group or the like; and G represents a group of monocyclic or bicyclic compound), which bind to dopamine D_2 receptors. WO 2005/019215 A1 teaches that some compounds disclosed therein have an activity as partial agonists of D_2 receptors or an activity as antagonists of D_2 receptors, and may be effective for the treatment of schizophrenia and other central nervous system.

[0006] However, WO 2005/019215 A1 does not specifically disclose the compounds of the present invention.

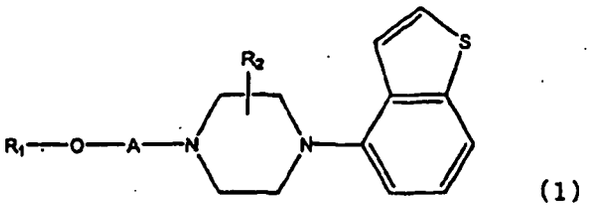
DISCLOSURE OF THE INVENTION

[0007] An object of the present invention is to provide an antipsychotic drug which has a wider treatment spectrum, less side effects and excellent tolerability and safety as compared with well-known typical and atypical antipsychotic drugs.

[0008] The present inventors have conducted intensive studies on the above-described problem and consequently succeeded in synthesizing a novel compound which has dopamine D_2 receptor partial agonist activity (D_2 receptor partial agonist activity), serotonin $5\text{-}HT_{2A}$ receptor antagonist activity ($5\text{-}HT_{2A}$ receptor antagonist activity) and adrenalin α_1

receptor antagonist activity (α_1 receptor antagonist activity) and further has serotonin uptake inhibitory effect (or serotonin reuptake inhibitory effect) together in addition to these effects. The present invention has been completed based on this finding.

[0009] There is provided a heterocyclic compound or a salt thereof represented by the formula (1):



(1)

where R^2 represents a hydrogen atom or a lower alkyl group;
A represents a lower alkylene group or a lower alkenylene group; and
R^1 represents
an aromatic group selected from a phenyl group, a naphthyl group, a dihydroindenyl group and a tetrahydronaphthyl group;
wherein at least one group selected from the group consisting of the groups (1) to (66) below may be present as a substituent on the aromatic group represented by R^1:

(1) a lower alkyl group,
(2) a lower alkenyl group,
(3) a halogen substituted lower alkyl group,
(4) a lower alkoxy group,
(5) an aryloxy group,
(6) a lower alkylthio group,
(7) a halogen substituted lower alkoxy group,
(8) a hydroxy group,
(9) a protected hydroxy group,
(10) a hydroxy lower alkyl group,
(11) a protected hydroxy lower alkyl group,
(12) a halogen atom,
(13) a cyano group,
(14) an aryl group,
(15) a nitro group,
(16) an amino group,
(17) an amino group having a group(s) selected from the group consisting of a lower alkyl group, a lower alkanoyl group, a lower alkoxycarbonyl group, a lower alkylsulfonyl group, a carbamoyl group, a lower alkyl carbamoyl group, an amino lower alkanoyl group, a lower alkanoylamino lower alkanoyl group and a lower alkoxy carbonylamino lower alkanoyl group as a substituent,
(18) a lower alkanoyl group,
(19) an arylsulfonyl group that may have a lower alkyl group(s) on the aryl group,
(20) a carboxy group,
(21) a lower alkoxycarbonyl group,
(22) a carboxy lower alkyl group,
(23) a lower alkoxycarbonyl lower alkyl group,
(24) a lower alkanoylamino lower alkanoyl group,
(25) a carboxy lower alkenyl group,
(26) a lower alkoxycarbonyl lower alkenyl group,
(27) a carbamoyl lower alkenyl group that may have a group(s) selected from the group consisting of a lower alkyl group and a halogen substituted lower alkyl group as a substituent,
(28) a carbamoyl group that may have a group(s) selected from the group consisting of the groups (i) to (lxxviii) below as a substituent:

(i) a lower alkyl group,

(ii) a lower alkoxy group,
(iii) a hydroxy lower alkyl group,
(iv) a lower alkoxy lower alkyl group,
(v) an aryloxy lower alkyl group,
(vi) a halogen substituted lower alkyl group,
(vii) an amino lower alkyl group that may have a group(s) selected from the group consisting of a lower alkyl group, a lower alkanoyl group, an aroyl group and a carbamoyl group,
(viii) a cyclo C3-C8 alkyl group that may have a group(s) selected from the group consisting of a lower alkyl group, a hydroxy group, a lower alkoxycarbonyl group and a phenyl lower alkoxy group as a substituent,
(ix) a cyclo C3-C8 alkyl substituted lower alkyl group,
(x) a lower alkenyl group,
(xi) a carbamoyl lower alkyl group that may have a group(s) selected from the group consisting of a lower alkyl group, phenyl group that may have a lower alkyl group(s) and a phenyl group(s) that may have a lower alkoxy group(s) as a substituent,
(xii) a lower alkoxycarbonyl lower alkyl group,
(xiii) a furyl lower alkyl group (that may have a lower alkyl group(s) as a substituent) on the furyl group,
(xiv) a tetrahydrofuryl lower alkyl group,
(xv) a 1,3-dioxolanyl lower alkyl group,
(xvi) a tetrahydropyranyl lower alkyl group,
(xvii) a pyrrolyl lower alkyl group (that may have a lower alkyl group(s) as a substituent on the pyrrolyl group),
(xviii) a lower alkyl group substituted with a dihydropyrazolyl group that may have an oxo group(s),
(xix) a pyrazolyl lower alkyl group (that may have a lower alkyl group(s) as a substituent on the pyrazolyl group),
(xx) an imidazolyl lower alkyl group,
(xxi) a pyridyl lower alkyl group,
(xxii) a pyrazinyl lower alkyl group (that may have a lower alkyl group(s) as a substituent on the pyrazinyl group),
(xxiii) a pyrrolidinyl lower alkyl group (that may have a group(s) selected from the group consisting of an oxo group(s) and a lower alkyl group as a substituent on the pyrrolidinyl group),
(xxiv) a piperidyl lower alkyl group (that may have a group(s) selected from the group consisting of a benzoyl group and a lower alkanoyl group as a substituent on the piperidyl group),
(xxv) a piperazinyl lower alkyl group (that may have a lower alkyl group(s) as a substituent on the piperazinyl group),
(xxvi) a morpholinyl lower alkyl group,
(xxvii) a thienyl lower alkyl group (that may have a lower alkyl group(s) as a substituent on the thienyl group),
(xxviii) a thiazolyl lower alkyl group,
(xxix) a dihydrobenzofuryl lower alkyl group,
(xxx) a benzopyranyl lower alkyl group (that may have an oxo group(s) as a substituent on the benzopyranyl group),
(xxxi) a benzimidazolyl lower alkyl group,
(xxxii) an indolyl lower alkyl group that may have a lower alkoxycarbonyl group(s) on the lower alkyl group),
(xxxiii) an imidazolyl lower alkyl group that has a substituent(s) selected from the group consisting of a carbamoyl group and a lower alkoxycarbonyl group on the lower alkyl group,
(xxxiv) a pyridyl group that may have a group(s) selected from the group consisting of a lower alkyl group, a lower alkoxy group and a lower alkylthio lower alkyl group as a substituent,
(xxxv) a pyrrolidinyl group that may have a group(s) selected from the group consisting of a lower alkyl group, a lower alkoxycarbonyl group, a lower alkanoyl group and an aroyl group as a substituent,
(xxxvi) a piperidyl group that may have a group(s) selected from the group consisting of a lower alkyl group, a lower alkoxycarbonyl group, a lower alkanoyl group and an aroyl group that may have a group(s) selected from the group consisting of a lower alkyl group and a halogen atom as a substituent,
(xxxvii) a tetrahydrofuryl group that may have an oxo group(s),
(xxxviii) a hexahydroazepinyl group that may have an oxo group(s),
(xxxix) a pyrazolyl group that may have a group(s) selected from the group consisting of a lower alkyl group, an aryl group and a furyl group as a substituent,
(xl) a thiazolyl group,
(xli) a thiadiazolyl group that may have a lower alkyl group(s),
(xlii) an isoxazolyl group that may have a lower alkyl group(s),
(xliii) an indazolyl group,
(xliv) an indolyl group,
(xlv) a tetrahydrobenzothiazolyl group,

(xlvi) a tetrahydroquinolyl group that may have a group(s) selected from the group consisting of a lower alkyl group, a lower alkoxy group, a halogen atom and an oxo group as a substituent,
(xlvii) a quinolyl group that may have a lower alkyl group(s),
(xlviii) a benzodioxolyl lower alkyl group,
(xlix) an aryl group that may have a group(s) as a substituent, selected from the group consisting of a halogen atom; a lower alkyl group; a lower alkoxy group; a halogen substituted lower alkyl group; a halogen substituted lower alkoxy group; a lower alkenyl group; an amino group that may have a group(s) selected from the group consisting of a lower alkanoyl group, a lower alkyl sulfonyl group, a lower alkyl group and an aryl group; a sulfamoyl group; a lower alkylthio group; a lower alkanoyl group; a lower alkoxycarbonyl group; a pyrrolyl group; a lower alkynyl group; a cyano group; a nitro group; an aryloxy group; an aryl lower alkoxy group; a hydroxy group; a hydroxy lower alkyl group; a carbamoyl group that may have a group(s) selected from the group consisting of a lower alkyl group and an aryl group; a pyrazolyl group; a pyrrolidinyl group that may have an oxo group(s); an oxazolyl group; an imidazolyl group that may have a lower alkyl group(s); a dihydrofuryl group that may have an oxo group(s); a thiazolidinyl lower alkyl group that may have an oxo group(s); an imidazolyl lower alkanoyl group and a piperidinylcarbonyl group,
(l) a cyano lower alkyl group,
(li) a dihydroquinolyl group that may have a group(s) selected from the group consisting of a lower alkyl group and an oxo group,
(lii) a halogen substituted lower alkylamino group,
(liii) a lower alkylthio lower alkyl group,
(liv) an amidino group that may have a lower alkyl group(s),
(lv) an amidino lower alkyl group,
(lvi) a lower alkenyloxy lower alkyl group,
(lvii) an arylamino group that may have a substituent(s) selected from the group consisting of a lower alkyl group, a lower alkoxy group, a halogen substituted lower alkyl group and a halogen substituted lower alkoxy group, on the aryl group,
(lviii) an aryl lower alkenyl group,
(lix) a pyridylamino group that may have a lower alkyl group(s),
(lx) an aryl lower alkyl group (that may have on the aryl group and/or the lower alkyl group a group(s) selected from the group consisting of a halogen atom, a lower alkyl group, a halogen substituted lower alkyl group, a halogen substituted lower alkoxy group, a lower alkoxy group, a carbamoyl group and a lower alkoxycarbonyl group as a substituent),
(lxi) a lower alkynyl group,
(lxii) an aryloxy lower alkyl group (that may have as a substituent on the aryl group a group(s) selected from the group consisting of a lower alkoxy group; a carbamoyl group that may have a group(s) selected from the group consisting of a lower alkoxy group and a lower alkyl group; and a pyrrolidinyl group that may have an oxo group(s)),
(lxiii) an isoxazolidinyl group that may have an oxo group(s),
(lxiv) a dihydroindenyl group,
(lxv) an aryl lower alkoxy lower alkyl group,
(lxvi) a tetrahydropyranyl group,
(lxvii) an azetidinyl group that may have a group(s) selected from the group consisting of a lower alkanoyl group and an aroyl group,
(lxviii) an azetidinyl lower alkyl group that may have a group(s) selected from the group consisting of a lower alkanoyl group and aroyl group,
(lxix) a tetrazolyl group,
(lxx) an indolinyl group that may have an oxo group(s),
(lxxi) a triazolyl group that may have a group(s) selected from the group consisting of a lower alkyl group and a lower alkylthio group,
(lxxii) an imidazolyl group that may have a carbamoyl group(s),
(lxxiii) an oxazolyl group that may have a lower alkyl group(s),
(lxxiv) an isothiazolyl group that may have a lower alkyl group(s),
(lxxv) a benzimidazolyl group,
(lxxvi) a dihydrobenzothiazolyl group that may have an oxo group(s),
(lxxvii) a thienyl group that may have a lower alkoxycarbonyl group(s), and
(lxxviii) an oxazolyl lower alkyl group that may have a lower alkyl group(s)

(29) an amino lower alkyl group that may have a group(s) selected from the group consisting of a lower alkyl group,

a halogen substituted lower alkyl group, a lower alkoxycarbonyl group, a lower alkanoyl group, an aryl group, an aryl lower alkyl group, an aroyl group and an amino substituted alkyl group (that may have a lower alkyl group(s) as a substituent on the amino group) on the amino group,

(30) a lower alkyl group substituted with a carbamoyl group that may have a group(s) selected from the group consisting of a lower alkyl group and a halogen substituted lower alkyl group,

(31) a thiocarbamoyl group that may have a lower alkyl group(s),

(32) a sulfamoyl group,

(33) an oxazolidinyl group that may have an oxo group(s),

(34) an imidazolidinyl group that may have a substituent(s) selected from the group consisting of an oxo group and a lower alkyl group,

(35) a pyrrolidinyl group that may have an oxo group(s),

(36) an imidazolyl group,

(37) a triazolyl group,

(38) an isoxazolyl group,

(39) a piperidyl group that may have a substituent(s) selected from the group consisting of a lower alkyl group, a lower alkanoyl group, an arylsulfonyl group, an oxo group, a hydroxy group, and an amino group that may have a group(s) selected from the group consisting of a lower alkyl group, a lower alkanoyl group, a lower alkoxycarbonyl group and a lower alkanoylamino lower alkanoyl group,

(40) a piperidylcarbonyl group that may have a substituent(s) selected from the group consisting of a lower alkyl group, a hydroxy group, a hydroxy lower alkyl group, a lower alkanoyl group, a carboxy lower alkyl group, a lower alkyl carbamoyl lower alkyl group, a carbamoyl group, a lower alkoxy group, a carboxy group, a lower alkoxycarbonyl group, an amino group (on which 1 to 2 groups selected from the group consisting of a lower alkyl group, a lower alkanoyl group, a lower alkoxycarbonyl group and an aroyl group may be present), a piperidyl group (on which a group(s) selected from the group consisting of a lower alkanoyl group, a lower alkoxycarbonyl group and an aroyl group may be present), piperazinyl group (on which a lower alkyl group(s) may be present as a substituent), a 1,4-dioxa-8-azaspiro[4.5]decyl group, a morpholinyl group, a hexahydro-1,4-diazepinyl group (on which a lower alkyl group(s) may be present as a substituent), a pyridyl group, a pyridyloxy group, a pyridyl lower alkoxy group, a tetrahydroquinolyl group (on which an oxo group(s) may be present), a benzodioxolyl group, an aryl lower alkoxy group (that may have a group(s) selected from the group consisting of a halogen atom, a lower alkyl group, a lower alkoxy group and a halogen substituted lower alkoxy group on the aryl group), an aryl group (on which a group(s) selected from the group consisting of a halogen atom, a lower alkoxy group, a hydroxy group may be present), an aryloxy group (that may have on the aryl group a group(s) selected from the group consisting of a cyano group, a halogen atom, a lower alkyl group, a lower alkoxy group and a halogen substituted lower alkyl group), an aryl lower alkyl group (that may have on the aryl group a group(s) selected from the group consisting of a halogen atom, a lower alkyl group, a lower alkoxy group and a halogen substituted lower alkyl group), and an aroyl group (that may have on the aryl group a group(s) selected from the group consisting of a halogen atom and a lower alkoxy group),

(41) a pyrrolidinylcarbonyl group that may have a group as a substituent, selected from the group consisting of a hydroxy lower alkyl group, a carbamoyl group, a hydroxy group, an amino group (that may have on the amino group a group(s) selected from the group consisting of a lower alkyl group, a lower alkanoyl group and an aroyl group), a morpholinyl lower alkyl group, a pyrrolidinyl lower alkyl group, a piperidyl lower alkyl group, a piperazinyl lower alkyl group (that may have a lower alkyl group(s) as a substituent on the piperazinyl group), an amino lower alkyl group (that may have a lower alkyl group(s) as a substituent on the amino group), an aryloxy group (that may have a halogen substituted lower alkoxy group(s) on the aryl group), an aryloxy lower alkyl group (that may have a halogen substituted lower alkoxy group(s) on the aryl group) and a tetrahydroquinolyl group (on which an oxo group(s) may be present),

(42) a piperazinylcarbonyl group that may have a group(s) as a substituent, selected from the group consisting of a lower alkyl group, a cyclo C3-C8 alkyl group, a lower alkanoyl group, a hydroxy lower alkyl group, a lower alkoxy lower alkyl group, a lower alkoxycarbonyl group, an amino lower alkyl group (that may have a lower alkyl group(s) as a substituent on the amino group), a piperidyl lower alkyl group (that may have a lower alkyl group(s) as a substituent on the piperidyl group), a morpholinyl lower alkyl group, a pyrrolidinyl lower alkyl group, a 1,3-dioxolanyl lower alkyl group, a tetrahydrofuryl lower alkyl group, a pyridyl lower alkyl group (that may have a phenyl group(s) as a substituent on the lower alkyl group), an imidazolyl lower alkyl group, a furyl lower alkyl group, a pyrrolidinyl-carbonyl lower alkyl group, a piperidyl group that may have a lower alkyl group(s) as a substituent, pyridyl group (that may have on the pyridyl group a group(s) selected from the group consisting of a lower alkyl group, a cyano group and a halogen substituted lower alkyl group as a substituent), a thieno[2,3-b]pyridyl group, an aryl group (on which a group(s) selected from the group consisting of a halogen atom and a lower alkyl group may be present), an aroyl group, a furyl carbonyl group, an aryl lower alkoxycarbonyl group and an oxo group,

(43) a hexahydroazepinylcarbonyl group,

(44) a hexahydro-1,4-diazepinylcarbonyl group that may have a substituent(s) selected from the group consisting of a lower alkyl group and a pyridyl group,
(45) a dihydropyrrolylcarbonyl group that may have a lower alkyl group(s),
(46) a thiomorpholinylcarbonyl group,
(47) a morpholinylcarbonyl group that may have a group(s) selected from the group consisting of a lower alkyl group, a piperidyl lower alkyl group and an aryl group,
(48) a thiazolidinyl carbonyl group that may have an aryl group(s) that may have a group(s) selected from the group consisting of a lower alkoxy group and a cyano group,
(49) an azabicyclo[3.2.2]nonylcarbonyl group,
(50) an 8-azabicyclo[3.2.1]octylcarbonyl group that may have a halogen substituted or unsubstituted aryloxy group (s),
(51) an indolinylcarbonyl group,
(52) a tetrahydroquinolylcarbonyl group,
(53) a tetrahydropyrido[3.4-b]indolylcarbonyl group,
(54) a morpholinyl lower alkyl group,
(55) a piperazinyl lower alkyl group that may have a lower alkyl group(s) on the piperazinyl group,
(56) a morpholinylcarbonyl lower alkyl group,
(57) a piperazinylcarbonyl lower alkyl group that may have a lower alkyl group(s) on the piperazinyl group,
(58) an oxo group,
(59) an amino lower alkoxy group (that may have a lower alkyl group(s) on the amino group),
(60) a lower alkoxy lower alkoxy group,
(61) a piperazinyl group that may have a group(s) selected from the group consisting of an oxo group, a lower alkyl group, a lower alkanoyl group and a lower alkoxycarbonyl group,
(62) a morpholinyl group,
(63) a 1,3,8-triazaspiro[4.5]decanylcarbonyl group that may have a group(s) selected from the group consisting of an oxo group and an aryl group,
(64) a tetrahydropyridylcarbonyl group that may have a pyridyl group(s),
(65) an imidazolidinylcarbonyl group that may have a thioxo group(s), and
(66) a 1,4-dioxa-8-azaspiro[4.5]decanyl group.

[0010] The present invention also provides a pharmaceutical composition comprising a heterocyclic compound of the general formula (1) or a salt thereof according to the present invention, as an active ingredient and a pharmaceutically acceptable carrier.

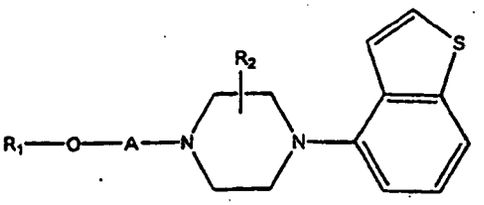
[0011] The heterocyclic compound of the general formula (1) and the pharmaceutical composition according to the present invention can be used as a pharmaceutical composition for treating or preventing central nervous system disorders selected from the group consisting of schizophrenia; refractory, intractable or chronic schizophrenia; emotional disturbance; psychotic disorder; mood disorder; bipolar I type disorder; bipolar II type disorder; depression; endogenous; = depression; major depression; melancholy and refractory depression; dysthymic disorder; cyclothymic disorder; panic attack; panic disorder; agoraphobia; social phobia; obsessive-compulsive disorder; post-traumatic stress disorder; generalized anxiety disorder; acute stress disorder; hysteria; somatization disorder; conversion disorder; pain.disorder; hypochondriasis; factitious disorder; dissociative disorder; sexual dysfunction; sexual desire disorder; sexual arousal disorder; erectile dysfunction; anorexia nervosa; bulimia nervosa; sleep disorder; adjustment disorder; alcohol abuse; alcohol intoxication; drug addiction; stimulant intoxication; narcotism; anhedonia; iatrogenic anhedonia; anhedonia of a psychic or mental cause; anhedonia associated with depression; anhedonia associated with schizophrenia; delirium; cognitive impairment; cognitive impairment associated with Alzheimer's disease, Parkinson's disease and other neurodegenerative diseases; cognitive impairment caused by Alzheimer's disease; Parkinson's disease and associated neurodegenerative diseases; cognitive impairment of schizophrenia; cognitive impairment caused by refractory, intractable or chronic schizophrenia; vomiting; motion sickness; obesity; migraine; pain (ache); mental retardation; autism disorder (autism); Tourette's disorder; tic disorder; attention-deficit/hyperactivity disorder; conduct disorder; and Down's syndrome.

[0012] The present invention provides a process for producing a pharmaceutical composition comprising mixing a heterocyclic compound represented by the formula (1) or a salt thereof with a pharmaceutically acceptable carrier.

[0013] The present invention provides use of a heterocyclic compound represented by the formula (1) or a salt thereof as a drug.

[0014] Specifically provided is of a heterocyclic compound represented by the formula (1) or a salt thereof, as a dopamine D_2 receptor partial agonist and/or serotonin 5-HT_{2A} receptor antagonist and/or an adrenaline α_1 receptor antagonist and/or a serotonin uptake inhibitor (or a serotonin reuptake inhibitor).

[0015] The present invention provides a process for producing a heterocyclic compound represented by the formula (1):

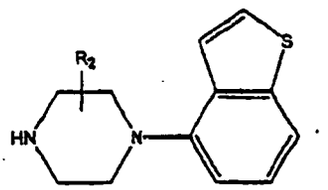


(1)

[wherein R_1, R_2 and A are the same as defined in claim 1] or a salt thereof, characterized by comprising a reaction of a compound represented by the formula:

$$R_1\text{-O-A-}X_1$$

[wherein R_1 and A are the same as defined above, and X_1 represents a halogen atom or a group which causes a substitution reaction the same as in a halogen atom] or a salt thereof with a compound represented by the formula:



[wherein R_2 is the same as defined above] or a salt thereof.

BEST MODE FOR CARRYING OUT THE INVENTION

[0016] Specific examples of each of the groups shown in the general formula (1) are as follows.

[0017] Specific examples of each of the groups shown in the general formula are as follows.

[0018] The lower alkyl group is a linear or branched alkyl group having 1 to 6 carbon atoms. Specific examples thereof include a methyl group, ethyl group, n-propyl group, isopropyl group, n-butyl group, isobutyl group, tert-butyl group, sec-butyl group, n-pentyl group, 1-ethylpropyl group, isopentyl group, neo-pentyl group, n-hexyl group, 1,2,2-trimethylpropyl group, 3,3-dimethylbutyl group, 2-ethylbutyl group, isohexyl group, and 3-methylpentyl group.

[0019] The lower alkylene group is a linear or branched alkylene group having 1 to 6 carbon atoms. Specific examples thereof include a methylene group, ethylene group, trimethylene group, 2-methyltrimethylene group, 2,2-dimethylethylene group, 2,2-dimethyltrimethylene group, 1-methyltrimethylene group, methylmethylene group, ethylmethylene group, tetramethylene group, pentamethylene group, and hexamethylene group.

[0020] The lower alkenylene group is a linear or branched alkenylene group having 1 to 3 double bonds and 2 to 6 carbon atoms. Specific examples thereof include a vinylene group, 1-propenylene group, 1-methyl-1-propenylene group, 2-methyl-1-propenylene group, 2-propenylene group, 2-butenylene group, 1-butenylene group, 3-butenylene group, 2-pentenylene group, 1-pentenylene group, 3-pentenylene group, 4-pentenylene group, 1,3-butadienylene group, 1,3-pentadienylene group, 2-penten-4-ynylene group, 2-hexenylene group, 1-hexenylene group, 5-hexenylene group, 3-hexenylene group, 4-hexenylene group, 3,3-dimethyl-1-propenylene group, 2-ethyl-1-propenylene group, 1,3;5-hexatrienylene group, 1,3-hexadienylene group, and 1,4-hexadienylene group.

[0021] The lower alkenyl group is a linear or branched alkenyl group having 1 to 3 double bonds and 2 to 6 carbon atoms, including both a trans and cis-configurations. Specific examples thereof include a vinyl group, 1-propenyl group, 2-propenyl group, 1-methyl-1-propenyl group, 2-methyl-1-propenyl group, 2-methyl-2-propenyl group, 2-propenyl group, 2-butenyl group, 1-butenyl group, 3-butenyl group, 2-pentenyl group, 1-pentenyl group, 3-pentenyl group, 4-pentenyl group, 1,3-butadienyl group, 1,3-pentadienyl group, 2-penten-4-yl group, 2-hexenyl group, 1-hexenyl group, 5-hexenyl group, 3-hexenyl group, 4-hexenyl group, 3,3-dimethyl-1-propenyl group, 2-ethyl-1-propenyl group, 1,3,5-hexatrienyl group, 1,3-hexadienyl group, and 1,4-hexadienyl group.

[0022] Examples of the halogen atom include a fluorine atom, chlorine atom, bromine atom and iodine atom.

[0023] Examples of the halogen substituted lower alkyl group include a lower alkyl group as illustrated above substituted with 1 to 7, more preferably, 1 to 3 halogen atoms. Specific examples thereof include a fluoromethyl group, difluoromethyl group, trifluoromethyl group, chloromethyl group, dichloromethyl group, trichloromethyl group, bromomethyl group, di-

bromomethyl group, dichlorofluoromethyl group, 2,2-difluoroethyl group, 2,2,2-trifluoroethyl group, pentafluoroethyl group, 2-fluoroethyl group, 2-chloroethyl group, 3,3,3-trifluoropropyl group, heptafluoropropyl group, 2,2,3,3,3-pentafluoropropyl group, heptafluoroisopropyl group, 3-chloropropyl group, 2-chloropropyl group, 3-bromopropyl group, 4,4,4-trifluorobutyl group, 4,4,4,3,3-pentafluorobutyl group, 4-chlorobutyl group, 4-bromobutyl group, 2-chlorobutyl group, 5,5,5-trifluoropentyl group, 5-chloropentyl group, 6,6,6-trifluorohexyl group, 6-chlorohexyl group, and perfluorohexyl group.

[0024] The lower alkoxy group is a linear or branched alkoxy group having 1 to 6 carbon atoms. Specific examples thereof include a methoxy group, ethoxy group, n-propoxy group, isopropoxy group, n-butoxy group, isobutoxy group, tert-butoxy group, sec-butoxy group, n-pentyloxy group, isopentyloxy group, neopentyloxy group, n-hexyloxy group, isohexyloxy group, and 3-methylpentyloxy group.

[0025] Examples of the aryl group include a phenyl group, substituted phenyl group, biphenyl group, substituted biphenyl group, naphthyl group, and substituted naphthyl group. Examples of the substituent for an aryl group include a lower alkyl group as illustrated above (a linear or branched lower alkyl group having 1 to 6 carbon atoms), a halogen atom as illustrated above, and an amino group. On the aryl group, 1 to 7, preferably 1 to 5, more preferably, 1 to 2 substituents of at least one type of these may be present. Specific examples of the aryl group may include a phenyl group, (2-, 3-, or 4-)biphenyl group, (1- or 2-)naphthyl group, (2-, 3-, or 4-)methylphenyl group, (2-, 3-, or 4-)ethylphenyl group, (2-, 3-, or 4-)n-propylphenyl group, (2-, 3-, or 4-)n-butylphenyl group, (2-, 3-, or 4-)n-pentylphenyl group, (2-, 3-, or 4-)n-hexylphenyl group, (2-, 3-, or 4-)isobutylphenyl group, (2-, 3-, or 4-)tert-butylphenyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)methyl-2-biphenyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)methyl-3-biphenyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)methyl-4-biphenyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)ethyl-2-biphenyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-) ethyl-3-biphenyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)ethyl-4-biphenyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-propyl-2-biphenyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, -or 6'-)n-propyl-3-biphenyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-propyl-4-biphenyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-butyl-2-biphenyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-butyl-3-biphenyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-butyl-4-biphenyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-pentyl-2-biphenyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-pentyl-3-biphenyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-pentyl-4-biphenyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-hexyl-2-biphenyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-hexyl-3-biphenyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-hexyl-4-biphenyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)isobutyl-2-biphenyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)isobutyl-3-biphenyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)isobutyl-4-biphenyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)tert-butyl-2-biphenyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)tert-butyl-3-biphenyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)tert-butyl-4-biphenyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)methyl-1-naphthyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)methyl-2-naphthyl group, (2-, '3-, 4-, 5-, 6-, 7-, or 8-)ethyl-1-naphthyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)ethyl-2-naphthyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-propyl-1-naphthyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-propyl-2-naphthyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-butyl-1-naphthyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-butyl-2-naphthyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-pentyl-1-naphthyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-pentyl-2-naphthyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-) n-hexyl-1-naphthyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-hexyl-2-naphthyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)isobutyl-1-naphthyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)isobutyl-2-naphthyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)tert-butyl-1-naphthyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)tert-butyl-2-naphthyl group, (2-, 3-, or 4-)chlorophenyl group, (2-, 3-, or 4-)fluorophenyl group, (2-, 3-, or 4-) bromophenyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)chloro-1-naphthyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)chloro-2-naphthyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)fluoro-1-naphthyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)fluoro-2-naphthyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)bromo-1-naphthyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)bromo-2-naphthyl group, (2-, 3-, or 4-)aminophenyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)amino-1-naphthyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)amino-2-naphthyl group, 2,3-dimethylphenyl group, 3,4-dimethylphenyl group, 2,4-dimethylphenyl group, 2,5-dimethylphenyl group, 2,6-dimethylphenyl group, 2,4,6-trimethylphenyl group, 3,4,5-trimethylphenyl group, 2,3,4,5-tetraethylphenyl group, pentamethylphenyl group, 2,4-dimethyl-1-naphthyl group, 2,3-dimethyl-1-naphthyl group, 3,4-dimethyl-1-naphthyl group, 3,5,7-triethylnaphthyl group, 3,4,5,7-tetramethyl-1-naphthyl group, 2,3,4,5,7-pentamethyl-1-naphthyl group, 2,3,4,5,6,7-hexaethyl-1-naphthyl group, heptamethyl-1-naphthyl group, 2,3-diaminophenyl group, 2,4,6-triaminophenyl group, and 2-methyl-5-chloro-1-naphthyl group.

[0026] Examples of the aryloxy group include a phenyloxy group, substituted phenyloxy group, biphenyloxy group, substituted biphenyloxy group, naphthyloxy group, and substituted naphthyloxy group. Examples of the substituent for an aryloxy group include a lower alkyl group as illustrated above a linear or branched alkyl group having 1 to 6 carbon atoms), a halogen atom as illustrated above, and an amino group. On the aryl group, 1 to 7, preferably 1 to 5, more preferably, 1 to 2 substituents of at least one type of these may be present. Specific examples of the aryloxy groups include a phenyloxy group, (2-, 3-, or 4-)biphenyloxy group, (1- or 2-) naphthyloxy group, (2-, 3-, or 4-)methylphenyloxy group, (2-, 3-, or 4-)ethylphenyloxy group, (2-, 3-, or 4-)n-propylphenyloxy group, (2-, 3-, or 4-)n-butylphenyloxy group, (2-, 3-, or 4-)n-pentylphenyloxy group, (2-, 3-, or 4-)n-hexylphenyloxy group, (2-, 3-, or 4-)isobutylphenyloxy group, (2-, 3-, or 4-)tert-butylphenyloxy group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)methyl-2-biphenyloxy group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)methyl-3-biphenyloxy group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)methyl-4-biphenyloxy group, (3-, 4-,

5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)ethyl-2-biphenyloxy group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)ethyl-3-biphenyloxy group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)ethyl-4-biphenyloxy group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-propyl-2-biphenyloxy group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-propyl-3-biphenyloxy group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-propyl-4-biphenyloxy group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-butyl-2-biphenyloxy group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-butyl-3-biphenyloxy group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-butyl-4-biphenyloxy group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-pentyl-2-biphenyloxy group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-pentyl-3-biphenyloxy group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-pentyl-4-biphenyloxy group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-hexyl-2-biphenyloxy group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-hexyl-3-biphenyloxy group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-hexyl-4-biphenyloxy group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-) isobutyl-2-biphenyloxy group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)isobutyl-3-biphenyloxy group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)isobutyl-4-biphenyloxy group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)tert-butyl-2-biphenyloxy group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)tert-butyl-3-biphenyloxy group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)tert-butyl-4-biphenyloxy group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)methyl-1-naphthyloxy group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)methyl-2-naphthyloxy group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)ethyl-1-naphthyloxy group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)ethyl-2-naphthyloxy group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-propyl -1-naphthyloxy group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-propyl-2-naphthyloxy group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-butyl-1-naphthyloxy group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-butyl-2-naphthyloxy group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-pentyl-1-naphthyloxy group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-pentyl-2-naphthyloxy group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-hexyl-1-naphthyloxy group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-hexyl-2-naphthyloxy group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-) isobutyl-1-naphthyloxy group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)isobutyl-2-naphthyloxy group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)tert-butyl-1-naphthyloxy group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)tert-butyl-2-naphthyloxy group, (2-, 3-, or 4-)chlorophenyloxy group, (2-, 3-, or 4-)fluorophenyloxy group, (2-, 3-, or 4-)bromophenyloxy group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-) chloro-1-naphthyloxy group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)chloro-2-naphthyloxy group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)fluoro-1-naphthyloxy group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)fluoro-2-naphthyloxy group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-) bromo-1-naphthyloxy group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)bromo-2-naphthyloxy group, (2-, 3-, or 4-)aminophenyloxy group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)amino-1-naphthyloxy group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)amino-2-naphthyloxy group, 2,3-dimethylphenyloxy group, 3,4-dimethylphenyloxy group, 2,4-dimethylphenyloxy group, 2,5-dimethylphenyloxy group, 2,6-dimethylphenyloxy group, 2,4,6-trimethylphenyloxy group, 3,4,5-trimethylphenyloxy group, 2,3,4,5-tetraethylphenyloxy group, pentamethylphenyloxy group, 2,4-dimethyl-1-naphthyloxy group, 2,3-dimethyl-1-naphthyloxy group, 3,4-dimethyl-1-naphthyloxy group, 3,5,7-triethyl-1-naphthyloxy group, 3,4,5,7-tetramethyl-1-naphthyloxy group, 2,3,4,5,7-pentamethyl-1-naphthyloxy group, 2,3,4,5,6,7-hexaethyl-1-naphthyloxy group, heptamethyl-1-naphthyloxy group, 2,3-diaminophenyloxy group, 2,4,6-triaminophenyloxy group, and 2-methyl-5-chloro-1-naphthyloxy group.

[0027] The lower alkylthio group is a linear or branched alkylthio group having 1 to 6 carbon atoms. Specific examples thereof include a methylthio group, ethylthio group, n-propylthio group, isopropylthio group, n-butylthio group, tert-butylthio group, n-pentylthio group, and n-hexylthio group.

[0028] Examples of the halogen-substituted lower alkoxy group include a lower alkoxy group as illustrated above substituted with 1 to 7, preferably, 1 to 3 halogen atoms. Specific examples thereof include a fluoromethoxy group, difluoromethoxy group, trifluoromethoxy group, chloromethoxy group, dichloromethoxy group, trichloromethoxy group, bromomethoxy group, dibromomethoxy group, dichlorofluoromethoxy group, 2,2,2-trifluoroethoxy group, pentafluoroethoxy group, 2-chloroethoxy group, 3,3,3-trifluoropropoxy group, heptafluoropropoxy group, heptafluoroisopropoxy group, 3-chloropropoxy group, 2-chloropropoxy group, 3-bromopropoxy group, 4,4,4-trifluorobutoxy group, 4,4,4,3,3-pentafluorobutoxy group, 4-chlorobutoxy group, 4-bromobutoxy group, 2-chlorobutoxy group, 5,5,5-trifluoropentoxy group, 5-chloropentoxy group, 6,6,6-trifluorohexyloxy group, and 6-chlorohexyloxy group.

[0029] Examples of the protecting group of a hydroxy group include a linear or branched alkyl group having 1 to 6 carbon atoms, a lower alkanoyl group (a linear or branched alkanoyl group having 1 to 6 carbon atoms), and a phenyl lower alkyl group whose lower alkyl moiety is a linear or branched alkyl group having 1 to 6 carbon atoms.

[0030] Examples of the hydroxy group protected include a methoxy group, ethoxy group, n-propoxy group, isopropoxy group, n-butoxy group, isobutoxy group, tert-butoxy group, sec-butoxy group, n-pentyloxy group, isopentyloxy group, neopentyloxy group, n-hexyloxy group, isohexyloxy group, 3-methylpentyloxy group, lower alkanoyloxy group and phenyl lower alkoxy group. Specific examples include a formyloxy group, acetyloxy group, propionyloxy group, butyryloxy group, isobutyryloxy group, pentanoyloxy group, tert-butylcarbonyloxy group, hexanoyloxy group, benzyloxy group, 2-phenylethoxy group, 1-phenylethoxy group, 3-phenylpropoxy group, 4-phenylbutoxy group, 5-phenylpentyloxy group, 6-phenylhexyloxy group, 1,1-dimethyl-2-phenylethoxy group, and 2-methyl-3-phenylpropoxy group.

[0031] Examples of the hydroxy lower alkyl group include a lower alkyl group as illustrated above having 1 to 5, preferably 1 to 3 hydroxy groups (a linear or branched alkyl group having 1 to 6 carbon atoms). Specific examples thereof include a hydroxymethyl group, 2-hydroxyethyl group, 1-hydroxyethyl group, 3-hydroxypropyl group, 2,3-dihydroxypropyl group, 4-hydroxybutyl group, 3,4-dihydroxybutyl group, 1,1-dimethyl-2-hydroxyethyl group, 5-hydroxypentyl group, 6-hydroxyhexyl group, 3,3-dimethyl-3-hydroxypropyl group, 2-methyl-3-hydroxypropyl group, 2,3,4-trihydroxybutyl group, and perhydroxyhexyl group.

[0032] Example of a protecting group of a hydroxy lower alkyl group include a linear or branched alkyl group having

1 to 6 carbon atoms, a lower alkanoyl group (a linear or branched alkanoyl group having 1 to 6 carbon atoms), and a phenyl lower alkyl group whose lower alkyl moiety is a linear or branched alkyl group having 1 to 6 carbon atoms.

[0033] Examples of the hydroxy lower alkyl group protected include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 5, preferably 1 to 3 protected hydroxy groups as illustrated above (preferably a lower alkoxy group, lower alkanoyloxy group or phenyl lower alkoxy group). Specific examples thereof include a methoxymethyl group, 2-methoxyethyl group, 2-ethoxyethyl group, 2-n-propoxyethyl group, 2-isopropoxyethyl group, 2-n-butoxyethyl group, 2-isobutoxyethyl group, 2-tert-butoxyethyl group, 2-sec-butoxyethyl group, 2-n-pentyloxyethyl group, 2-isopentyloxyethyl group, 2-neopentyloxyethyl group, 2-n-hexyloxyethyl group, 2-isohexyloxyethyl group, 2-(3-methylpentyloxy)ethyl group, 2-formyloxyethyl group, 2-acetyloxyethyl group, 2-propionyloxyethyl group, 2-butyryloxyethyl group, 2-isobutyryloxyethyl group, 2-pentanoyloxyethyl group, 2-tert-butylcarbonyloxyethyl group, 2-hexanoyloxyethyl group, 2-benzyloxyethyl group, 2-(2-phenylethoxy)ethyl group, 2-(1-phenylethoxy)ethyl group, 2-(3-phenylpropoxy)ethyl group, 2-(4-phenylbutoxy)ethyl group, 2-(5-phenylpentyloxy)ethyl group, 2-(6-phenylhexyloxy)ethyl group, 2-(1,1-dimethyl-2-phenylethoxy)ethyl group, 2-(2-methyl-3-phenylpropoxy)ethyl group, 3-ethoxypropyl group, 2,3-diethoxypropyl group, 4-ethoxybutyl group, 3,4-diethoxybutyl group, 1,1-dimethyl-2-ethoxyethyl group, 5-ethoxypentyl group, 6-ethoxyhexyl group, 3,3-dimethyl-3-ethoxypropyl group, 2-methyl-3-ethoxypropyl group, and 2,3,4-triethoxybutyl group.

[0034] The lower alkanoyl group is a linear or branched alkanoyl group having 1 to 6 carbon atoms. Specific examples thereof include a formyl group, acetyl group, propionyl group, butyryl group, isobutyryl group, pentanoyl group, tert-butylcarbonyl group, and hexanoyl group.

[0035] The lower alkoxycarbonyl group is a linear or branched alkoxycarbonyl group whose lower alkoxy moiety is one as illustrated above, and has 1 to 6 carbon atoms. Specific examples thereof include a methoxycarbonyl group, ethoxycarbonyl group, n-propoxycarbonyl group, isopropoxycarbonyl group, n-butoxycarbonyl group, isobutoxy carbonyl group, tert-butoxycarbonyl group, sec-butoxycarbonyl group, n-pentyloxycarbonyl group, neopentyloxy group, n-hexyloxycarbonyl group, isohexyloxycarbonyl group, and 3-methylpentyloxycarbonyl group.

[0036] The lower alkylsulfonyl group is a linear or branched alkylsulfonyl group whose lower alkyl moiety is one as illustrated above, and has 1 to 6 carbon atoms. Specific examples thereof include a methylsulfonyl group, ethylsulfonyl group, n-propylsulfonyl group, isopropylsulfonyl group, n-butylsulfonyl group, isobutylsulfonyl group, tert-butylsulfonyl group, sec-butylsulfonyl group, n-pentylsulfonyl group, isopentylsulfonyl group, neopentylsulfonyl group, n-hexylsulfonyl group, isohexylsulfonyl group, and 3-methylpentylsulfonyl group.

[0037] The lower alkylcarbamoyl group is a carbamoyl group having 1 to 2 lower alkyl groups as illustrated above (linear or branched alkyl groups having 1 to 6 carbon atoms) as a substituent(s). Specific examples thereof include a N-methylcarbamoyl group, N,N-dimethylcarbamoyl group, N-ethylcarbamoyl group, N,N-diethylcarbamoyl group, N-n-propylcarbamoyl group, N-n-butylcarbamoyl group, N-n-pentylcarbamoyl group, N-n-hexylcarbamoyl group, N-isobutylcarbamoyl group, N-tert-butylcarbamoyl group, and N,N-di-n-propylcarbamoyl group.

[0038] Examples of the aminoalkanoyl group include a lower alkanoyl group as illustrated above (a linear or branched alkanoyl group having 1 to 6 carbon atoms) having 1 to 3 (preferably 1) amino groups. Specific examples thereof include an aminoacetyl group, 3-aminopropionyl group, 4-aminobutyryl group, 3,4-diaminobutyryl group, 3,3-dimethyl-3-aminopropionyl group, 4-aminobutyryl group and 5-aminovaleryl group.

[0039] Examples of the lower alkanoyl amino lower alkanoyl group include a lower alkanoyl group as illustrated above (a linear or branched alkanoyl group having 1 to 6 carbon atoms) whose lower alkanoyl moiety has 1 to 3 (preferably 1) lower alkanoylamino groups as illustrated above. Specific examples thereof include an N-formylaminoacetyl group, N-acetylaminoacetyl group, N-propionylaminoacetyl group, 3-(N-acetylamino)propionyl group, 4-(N-acetylamino)butyryl group, 3,4-di(N-acetylamino)butyryl group, 3,3-dimethyl-3-(N-propinylamino)propionyl group, 4-(N-formylamino)butyryl group, and 5-(N-acetylamino)valeryl group.

[0040] Examples of the lower alkoxy carbonylamino lower alkanoyl group include a lower alkanoyl group as illustrated above (a linear or branched alkanoyl group having 1 to 6 carbon atoms) whose lower alkoxycarbonyl moiety has 1 to 3 (preferably 1) lower alkoxy carbonylamino groups as illustrated above. Specific examples thereof include an N-methoxycarbonylaminoacetyl group, N-ethoxycarbonylaminoacetyl group, N-tert-butoxycarbonylaminoacetyl group, 3-(N-methoxycarbonylamino)propionyl group, 4-(N-acetylamino)butyryl group, 3,4-di(N-acetylamino)butyryl group, 3,3-dimethyl-3-(N-propinylamino)propionyl group, 4-(N-formylamino)butyryl group and 5-(N-acetylamino)valeryl group. Examples of the amino group having, as a substituent, a group selected from the group consisting of a lower alkyl group, lower alkanoyl group, lower alkoxycarbonyl group, lower alkylsulfonyl group, carbamoyl group, lower alkylcarbamoyl group, amino lower alkanoyl group, lower alkanoylamino lower alkanoyl group, and lower alkoxycarbonylamino lower alkanoyl group include an amino group having, as a substituent, 1 to 2 groups selected from the group consisting of

a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);
a lower alkanoyl group as illustrated above (preferably a linear or branched alkanoyl group having 1 to 6 carbon atoms);
a lower alkoxycarbonyl group as illustrated above ;
a lower alkylsulfonyl group as illustrated above (a linear or branched alkylsulfonyl group having 1 to 6 carbon atoms);

a carbamoyl group;
a lower alkylcarbamoyl group as illustrated above (preferably a carbamoyl group having, as a substituent, 1 to 2 lower alkyl groups as illustrated above (linear or branched alkyl groups having 1 to 6 carbon atoms)); an amino lower alkanoyl group as illustrated above; a lower alkanoylamino lower alkanoyl group as illustrated above; and a lower alkoxycarbonylamino lower alkanoyl group as illustrated above. Specific examples thereof include an amino group, N-methylamino group, N,N-dimethylamino group, N-ethylamino group, N-n-propylamino group, N-isopropylamino group, N-formylamino group, N-acetylamino group, N-tert-butoxycarbonylamino group, N-methoxycarbonylamino group, N-methylsulfonylamino group, N-ethylsulfonylamino group, N-methyl-N-acetylamino group, N-methyl-N-methoxycarbonylamino group, N-[N,N-dimethylcarbamoyl]amino group, N-carbamoylamino group, N-[N-methylcarbamoyl]amino group, N-[N,N-diethylcarbamoyl]amino group, N-(aminoacetyl]amino group, N-[[N-formylamino]acetyl]amino group, N-[[N-acetylamino]acetyl]amino group, N-([N-methoxycarbonylamino]acetyl]amino group, and N-[(N-tert-butoxycarbonylamino]acetyl]amino group.

[0041] Examples of the arylsulfonyl group that may have a lower alkyl group on an aryl group include an arylsulfonyl group whose aryl moiety is phenyl, biphenyl, naphthyl or the like and on which 1 to 7, preferably 1 to 5, more preferably, 1 to 2 linear or branched alkyl groups having 1 to 6 carbon atoms. Specific examples of the arylsulfonyl group that may have a lower alkyl group on an aryl group include a phenylsulfonyl group, (2-, 3-, or 4-)biphenylsulfonyl group, (1- or 2-)naphthylsulfonyl group, (2-, 3-, or 4-)methylphenylsulfonyl group, (2-, 3-, or 4-)ethylphenylsulfonyl group, (2-, 3-, or 4-)n-propylphenylsulfonyl group, (2-, 3-, or 4-)n-butylphenylsulfonyl group, (2-, 3-, or 4-)n-pentylphenylsulfonyl group, (2-, 3-, or 4-)n-hexylphenylsulfonyl group, (2-, 3-, or 4-)isobutylphenylsulfonyl group, (2-, 3-, or 4-)tert-butylphenylsulfonyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)methyl-2-biphenylsulfonyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)methyl-3-biphenylsulfonyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)methyl-4-biphenylsulfonyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)ethyl-2-biphenylsulfonyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)ethyl-3-biphenylsulfonyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)methyl-4-biphenylsulfonyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-propyl-2-biphenylsulfonyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-propyl-3-biphenylsulfonyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-propyl-4-biphenylsulfonyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-butyl-2-biphenylsulfonyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-butyl-3-biphenylsulfonyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-butyl-4-biphenylsulfonyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-pentyl-2-biphenylsulfonyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-pentyl-3-biphenylsulfonyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-) n-pentyl-4-biphenylsulfonyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-hexyl-2-biphenylsulfonyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-hexyl-3-biphenylsulfonyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-hexyl-4-biphenylsulfonyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)isobutyl-2-biphenylsulfonyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)isobutyl-3-biphenylsulfonyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)isobutyl-4-biphenylsulfonyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)tert-butyl-2-biphenylsulfonyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)tert-butyl-3-biphenylsulfonyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)tert-butyl-4-biphenylsulfonyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)methyl-1-naphthylsulfonyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)methyl-2-naphthylsulfonyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)ethyl-l-naphthylsulfonyl croup, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)ethyl-2-naphthylsulfonyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-propyl-1-naphthylsulfonyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-propyl-2-naphthylsulfonyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-butyl-1-naphthylsulfonyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-butyl-2-naphthylsulfonyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-) n-pentyl-1-naphthylsulfonyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-pentyl-2-naphthylsulfonyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-hexyl-1-naphthylsulfonyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-hexyl-2-naphthylsulfonyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)isobutyl-1-naphthylsulfonyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)isobutyl-2-naphthylsulfonyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)tert-butyl-1-naphthylsulfonyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)tert-butyl-2-naphthylsulfonyl group, 2,3-dimethylphenylsulfonyl group, 3,4-dimethylphenylsulfonyl group, 2,4-dimethylphenylsulfonyl group, 2,5-dimethylphenylsulfonyl group, 2,6-dimethylphenylsulfonyl group, 2,4,6-trimethylphenylsulfonyl group, 3,4,5-trimethylphenylsulfonyl group, 2,3,4,5-tetraethylphenylsulfonyl group, pentamethylphenylsulfonyl group, 2,4-dimethyl-1-naphthylsulfonyl group, 2,3-dimethyl-l-naphthylsulfonyl group, 3,4-dimethyl-1-naphthylsulfonyl group, 3,5,7-triethyl-1-naphthylsulfonyl group, 3,4,5,7-tetramethyl-1-naphthylsulfonyl group, 2,3,4,5,7-pentamethyl-1-naphthylsulfonyl group, 2,3,4,5,6,7-hexaethyl-1-naphthylsulfonyl group, and heptamethyl-1-naphthylsulfonyl group.

[0042] Examples of a carboxyl lower alkyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 3 (preferably 1) carboxyl groups. Specific examples thereof include carboxymethyl group, 2-carboxyethyl group, 1-carboxyethyl group, 1-carboxy-l-methylethyl group, 3-carboxypropyl group, 2,3-dicarboxypropyl group, 4-carboxybutyl group, 3,4-dicarboxybutyl group, 1,1-dimethyl-2-carboxyethyl group, 5-carboxypentyl group, 6-carboxyhexyl group, 3,3-dimethyl-3-carboxypropyl group, 2-methyl-3-carboxypropyl group, and 2,3,4-tricarboxybutyl group.

[0043] Examples of a lower alkoxycarbonyl lower alkyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 3 (preferably 1 to 2) lower alkoxycarbonyl groups as illustrated above. Specific examples thereof include a methoxycarbonylmethyl group, ethoxycarbonylmethyl group, 1-methoxycarbonylethyl group, 2-methoxycarbonyletnyl group, 2-ethoxycarbonylethyl group, 1-ethoxycarbonylethyl group, 3-methoxycarbonylpropyl group, 3-ethoxycarbonylpropyl group, 4-ethoxycarbonylbutyl group, 5-isopropoxycar-

bonylpentyl group, 6-n-propoxycarbonylhexyl group, 1,1-dimethyl-2-n-butoxycarbonylethyl group, 1-methyl-1-methoxycarbonylethyl group, 2-methyl-1-methoxycarbonylpropyl group, 2-methyl-3-tert-butoxycarbonylpropyl group, 3-methyl-1-methoxycarbonylbutyl group, diethoxycarbonylmethyl group, 1,2-diethoxycarbonylethyl group, 2-n-pentyloxycarbonylethyl group, and n-hexyloxycarbonylmethyl group.

[0044] Examples of the carbamoyl lower alkyl group that may have a group, as a substituent, selected from the group consisting of a lower alkyl group, a phenyl group that may have a lower alkyl group and a phenyl group that may have a lower alkoxy group include a, lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 3 (preferably 1 to 2) carbamoyl groups. The carbamoyl moiety may have 1 to 2 groups selected from the group consisting of a phenyl group that may have 1 to 3 (preferably 1) lower alkyl groups as illustrated above (linear or branched alkyl groups having 1 to 6 carbon atoms) and a phenyl group that may have 1 to 3 (preferably 1) lower alkoxy groups as illustrated above (linear or branched alkoxy groups having 1 to 6 carbon atoms). Specific examples of the carbamoyl lower alkyl group include a carbamoylmethyl group, dicarbamoylmethyl group, 2-carbamoylethyl group, 1-carbamoylethyl group, 1-carbamoyl-2-methylpropyl group, 3-carbamoylpropyl group, 4-carbamoylbutyl group, 5-carbamoylpentyl group, 6-carbamoylhexyl group, 1,1-dimethyl-2-carbamoylethyl group, 2-methyl-3-carbamoylpropyl group, N-methylcarbamoylmethyl group, N,N-dimethylcarbamoylmethyl group, N-methyl-N-ethylcarbamoylmethyl group, N-methylcarbamoylmethyl group, 2-(N-methylcarbamoyl)ethyl group, 2-(N-ethylcarbamoyl)ethyl group, N-phenylcarbamoylmethyl group, N-(2-methoxyphenyl)carbamoylmethyl group, and N-(4-methylphenyl)carbamoylmethyl group.

[0045] Examples of the carboxyl lower alkenyl group include a lower alkenyl group as illustrated above having 1 to 3, preferably 1, carboxyl groups and including both trans and cis configurations (a linear or branched alkenyl group having 1 to 3 double bonds and 2 to 6 carbon atoms). Specific examples thereof include a 2-carboxyethenyl group, 3-carboxy-2-propenyl group, 4-carboxy-2-butenyl group, 4-carboxy-3-butenyl group, 4-carboxy-1,3-butadienyl group, 5-carboxy-1,3,5-hexatrienyl group, 5-carboxy-2,4-hexadienyl group, 5-carboxy-3-pentenyl group, and 3-carboxy-1-propenyl group.

[0046] Examples of the lower alkoxycarbonyl lower alkenyl group include a lower alkenyl group as illustrated above (a linear or branched alkenyl group having 1 to 3 double bonds and 2 to 6 carbon atoms) having 1 to 3 lower alkoxycarbonyl groups as illustrated above and including both trans and cis configurations. Specific example of the lower alkoxycarbonyl lower alkenyl group include a 2-methoxycarbonylethenyl group, 2-ethoxycarbonylethenyl group, 1-ethoxycarbonylethenyl group, 3-methoxycarbonyl-2-propenyl group, 3-ethoxycarbonyl-2-propenyl group, 4-ethoxycarbonyl-2-butenyl group, 4-ethoxycarbonyl-1,3-buthadienyl group, 5-isopropoxycarbonyl-3-pentenyl group, 6-n-propoxycarbonyl-1,3,5-hexatrienyl group, 1,1-dimethyl-2-n-butoxycarbonylethenyl group, 2-methyl-3-tert-butoxycarbonyl-2-propenyl group, and 2-n-pentyloxycarbonylethenyl group.

[0047] Examples of the carbamoyl lower alkenyl group include a lower alkenyl group as illustrated above (a linear or branched alkenyl group having 2 to 6 carbon atoms and 1 to 3 double bonds) having 1 to 3, preferably 1, carbamoyl groups- Specific examples thereof include a 2-carbamoylethenyl group, 3-carbamoyl-2-propenyl group, 4-carbamoyl-2-butenyl group, 4-carbamoyl-3-butenyl group, 4-carbamoyl-1,3-butadienyl group, 5-carbamoyl-1,3,5-hexatrienyl group, 5-carbamoyl-2,4-hexadienyl group, 5-carbamoyl-3-pentenyl group, and 3-carbamoyl-1-propenyl group.

[0048] Examples of the carbamoyl lower alkenyl group that may have, as a substituent, a group selected from the group consisting of a lower alkyl group and a halogen-substituted lower alkyl group include a lower alkenyl group as illustrated above (a linear or branched alkenyl group having 1 to 3 double bonds and 2 to 6 carbon atoms) having 1 to 3, preferably 1 carbamoyl group that may have, on the carbamoyl group, 1 to 2 substituents selected from the group consisting of a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms); and a halogen-substituted lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms preferably having 1 to 7, more preferably 1 to 3 substituents of halogen atoms). Specific examples thereof include a 2-carbamoylethenyl group, 2-(N-methylcarbamoyl)ethenyl group, 2-(N-ethylcarbamoyl)ethenyl group, 2-(N,N-dimethylcarbamoyl)ethenyl group, and 2-[N-(2,2,2-trifluoroethyl)carbamoyl]ethenyl group.

[0049] Examples of the lower alkoxy lower alkyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 3, preferably 1, lower alkoxy groups as illustrated above (a linear or branched alkoxy group having 1 to 6 carbon atoms). Specific examples thereof include a methoxymethyl group, 2-methoxyethyl group, 1-ethoxyethyl group, 2-ethoxyethyl group, 2-isobutoxyethyl group, 2,2-dimethoxyethyl group, 2-methoxy-1-methylethyl group, 2-methoxy-1-ethylethyl group, 3-methoxypropyl group, 3-ethoxypropyl group, 2-isopropoxyethyl group, 3-isopropoxypropyl group, 3-n-butoxypropyl group, 4-n-propoxybutyl group, 1-methyl-3-isobutoxy propyl group, 1,1-dimethyl-2-n-pentyloxyethyl group, 5-n-hexyloxypentyl group, 6-methoxyhexyl group, 1-ethoxyisopropyl group, and 2-methyl-3-methoxypropyl group.

[0050] Examples of the aryloxy lower alkyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 3, preferably 1 aryloxy groups whose aryl moiety is phenyl, biphenyl, naphthyl or the like. Examples of a substituent for an aryl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms), a halogen atom as illustrated above, and an amino group. One to seven substituents of at least one type of these may be present on an aryl ring. Specific examples of the aryloxy lower alkyl include a phenoxymethyl group, 2-phenoxyethyl group, 2-[(1- or 2-)naphthyloxy]ethyl group, 2-[(2-, 3-, or 4-)meth-

ylphenoxy]ethyl group, 2-[(2-, 3-, or 4-)ethylphenoxy]ethyl group, 2-[(2-, 3-, or 4-)n-propylphenoxy]ethyl group, 2-[(2-, 3-, or 4-)n-butylphenoxy]ethyl group, 2-[(2-, 3-, or 4-)n-pentylphenoxy]ethyl group, 2-[(2-, 3-, or 4-)n-hexylphenoxy]ethyl group, 2-[(2-, 3-, or 4-)isobutylphenoxy]ethyl group, 2-[(2-, 3-, or 4-)tert-butylphenoxy]ethyl group, 2-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)methyl-1-naphthyloxy]ethyl group, 2-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-)methyl-2-naphthyloxy)ethyl group, 2-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)ethyl-1-naphthyloxy)ethyl group, 2-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-)ethyl-2-naphthyloxy]ethyl group, 2-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-propyl-1-naphthyloxy]ethyl group, 2-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-propyl-2-naphthyloxy]ethyl group, 2-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-butyl-l-naphthyloxy]ethyl group, 2-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-butyl-2-naphthyloxy]ethyl group, 2-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-pentyl-l-naphthyloxy]ethyl group, 2-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-pentyl-2-naphthyloxy] ethyl group, 2-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-hexyl-l-naphthyloxy]ethyl group, 2-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-hexyl-2-naphthyloxylethyl group, 2-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)isobutyl-l-naphthyloxy]ethyl group, 2-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-) isobutyl-2-naphthyloxy]ethyl group, 2-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)tert-butyl-1-naphthyloxy]ethyl group, 2-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-)tert-butyl-2-naphthyloxy]ethyl group, 2-[(2-, 3-, or 4-)chlorophenoxy]ethyl group, 2-[(2-, 3-, or 4-)fluorophenoxy]ethyl group, 2-[(2-, 3-, or 4-)bromophenoxy]ethyl group, 2-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)chloro-1-naptithyloxy]ethyl group, 2-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-)chloro-2-naphthyloxy]ethyl group, 2-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)fluoro-1-naphthyloxy] ethyl group, 2-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-)fluoro-2-naphthyloxy]ethyl group, 2-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)bromo-1-naphthyloxy]ethyl group, 2-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-)bromo-2-naphthyloxy] ethyl group, 2-[(2-, 3-, or 4-)aminophenoxy] ethyl group, 2-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)amino-1-naphthyloxy]ethyl group, 2-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-)amino-2-naphthyloxy]ethyl group, 2-(2,3-dimethylphenoxy)ethyl group, 2-(3,4-dimethylphenoxy)ethyl group, 2-(2,4-dimethylphenoxy)ethyl group, 2-(2,5-dimethylphenoxy)ethyl group, 2-(2,6-dimethylphenoxy)ethyl group, 2-(2,4,6-trimethylphenoxy) ethyl group, 2-(3,4,5-trimethylphenoxy)ethyl group, 2-(2,3,4,5-tetraethylphenoxy)ethyl group, 2-(pentamethylphenoxy) ethyl group, 2-(2,4-dimethyl-1-naphthyloxy)ethyl group, 2-(2,3-dimethyl-1-naphthyloxy)ethyl group, 2-(3,4-dimethyl-1-naphthyloxy)ethyl group, 2-(3,5,7-triethyl-1-naphthyloxy)ethyl group, 2-(3,4,5,7-tetramethyl-1-naphthyloxy)ethyl group, 2-(2,3,4,5,7-pentamethyl-1-naphthyloxy)ethyl group, 2-(2,3,4,5,6,7-hexaethyl-1-naphthyloxy)ethyl group, 2-(heptamethyl-1-naphthyloxy)ethyl group, 2-(2,3-diaminophenoxy)ethyl group, 2-(2,4,6-triaminophenoxy)ethyl group, 2-(2-methyl-5-chloro-1-naphthyl)ethyl group, 3-phenoxypropyl group, 2,3-diphenoxypropyl group, 4-phenoxybutyl group, 3,4-diphenoxybutyl group, 1,1-dimethyl-2-phenoxyethyl group, 5-phenoxypentyl group, 6-phenoxyhexyl group, 3,3-dimethyl-3-phenoxypropyl group, 2-methyl-3-phenoxypropyl group, and 2,3,4-triphenoxybutyl group, 3-[(1- or 2-)naphthyloxy]propyl group, 2,3-di[(1- or 2-)naphthyloxy]propyl group, 4-[(1- or 2-)naphthyloxy]butyl group, 3,4-di[(1- or 2-)naphthyloxy]butyl group, 1,1-dimethyl-2-[(1- or 2-)naphthyloxy]ethyl group, 5-[(1- or 2-)naphthyloxy]pentyl group, 6-[(1- or 2-)naphthyloxy] hexyl group, 3,3-dimethyl-3-[(1- or 2-)naphthyloxy]propyl group, 2-methyl-3-[(1- or 2-)naphthyloxy]propyl group, and 2,3,4-tri[(1- or 2-)naphthyloxy]butyl group.

[0051] Examples of the amino lower alkyl group that may have a group selected from the group consisting of a lower alkyl group, lower alkanoyl group, aroyl group and carbamoyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 5 (preferably 1) amino groups that may have 1 to 2 groups selected from the group consisting of a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms), lower alkanoyl group as illustrated above (a linear or branched alkanoyl group having 1 to 6 carbon atoms), aroyl group as illustrated above (preferably benzoyl group) as illustrated above and carbamoyl group. Specific examples of the amino lower alkyl group include an aminomethyl group, 2-aminoethyl group, 1-aminoethyl group, 3-aminopropyl group, 4-aminobutyl group, 5-aminopentyl group, 6-aminohexyl group, 1,1-dimethyl-2-aminoethyl group, 2-methyl-3-aminopropyl group, N,N-dimethylaminomethyl group, N-methyl-N-ethylaminomethyl group, N-methylaminomethyl group, 2-(N-methylamino)ethyl group, 1-methyl-2-(N,N-dimethylamino)ethyl group, 1-methyl-2-(N,N-diethylamino)ethyl group, 2-(N,N-dimethylamino)ethyl group, 2-(N,N-diethylamino)ethyl group, 2-(N,N-diisopropylamino) ethyl group, 3-(N,N-dimethylamino)propyl group, 3-(N,N-diethylamino)propyl group, 2-(N-acetylamino)ethyl group, 2-(N-methyl-N-acetylamino)ethyl group, 2-(N-methyl-N-n-butyrylamino)ethyl group, 2-(N-methyl-N-benzoylamino)ethyl group, and 2-.(N-carbamoylamino)ethyl group.

[0052] Examples of the cyclo C3-C8 alkyl group include a cyclopropyl group, cyclobutyl group, cyclopentyl group, cyclohexyl group, cycloheptyl group, and cyclooctyl group.

[0053] Examples of the cyclo C3-C8 alkyl group that may have a group, as a substituent, selected from the group consisting of a lower alkyl group, hydroxy group, lower alkoxy carbonyl group and phenyl lower alkoxy group include a cyclo C3-C8 alkyl group that may have 1 to 3 (preferably 1) groups, as a substituent(s), selected from the group consisting of

a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);
a hydroxy group;
a lower alkoxy carbonyl group as illustrated above ; and
a lower alkoxy group (a linear or branched alkoxy group having 1 to 6 carbon atoms) having 1 to 3 (preferably 1) phenyl groups. Specific examples thereof include a cyclopropyl group, cyclobutyl group, cyclopentyl group, cyclohexyl group, cycloheptyl group, cyclooctyl group, 1-methylcyclopropyl group, 1-methylcyclopentyl group, 1-methylcyclohexyl group, 2-methylcyclohexyl group, 4-hydroxycyclohexyl group, 4-methoxycarbonylcyclohexyl group, 2-benzyloxypentyl group,

and 2-benzyloxyhexyl group.

[0054] Example of the cyclo C3-C8 alkyl substituted lower alkyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 3, preferably 1 cyclo C3-C8 alkyl group as illustrated above. Specific examples thereof include a cyclopropylmethyl group, cyclohexylmethyl group, 2-cyclopropylethyl group, 1-cyclobutylethyl group, cyclopentylmethyl group, 3-cyclopentylpropyl group, 4-cyclohexylbutyl group, 5-cycloheptylpentyl group, 6-cyclooctylhexyl group, 1,1-dimethyl-2-cyclohexylethyl group, and 2-methyl-3-cyclopropylpropyl group.

[0055] Examples of the furyl lower alkyl group (that may have a substituent of a lower alkyl group on the furyl group) include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 2 (preferably 1) furyl groups on which 1 to 3 (preferably 1 to 2) lower alkyl groups as illustrated above (linear or branched alkyl groups having 1 to 6 carbon atoms) may be present as a substituent. Specific examples thereof include a [(2- or 3-)furyl]methyl group, 2-[(2- or 3-)furyl]ethyl group, 1-[(2- or 3-)furyl]ethyl group, 3-[(2- or 3-)furyl]propyl group, 4-[(2- or 3-)furyl]butyl group, 5-[(2- or 3-)furyl]pentyl group, 6-[(2- or 3-)furyl]hexyl group, 1,1-dimethyl-2-[(2- or 3-)furyl]ethyl group, 2-methyl-3-[(2- or 3-)furyl]propyl group, [5-ethyl-(2-, 3-, or 4-)furyl]methyl group, [5-methyl-(2-, 3-, or 4-)furyl]methyl group, [2-n-propyl-(3-. 4-, or 5-)furyl]methyl group, [3-tert-butyl-(2-, 4-, or 5-)furyl]methyl group, [4-n-pentyl-(2-, 3-, or 5-)furyl]methyl group, [2-n-hexyl-(3-, 4-, or 5-)furyl]methyl group, [2,5-dimethyl-(3- or 4-)furyl]methyl group, [2,5-diethyl-(3- or 4-)furyl]methyl group, and [2,4,5-triethyl-3-furyl]methyl group.

[0056] Examples of the tetrahydrofuryl lower alkyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 2 (preferably 1) tetrahydrofuryl groups. Specific examples thereof include a (2- or 3-)(2,3,4,5-tetrahydrofuryl)methyl group, 2-[(2- or 3-)(2,3,4,5-tetrahydrofuryl)]ethyl group, 1-[(2- or 3-)(2,3,4,5-tetrahydrofuryl)]ethyl group, 3-[(2- or 3-)(2,3,4,5-tetrahydrofuryl)]propyl group, 2,3-di[(2- or 3-)(2,3,4,5-tetrahydrofuryl)]propyl group, 4-[(2- or 3-)(2,3,4,5-tetrahydrofuryl)]butyl group, 3,4-di[(2- or 3-)(2;3,4,5-tetrahydrofuryl)]butyl group, 1,1-dimethyl-2-[(2- or 3-)(2,3,4,5-tetrahydrofuryl)]ethyl group, 5-[(2- or 3-)(2,3,4,5-tetrahydrofuryl)]pentyl group, 6-[(2- or 3-)(2,3,4,5-tetrahydrofuryl)]hexyl group, 3,3-dimethyl-3-[(2- or 3-)(2,3,4,5-tetrahydrofuryl)]propyl group, 2-methyl-3-[(2- or 3-)(2,3,4,5-tetrahydrofuryl)lpropyl group, and 2,3,4-tri[(2- or 3-) (2,3,4,5-tetrahydrofuryl)]butyl group.

[0057] Examples of a 1,3-dioxolanyi lower alkyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 2 (preferably 1) 1,3-dioxolanyl groups. Specific examples thereof include a [(2- or 4-)1,3-dioxolanyl]methyl group, 2-[(2- or 4-)1,3-dioxolanyl]ethyl group, 1-[(2- or 4-)1,3-dioxolanyl]ethyl group, 3-[(2- or 4-)1,3-dioxolanyl]propyl group, 4-[(2- or 4-)1,3-dioxolanyl]butyl group, 1,1-dimethyl-2-[(2- or 4-)1,3-dioxolanyl]ethyl group, 5-[(2- or 4-)1,3-dioxolanyl]pentyl group, 6-[(2- or 4-)1,3-dioxolanyl]hexyl group, 1-[(2- or 4-)1,3-dioxolanyl]isopropyl group, and 2-methyl-3-[(1-, 2-, or 4-)imidazolyl]propyl group.

[0058] Examples of the tetrahydropyranyl lower alkyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 2 (preferably 1) tetrahydropyranyl groups. Specific examples thereof include a [(2-, 3-, or 4-)tetrahydropyranyl]methyl group, 2-[(2-, 3-, or 4-)tetrahydropyranyl]ethyl group, 1-[(2-, 3-, or 4-)tetrahydropyranyl]ethyl group, 3-[(2-, 3-, or 4-)tetrahydropyranyl]propyl group, 4-[(2-, 3-, or 4-)tetrahydropyranyl]butyl group, 1,1-dimethyl-2-[(2-, 3-, or 4-)tetrahydropyranyl]ethyl group, 5-[(2-, 3-, or 4-)tetrahydropyranyl]pentyl group, 6-[(2-, 3-, or 4-)tetrahydropyranyl]hexyl group, 1-[(2-, 3-, or 4-)tetrahydropyranyl]isopropyl group, and 2-methyl-3-[(2-, 3-, or 4-)tetrahydropyranyl]propyl group.

[0059] Examples of the pyrrolyl lower alkyl group (that may have a substituent of a lower alkyl group on the pyrrolyl group) include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 2 (preferably 1) pyrrolyl groups on which 1 to 3 (preferably 1 to 2) lower alkyl groups as illustrated above (linear or branched alkyl groups having 1 to 6 carbon atoms) may be present as a substituent(s). Specific examples thereof include a [(1-, 2-, or 3-)pyrrolyl]methyl group, 2-[(1-, 2-, or 3-)pyrrolyl]ethyl group, 1-[(1-, 2-, or 3-)pyrrolyl]ethyl group, 3-[(1-, 2-, or 3-)pyrrolyl]propyl group, 4-[(1-, 2-, or 3-)pyrrolyl]butyl group, 1,1-dimethyl-2-[(1-, 2-, or 3-)pyrrolyl]ethyl group, 5-[(1-, 2-, or 3-)pyrrolyl]pentyl group, 6-[(1-, 2-, or 3-)pyrrolyl]hexyl group, 1-[(1-, 2-, or 3-)pyrrolyl]isopropyl group, 2-methyl-3-[(1-, 2-, or 3-)pyrrolyl]propyl group, [1-methyl-(2- or 3-)pyrrolyl]methyl group, [1-ethyl-(2- or 3-)pyrrolyl]methyl group, [1-n-propyl-(2- or 3-)pyrrolyl]methyl group, [1-n-butyl-(2- or 3-)pyrrolyl]methyl group, [1-n-pentyl-(2- or 3-)pyrrolyl]methyl group, [1-n-hexyl-(2- or 3-)pyrrolyl]methyl group, 2-[5-methyl-(1-, 2-, 3-, or 4-)pyrrolyl]ethyl group, 1-[1-ethyl-(2- or 3-)pyrrolyl]ethyl group, 3-[1-ethyl-(2- or 3-)pyrrolyl]propyl group, 4-[1-n-propyl-(2- or 3-)pyrrolyl]butyl group, 5-[1-n-butyl-(2- or 3-)pyrrolyl]pentyl group, 6-[1-n-pentyl-(2- or 3-)pyrrolyl]hexyl group, [1,5-dimethyl-(2-, 3-, or 4-)pyrrolyl]methyl group, [1,3,5-trimethyl-2-pyrrolyl]methyl group, and [1,2,4-trimethyl-3-pyrrolyl]methyl group.

[0060] Examples of the lower alkyl group substituted with a dihydropyrazolyl group that may have an oxo group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having a 2,3-dihydropyrazolyl group or 4,5-dihydropyrazolyl group as a dihydropyrazolyl group, on which an oxo group may be present. Specific examples thereof include a 3-(2,3- or 4,5-)dihydropyrazolylmethyl group, 2-[4-(2,3- or 4,5-)dihydropyrazolyl]ethyl group, 1-[5-(2,3- or 4,5-)dihydropyrazolyl]ethyl group, 3-[3-(2,3- or 4,5-)dihydropyrazolyl]propyl group, 4-[4-(2,3- or 4,5-)dihydropyrazolyl]butyl group, 5-[1-(2,3- or 4,5-)dihydropyrazolyl]pentyl group, 6-[5-(2,3- or 4,5-)dihydropyrazolyl]hexyl group, 2-methyl-3-[1-(2,3-or 4,5-)dihydropyrazolyl]propyl group, 1,1-dimethyl-2-[3-(2,3- or 4,5-)dihydropyrazolyl]

ethyl group, 5-oxo-4-(4,5-dihydropyrazolyl)methyl group, 2-[5-oxo-4-(4,5-dihydropyrazolyl)]ethyl group, and 3-[5-oxo-4-(4,5-dihydropyrazolyl)]propyl group.

[0061] Examples of the pyrazolyl lower alkyl group (that may have a substituent of a lower alkyl group on the pyrazolyl group) include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 2 (preferably 1) pyrazolyl groups, on which 1 to 3 (preferably 1 to 2) lower alkyl groups as illustrated above (linear or branched alkyl groups having 1 to 6 carbon atoms) may be present as a substituent(s). Specific examples thereof include a 3-pyrazolylmethyl group, 2-(4-pyrazolyl)ethyl group, 2-(1-pyrazolyl)ethyl group, 1-(5-pyrazolyl)ethyl group, 3-(3-pyrazolyl)propyl group, 4-(4-pyrazolyl)butyl group, 5-(1-pyrazolyl)pentyl group, 6-(5-pyrazolyl)hexyl group, 2-methyl-3-(1-pyrazolyl)propyl group, 1,1-dimethyl=2-(3-pyrazolyl)ethyl group, 1-methyl-3-pyrazolylmethyl group, 1-ethyl-3-pyrazolylmethyl group, 1-n-propyl-3-pyrazolylmethyl group, 1-n-butyl-3-pyrazolylmethyl group, 1-n-pentyl-3-pyrazolylmethyl group, 1-methyl-4-pyrazolylmethyl group, 5-methyl-3-pyrazolylmethyl group, 1-ethyl-4-pyrazolylmethyl group, 1-n-propyl-4-pyrazolylmethyl group, 1-n-butyl-4-pyrazolylmethyl group, 1-n-hexyl-4-pyrazolylmethyl group, 3-methyl-1-pyrazolylmethyl group, 3-ethyl-1-pyrazolylmethyl group, 3-n-propyl-1-pyrazolylmethyl group, 3-n-butyl-l-pyrazolylmethyl group, 1,5-dimethyl-3-pyrazolylmethyl group, 3,5-dimethyl-4-pyrazolylmethyl group, 3,4-dimethyl-l-pyrazolylmethyl group, 1,3-dimethyl-5-pyrazolylmethyl group, 3,4-diethyl-1-pyrazolylmethyl group, 3,4-di-n-propyl-1-pyrazolylmethyl group, 3,4-di-n-butyl-1-pyrazolylmethyl group, 1,3,5-trimethyl-4-pyrazolylmethyl group, 3,4,5-trimethyl-1-pyrazolylmethyl group, 3,4,5-triethyl-1-pyrazolylmethyl group, 3,4,5-tri-n-propyl-1-pyrazolylmethyl group, 3,4,5-tri-n-butyl-l-pyrazolylmethyl group, 1-methyl-5-pyrazolylmethyl group, 1-ethyl-5-pyrazolylmethyl group, 1-n-propyl-5-pyrazolylmethyl group, 1-n-butyl-5-pyrazolylmethyl group, 2-(3-pyrazolyl)ethyl group, 3-(3-pyrazolyl)propyl group, 4-(3-pyrazolyl)butyl group, 5-(3-pyrazolyl)pentyl group, 6-(3-pyrazolyl)hexyl group, 2-(1-(4-chlorophenyl)-3-pyrazolyl)ethyl group, 3-(1-methyl-3-pyrazolyl)propyl group, 3-(3-methyl-4-pyrazolyl)propyl group, 3-(5-methyl-4-pyrazolyl)propyl group, 3-(1,5-dimethyl-3-pyrazolyl)propyl group, 3-(1-ethyl-3-pyrazolyl)propyl group, 3-(1-n-propyl-3-pyrazolyl)propyl group, 3-(1-n-butyl-3-pyrazolyl)propyl group, 4-(1-methyl-3-pyrazolyl)butyl group, 4-(1-ethyl-3-pyrazolyl)butyl group, 4-(1-n-propyl-3-pyrazolyl)butyl group, 4-(1-n-butyl-3-pyrazolyl)butyl group, 5-(1-methyl-3-pyrazolyl)pentyl group, 5-(1-ethyl-3-pyrazolyl)pentyl group, 5-(1-n-propyl-3-pyrazolyl)pentyl group, 5-(1-n-butyl-3-pyrazolyl)pentyl group, 6-(1-methyl-3-pyrazolyl)hexyl group, 6-(1-ethyl-3-pyrazolyl)hexyl group, 6-(1-n-propyl-3-pyrazolyl)hexyl group, and 6-[1-(3-butyl)-3-pyrazolyl]hexyl group.

[0062] Examples of the imidazolyl lower alkyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 2 (preferably 1) imidazolyl groups. Specific examples thereof include a [(1-, 2-, 4- or 5-)imidazolyl]methyl group, 2-[(1-, 2-, 4- or 5-)imidazolyl]ethyl group, 1-[(1-, 2-, 4- or 5-)imidazolyl]ethyl group, 3-[(1-, 2-, 4- or 5-)imidazolyl]propyl group, 4-[(1-, 2-, 4- or 5-)imidazolyl]butyl group, 1,1-dimethyl-2-[(1-, 2-, 4-or 5-)imidazolyl]ethyl group, 5-[(1-, 2-, 4- or 5-)imidazolyl]pentyl group, 6-[(1-, 2-, 4- or 5-)imidazolyl]hexyl group, 1-[(1-, 2-, 4- or 5-)imidazolyl]isopropyl group, and 2-methyl-3-[(1-, 2-, 4- or 5-)imidazolyl]propyl group.

[0063] Examples of the pyridyl lower alkyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 2 (preferably 1) pyridyl groups. Specific examples thereof include a (2-, 3- or 4-)pyridylmethyl group, 2-[(2-, 3- or 4-)pyridyl]methyl group, 1-[(2-, 3- or 4-)pyridyl]ethyl group, 3-[(2-, 3-or 4-)pyridyl]propyl group, 4-[(2-, 3- or 4-)pyridyl]butyl group, 1,1-dimethyl-2-[(2-, 3- or 4-)pyridyl]ethyl group, 5-[(2-, 3- or 4-)pyridyl]pentyl group, 6-[(2-, 3- or 4-)pyridyl]hexyl group, 1-[(2-, 3-or 4-)pyridyl]isopropyl group, 2-methyl-3-[(2-, 3- or 4-)pyridyl]propyl group.

[0064] Examples of the pyrazinyl lower alkyl group (a lower alkyl group may be present as a substituent on the pyrazinyl group) include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 2 (preferably 1) pyrazinyl groups on which 1 to 3 (preferably 1) lower alkyl groups as illustrated above (linear or branched alkyl groups having 1 to 6 carbon atoms) may be present as a substituent(s). Specific examples thereof include a 2-pyrazinylmethyl group, 2-(2-pyrazinyl)ethyl group, 1-(2-pyrazinyl)ethyl group, 3-(2-pyrazinyl)propyl group, 4-(2-pyrazinyl)butyl group, 5-(2-pyrazinyl)pentyl group, 6-(2-pyrazinyl)hexyl group, 3-methyl-3-(2-pyrazinyl)propyl group; 1,1-dimethyl-2-(2-pyrazinyl)ethyl group, 3-methyl-2-pyrazinylmethyl group, 3-ethyl-2-pyrazinylmethyl group, 3-n-propyl-2-pyrazinylmethyl group, 3-n-butyl-2-pyrazinylmethyl group, 3-n-pentyl-2-pyrazinylmethyl group, 5-methyl-2-pyrazinylmethyl group, 5-ethyl-2-pyrazinylmethyl group, 5-n-propyl-2-pyrazinylnethyl group, 5-n-butyl-2-pyrazinylmethyl group, 6-methyl-2-pyrazinylmethyl group, 6-ethyl-2-pyrazinylmethyl group; 6-n-propyl-2-pyrazinylmethyl group, 6-n-butyl-2-pyrazinylmethyl group, 3,5-dimethyl-2-pyrazinylmethyl group, 3,5-diethyl-2-pyrazinylmethyl group, 3,5-di-n-propyl-2-pyrazinylmethyl group, 3,5-di-n-butyl-2-pyrazinylmethyl group, 2-(5-methyl-2-pyrazinyl)ethyl group, 2-(5-ethyl-2-pyrazinyl)ethyl group, 2-(5-n-propyl-2-pyrazinyl)ethyl group, 2-(5-n-butyl-2-pyrazinyl)ethyl group, 3-(5-methyl-2-pyrazinyl)propyl group, 3-(5-ethyl-2-pyrazinyl)propyl group, 3-(5-n-propyl-2-pyrazinyl)propyl group, 3-(5-n-butyl-2-pyrazinyl)propyl group, 4-(5-methyl-2-pyrazinyl)butyl group, 4-(5-ethyl-2-pyrazinyl)butyl group, 4-(5-n-propyl-2-pyrazinyl)butyl group, 4-(5-n-butyl-2-pyrazinyl)butyl group, 5-(5-methyl-2-pyrazinyl)pentyl group, 5-(5-ethyl-2-pyrazinyl)pentyl group, 5-(5-n-propyl-2-pyrazinyl)pentyl group, 5-(5-n-butyl-2-pyrazinyl)pentyl group, 6-(5-methyl-2-pyrazinyl)hexyl group, 6-(5-ethyl-2-pyrazinyl)hexyl group, 6-(5-n-propyl-2-pyrazinyl)hexyl group, and 6-(5-n-butyl-2-pyrazinyl)hexyl group.

[0065] Examples of the pyrrolidinyl lower alkyl group (a group selected from the group consisting of an oxo group and

a lower alkyl group may be present as a substituent on the pyrrolidinyl group) include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 2 (preferably 1) pyrrolidinyle groups, on which 1 to 3 (preferably 1) groups selected from the group consisting of an oxo group and a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) may be present as a substituent(s). Specific examples thereof include a [(1-, 2-, or 3-)pyrrolidinyl]methyl group, 2-[(1-, 2-, or 3-)pyrrolidinyl]ethyl group, 1-[(1-, 2-, or 3-)pyrrolidinyl]ethyl group, 3-[(1-, 2-, or 3-)pyrrolidinyl]propyl group, 4-[(1-, 2-, or 3-)pyrrolidinyl]butyl group, 5-[(1-, 2-, or 3-)pyrrolidinyl]pentyl group, 6-[(1-, 2-,' or 3-)pyrrolidinyl]hexyl group, 1-methyl-2-[(1-, 2-, or 3-)pyrrolidinyl]ethyl group, 1,1-dimethyl-2-[(1-, 2-, or 3-)pyrrolidinyl]ethyl group, 2-methyl-3-[(1-, 2-, or 3-)pyrrolidinyl)propyl group, 1-methyl-(2- or 3-)pyrrolidinylmethyl group, 1-ethyl-(2- or 3-)pyrrolidinylmethyl group, 1-n-propyl-(2- or 3-)pyrrolidinylmethyl group, 1-n-butyl-(2- or 3-)pyrrolidinylmethyl group, 1-n-pentyl-(2- or 3-)pyrrolidinylmethyl group, 1-n-hexyl-(2- or 3-)pyrrolidinylmethyl group, 2-methyl-1-pyrrolidinylmethyl group, 2-ethyl-1-pyrrolidinylmethyl group, 2-n-propyl-1-pyrrolidinylmethyl group, 2-n-butyl-1-pyrrolidinylmethyl group, 2-n-pentyl-1-pyrrolidinylmethyl group, 2-n-hexyl-1-pyrrolidinylmethyl group, 3-methyl-2-pyrrolidinylmethyl group, 3-ethyl-2-pyrrolidinylmethyl group, 3-n-propyl-2-pyrrolidinylmethyl group, 3-n-butyl-2-pyrrolidinylmethyl group, 1,5-dimethyl-(2- or 3-)pyrrolidinylmethyl group, 1,5-di-ethyl-(2- or 3-)pyrrolidinylmethyl group, 1,5-di-n-propyl-(2- or 3-)pyrrolidinylmethyl group, 1,5-di-n-butyl-(2- or 3-)pyrrolidinylmethyl group, 1,4,5-triethyl-(2- or 3-)pyrrolidinylmethyl group, 1,4,5-tri-n-propyl-(2- or 3-)pyrrolidinylmethyl group, 1,4,5-tri-n-butyl-(2- or 3-)pyrrolidinylmethyl group, 3-[2-oxo-(1-pyrrolidinyl)propyl]group, 3-(5-oxo-(2-, 3-, or 4-)pyrrolidinyl]propyl group, and 3-[1-methyl-5-oxo-(2-, 3-, or 4-)pyrrolidinyl]propyl group.

[0066] Examples of the piperidyl lower alkyl group (that may have as a substituent on the piperidyl group, a group selected from the group consisting of a benzoyl group and a lower alkanoyl group) include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 2 (preferably 1) piperidyl groups having 1 to 3 (preferably 1) groups, as a substituent(s), selected from the group consisting of a benzoyl group and a lower alkanoyl group as illustrated above (preferably a linear or branched alkyl group having 1 to 6 carbon atoms) on the piperidyl group(s). Specific examples thereof include a (1-, 2-, 3-, or 4-)piperidylmethyl group, 2-[(1-, 2-, 3-, or 4-)piperidyl] ethyl group; 2-[1-benzoyl-(2-, 3-, or 4-)piperidyl]ethyl group, 2-[1-acetyl-(2-, 3-, or 4-)piperidyl]ethyl group, 2-[1-butyryl-(2-, 3-, or 4-)piperidyl]ethyl group, 1-[(1-, 2-, 3-, or 4-)piperidyl]ethyl group, 3-[(1-, 2-, 3-, or 4-)piperidyl]propyl group, 4-[(1-, 2-, 3-, or 4-)piperidyl]butyl group, 1,1-dimethyl-2-[(1-, 2-, 3-, or 4-)piperidyl]ethyl group, 5-[(1-, 2-, 3-, or 4-)piperidyl]pentyl group, 6-[(1-, 2-, 3-, or 4-)piperidyl]hexyl group, 1-[(1-, 2-, 3-, or 4-)piperidyl]isopropyl group, and 2-methyl-3-[(1-, 2-, 3-, or 4-)piperidyl]propyl group.

[0067] Examples of the piperazinyl lower alkyl group (that may have a lower alkyl group as a substituent on the piperazinyl group) include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 2 (preferably 1) piperazinyl groups, on which 1 to 3 (preferably 1) lower alkyl groups as illustrated above (linear or branched alkyl groups having 1 to 6 carbon atoms) may be present as a substituent(s). Specific examples thereof include a 1-piperazinylmethyl group, 2-piperazinylmethyl group, 2-(1-piperazinyl)ethyl group, 2-(2-piperazinyl) ethyl group, 1-(1-piperazinyl)ethyl group, 1-(2-piperazinyl)ethyl group, 3-(1-piperazinyl)propyl group, 3-(2-piperazinyl) propyl group, 4-(1-piperazinyl)butyl group, 4-(2-piperazinyl)butyl group, 2-(4-ethyl-2-piperazinyl)ethyl group, 1-(4-n-propyl-2-piperazinyl)ethyl group, 2-(4-n-butyl-2-piperazinyl)ethyl group, 2-(4-n-pentyl-2-piperazinyl)ethyl group, 1-(4-n-hexyl-2-piperazinyl)ethyl group, 2-(5-methyl-2-piperazinyl)ethyl group, 1-(5-ethyl-2-piperazinyl)ethyl group, 2-(5-n-propyl-2-piperazinyl)ethyl group, 1-(5-n-butyl-2-piperazinyl)ethyl group, 2-(5-n-pentyl-2-piperazinyl)ethyl group, 1-(5-n-hexyl-2-piperazinyl)ethyl group, 2-(6-methyl-2-piperazinyl)ethyl group, 1-(6-ethyl-2-piperazinyl)ethyl group, 2-(6-n-propyl-2-piperazinyl)ethyl group, 1-(6-n-butyl-2-piperazinyl)ethyl group, 2-(6-n-pentyl-2-piperazinyl)ethyl group, 2-(6-n-hexyl-2-piperazinyl)ethyl group, 3-(2-methyl-1-piperazinyl)propyl group, 3-(2-ethyl-1-piperazinyl)propyl group, 3-(2-n-propyl-1-piperazinyl)propyl group, 3-(2-n-butyl-1-piperazinyl)propyl group, 3-(2-n-pentyl-1-piperazinyl)propyl group, 3-(2-n-hexyl-1-piperazinyl)propyl group, 3-(3-methyl-1-piperazinyl)propyl group, 3-(3-ethyl-1-piperazinyl)propyl group, 3-(3-n-propyl-1-piperazinyl)propyl group, 3-(3-n-butyl-1-piperazinyl)propyl group, 3-(3-n-pentyl-1-piperazinyl)propyl group, 3-(3-n-hexyl-1-piperazinyl)propyl group, 3-(4-methyl-1-piperazinyl)propyl group, 3-(4-ethyl-1-piperazinyl)propyl group, 3-(4-n-propyl-1-piperazinyl)propyl group, 3-(4-n-butyl-1-piperazinyl)propyl group, 3-(4-n-pentyl-1-piperazinyl) propyl group, 6-(5-n-butyl-2-piperazinyl)hexyl group, 6-(5-n-pentyl-2-piperazinyl)hexyl group, 6-(5-n-hexyl-2-piperazinyl) hexyl group, 6-(6-methyl-2-piperazinyl)hexyl group, 6-(6-ethyl-2-piperazinyl)hexyl group, 6-(6-n-propyl-2-piperazinyl) hexyl group, 6-(6-n-butyl-2-piperazinyl)hexyl group, 6-(6-n-pentyl-2-piperazinyl)hexyl group, 6-(6-n-hexyl-2-piperazinyl) hexyl group, 2,3-dimethyl-1-piperazinylmethyl group, 3,3-dimethyl-1-piperazinylmethyl group, and 2-(1,3,4-trimethyl-2-piperazinyl)ethyl group.

[0068] Examples of the morpholinyl lower alkyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 2 (preferably 1) morpholinyl groups. Specific examples thereof include a 2-morpholinylmethyl group, 3-morpholinylmethyl group, 4-morpholinylmethyl group, 2-(2-morpholinyl) ethyl group, 2-(3-morpholinyl)ethyl group, 2-(4-morpholinyl)ethyl group, 1-(2-morpholinyl)ethyl group, 1-(3-morpholinyl) ethyl group, 1-(4-morpholinyl)ethyl group, 3-(2-morpholinyl)propyl group, 3-(3-morpholinyl)propyl group, 3-(4-morpholinyl)propyl group, 4-(2-morpholinyl)butyl group, 4-(3-morpholinyl)butyl group, 4-(4-morpholinyl)butyl group, 5-(2-mor-

pholinyl)pentyl group, 5-(3-morpholinyl)pentyl group, 5-(4-morpholinyl)pentyl group, 6-(2-morpholinyl)hexyl group, 6-(3-morpholinyl)hexyl group, 6-(4-morpholinyl)hexyl group, 3-methyl-3-(2-morpholinyl)propyl group, 3-methyl-3-(3-morpholinyl)propyl group, 3-methyl-3-(4-morpholinyl)propyl group, 1,1-dimethyl-2-(2-mcrpholinyl)ethyl group, 1,1-dimethyl-2-(3-morpholinyl)ethyl group, and 1,1-dimethyl-2-(4-morpholinyl)ethyl group.

[0069] Example of a thienyl lower alkyl group (that may have a lower alkyl group as a substituent on the thienyl group) include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 2 (preferably 1) thienyl groups, on which 1 to 3 (preferably 1) lower alkyl groups as illustrated above (linear or branched alkyl groups having 1 to 6 carbon atoms) may be present as a substituent(s). Specific examples thereof include a (2- or 3-)thienylmethyl group, 2-[(2- or 3-)thienyl]ethyl group, 1-[(2- or 3-)thienyl]ethyl group, 3-[(2- or 3-)thienyl]propyl group, 4-[(2- or 3-)thienyl]butyl group, 5-[(2- or 3-)thienyl]pentyl group, 6-[(2- or 3-)thienyl]hexyl group, 1,1-dimethyl-2-[(2- or 3-)thienyl]ethyl group, 2-methyl-3-[(2- or 3-)thienyl]propyl group, 3-methyl-(2-, 4-, or 5-)-thienylmethyl group, [5-methyl-(2, 3- or 4-)thienyl]methyl group, [4-ethyl-(2- or 3-)thienyl]methyl group, [5-n-propyl-(2, 3- or 4-)thienyl]methyl group, [3-n-butyl-(2-, 4-, or 5-)-thienyl]]]methyl group, [4,5-dimethyl-(2- or 3-)thienyl]methyl group, (3,4,5-trimethyl-2-thienyl)methyl group, 2-[3-methyl-(2-, 4-, or 5-)-thienyl]ethyl group, 1-[4-n-pentyl-(2- or 3-)thienyl]ethyl group, 3-[3-hexyl-2-thienyl]propyl group, 4-[4,5-dimethyl-(2- or 3-)thienyl]butyl group, 5-(2,4,5-trimethyl-3-thienyl)pentyl group, and 6-[5-ethyl-(2-, 3-, or 4-)thienyl]hexyl group.

[0070] Examples of the thiazolyl group include a (2-, 4- or 5-) thiazolyl group.

[0071] Examples of the thiazolyl lower alkyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 2 (preferably 1) thiazolyl groups. Specific examples thereof include a (2-, 4-, or 5-)thiazolylmethyl group, 2-[(2-, 4-, or 5-)thiazolyl)ethyl group, 1-[(2-, 4-, or 5-)thiazolyl]ethyl group, 3-[(2-, 4-, or 5-)thiazolyl]propyl group, 4-[(2-, 4-, or 5-)thiazolyl]butyl group, 5-[(2-, 4-, or 5-)thiazolyl)]pentyl group, 6-[(2-, 4-, or 5-)thiazolyl)]hexyl group, 1,1-dimethyl-2-[(2-, 4-, or 5-)thiazolyl]ethyl group, and [2-methyl-3-[(2-, 4-, or 5-)thiazolyl]propyl group.

[0072] Examples of the dihydrobenzofuryl group include a 2,3-dihydro-(2-, 3-, 4-, 5-, 6- or 7-)benzofuryl group.

[0073] Examples of the dihydrobenzofuryl lower alkyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 2 (preferably 1) dihydrobenzofuryl groups. Specific examples thereof include a 2,3-dihydro-4-benzofurylmethyl group, 2-(2,3-dihydro-4-benzofuryl)ethyl group, 3-(2,3-dihydro-4-benzofuryl)propyl group, 4-(2,3-dihydro-4-benzofuryl)butyl group, 5-(2,3-dihydro-4-benzofuryl)pentyl group, 6-(2,3-dihydro-4-benzofuryl)hexyl group, 2,3-dihydro-5-benzofurylmethyl group, 2-(2,3-dihydro-5-benzofuryl)ethyl group, 3-(2,3-dihydro-5-benzofuryl)propyl group, 4-(2,3-dihydro-5-benzofuryl)butyl group, 2,3-dihydro-6-benzofurylmethyl group, 2-(2,3-dihydro-6-benzofuryl)ethyl group, 3-(2,3-dihydro-6-benzofuryl)propyl group, 4-(2,3-dihydro-6-benzofuryl)butyl group, 5-(2,3-dihydro-6-benzofuryl)pentyl group, 2,3-dihydro-7-benzofurylmethyl group, 2,3-dihydro-7-benzofurylethyl group, 3-(2,3-dihydro-7-benzofuryl)propyl group, 4-(2,3-dihydro-7-benzofuryl)butyl group, and 6-(2,3-dihydro-7-benzofuryl)hexyl group.

[0074] Examples of the benzopyranyl lower alkyl group (that may have an oxo group as a substituent on the benzopyranyl group) include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 2 (preferably 1) benzopyranyl groups on which an oxo group may be present as a substituent. Specific examples thereof include a (4H-1-benzopyran-2-yl)methyl group, 2-(4H-1-benzopyran-2-yl)ethyl group, 3-(4H-1-benzopyran-2-yl)propyl group, 4-(4H-1-benzopyran-2-yl)butyl group, 5-(4H-1-benzopyran-2-yl)pentyl group, 6-(4H-1-benzopyran-2-yl)hexyl group, (4H-1-benzopyran-3-yl)methyl group, 2-(4H-1-benzopyran-3-yl)ethyl group, 3-(4H-1-benzopyran-3-yl)propyl group, 4-(4H-1-benzopyran-3-yl)butyl group, 5-(4H-1-benzopyran-3-yl)pentyl group, 6-(4H-1-benzopyran-3-yl)hexyl group, (4H-1-benzopyran-4-yl)methyl group, 2-(4H-1-benzopyran-4-yl)ethyl group, 3-(4H-1-benzopyran-4-yl)propyl group, 4-(4H-1-benzopyran-4-yl)butyl group, 5-(4H-1-benzopyran-4-yl)pentyl group, 6-(4H-1-benzopyran-4-yl)hexyl group, (2H-1-benzopyran-2-yl)methyl group, 2-(2H-1-benzopyran-2-yl)ethyl group, 3-(2H-1-benzopyran-2-yl)propyl group, 4-(2H-1-benzopyran-2-yl)butyl group, 5-(2H-1-benzopyran-2-yl)pentyl group, 6-(2H-1-benzopyran-2-yl)hexyl group, (2H-1-benzopyran-3-yl)methyl group, 2-(2H-l-benzopyran-3-yl)ethyl group, 3-(2H-1-benzopyran-3-yl)propyl group, 4-(2H-1-benzopyran-3-yl)butyl group, 5-(2H-1-benzopyran-3-yl)pentyl group, 6-(2H-1-benzopyran-3-yl)hexyl group, (2H-l-benzopyran-4-yl)methyl group, 2-(2H-1-benzopyran-4-yl)ethyl group, 3-(2H-1-benzopyran-4-yl)propyl group, 4-(2H-1-benzopyran-4-yl)butyl group, 5-(2H-1-benzopyran-4-yl)pentyl group, 6-(2H-1-benzopyran-4-yl)hexyl group, (1H-2-benzopyran-1-yl)methyl group, 2-(1H-2-benzopyran-1-yl)ethyl group, 3-(1H-2-benzopyran-1-yl)propyl group, 4-(1H-2-benzopyran-1-yl)butyl group, 5-(1H-2-benzopyran-1-yl)pentyl group, 6-(1H-2-benzopyran-1-yl)hexyl group, (1H-2-benzopyran-3-yl)methyl group, 2-(1H-2-benzopyran-3-yl)ethyl group, 3-(1H-2-benzopyran-3-yl)propyl group, 4-(1H-2-benzopyran-3-yl)butyl group, 5-(1H-2-benzopyran-3-yl)pentyl group, 6-(1H-2-benzopyran-3-yl)hexyl group, (1H-2-benzopyran-3-yl)methyl group, 2-(1H-2-benzopyran-4-yl)ethyl group, 3-(1H-2-benzopyran-4-yl)propyl group, 4-(1H-2-benzopyran-4-yl)butyl group, 5-(1H-2-benzopyran-4-yl)pentyl group, 6-(1H-2-benzopyran-4-yl)hexyl group, (4-oxo-4H-1-benzopyran-2-yl)methyl group, 2-(4-oxo-4H-1-benzopyran-2-yl)ethyl group, 3-(4-oxo-4H-1-benzopyran-2-yl)propyl group, 4-(4-oxo-4H-1-benzopyran-2-yl)butyl group, 5-(4-oxo-4H-1-benzopyran-2-yl)pentyl group, 6-(4-oxo-4H-1-benzopyran-2-yl)hexyl group, (9-oxo-4H-1-benzopyran-3-yl)methyl group, 2-(4-oxo-4H-1-

benzopyran-3-yl)ethyl group, 3-(4-oxo-4H-1-benzopyran-3-yl)propyl group, 4-(4-oxo-4H-1-benzopyran-3-yl)butyl group, 5-(4-oxo-4H-1-benzopyran-3-yl)pentyl group, 6-(4-oxo-4H-1-benzopyran-3-yl)hexyl group, (4-oxo-4H-1-benzopyran-4-yl)methyl group, (2-oxo-2H-1-benzopyran-3-yl)methyl group, 2-(2-oxo-2H-1-benzopyran-3-yl)ethyl group, 3-(2-oxo-2H-1-benzopyran-3-yl)propyl group, 4-(2-oxo-2H-1-benzopyran-3-yl)butyl group, 5-(2-oxo-2H-1-benzopyran-3-yl)pentyl group, 6-(2-oxo-2H-1-benzopyran-3-yl)hexyl group, (2-oxo-2H-1-benzopyran-4-yl)methyl group, 2-(2-oxo-2H-1-benzopyran-4-yl)ethyl group, 3-(2-oxo-2H-1-benzopyran-4-yl)propyl group, 4-(2-oxo-2H-1-benzopyran-4-yl)butyl group, 5-(2-oxo-2H-1-benzopyran-4-yl)pentyl group, 6-(2-oxo-2H-1-benzopyran-4-yl)hexyl group, (1-oxo-1H-2-benzopyran-3-yl)methyl group, 2-(1-oxo-1H-2-benzopyran-3-yl)ethyl group, 3-(1-oxo-1H-2-benzopyran-3-yl)propyl group, 4-(1-oxo-1H-2-benzopyran-3-yl)butyl group, 5-(1-oxo-1H-2-benzopyran-3-yl)pentyl group, 6-(1-oxo-1H-2-benzopyran-3-yl)hexyl group, (1-oxo-1H-2-benzopyran-4-yl)methyl group, 2-(1-oxo-1H-2-benzopyran-4-yl)ethyl group, 3-(1-oxo-1H-2-benzopyran-4-yl)propyl group, 4-(1-oxo-1H-2-benzopyran-4-yl)butyl group, 5-(1-oxo-1H-2-benzopyran-4-yl)pentyl group, and 6-(1-oxo-1H-2-benzopyran-4-yl)hexyl group.

[0075] Examples of the benzimidazolyl lower alkyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 2 (preferably 1) benzimidazolyl groups. Specific examples thereof include a 1-benzimidazolylmethyl group; 2-(1-benzimidazolyl)ethyl group, 3-(1-benzimidazolyl)propyl group, 4-(1-benzimidazolyl)butyl group, 5-(1-benzimidazolyl)pentyl group, 6-(1-benzimidazolyl)hexyl group, 2-benzimidazolylmethyl group, 2-(2-benzimidazolyl)ethyl group, 3-(2-benzimidazolyl)propyl group, 4-(2-benzimidazolyl)butyl group, 5-(2-benzimidazolyl)pentyl group, and 6-(2-benzimidazolyl)hexyl group.

[0076] Examples of the indolyl lower alkyl group that may have a lower alkoxycarbonyl group on the lower alkyl group include a lower alkyl group (a linear or branched alkyl group having 1 to 6 carbon atoms) as illustrated above that may have 1 to 3 (preferably 1) lower alkoxycarbonyl groups as illustrated above that may have 1 to 2 (preferably 1) indolyl groups.

Specific examples thereof include an indol(-1-, -2-,-3-, -4-, -5-, -6-, or -7-)ylmethyl group, 2-indol(-1-, -2-, -3-, -4-, -5-, -6-, or -7-)ylethyl group, 3-indol(-1-, -2-, -3-, -4-, -5-, -6-, or -7-)ylpropyl group, 4-indol(-1-, -2-, -3-, -4-, -5-, -6-, or -7-)ylbutyl group, 5-indol(-1-, -2-, -3-, -4-, -5-, -6-, or -7-)ylpentyl group, 6-indol-1-, -2-, -3-, -4-, -5-, -6-, or -7-)ylhexyl group, 3-methyl-3-indol(-1-, -2-, -3-, -4-, -5-, -6-, or -7-)ylpropyl group, 1,1-dimethyl-2-indol(-1-, -2-, -3-, -4-, -5-, -6-, or-7-)ylethyl group, and 1-methoxycarbonyl-2-indol(-1-,-2-, -3-, -4-, -5-, -6-, or -7-)ylethyl group.

[0077] Examples of the imidazolyl lower alkyl group having an substituent selected from the group consisting of a carbamoyl group and a lower alkoxycarbonyl group on the lower alkyl group include an imidazolyl lower alkyl group having a 1 to 3, preferably 1, substituents selected from the group consisting of a carbamoyl group and a lower alkoxycarbonyl group as illustrated above on the alkyl group whose lower alkyl moiety is the same as that illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms). Specific examples thereof include a carbamoyl-[(1-, 2-, 4-, or 5-)imidazolyl]methyl group, methoxycarbonyl-[(1-, 2-, 4-, or 5-)imidazolyl]methyl group, ethoxycarbonyl-[(1-, 2-, 4-, or 5-)imidazolyl]methyl group, n-butoxycarbonyl-[(1-, 2-, 4-, or 5-)imidazolyl]methyl group, isobutoxycarbonyl-[(1-, 2-, 4-, or 5-)imidazolyl]methyl group, tert-butoxycarbonyl-[(1-, 2-, 4-, or 5-)imidazolyl]methyl group, sec-butoxycarbonyl-[(1-, 2-, 4-, or 5-)imidazolyl]methyl group, n-pentyloxycarbonyl-[(1-, 2-, 4-, or 5-)imidazolyl]methyl group, neopentyloxy-[(1-, 2-, 4-, or 5-)imidazolyl]methyl group, n-hexyloxycarbonyl-[(1-, 2-, 4-, or 5-)imidazolyl]methyl group, isohexyloxycarbonyl-[(1-, 2-, 4-, or 5-)imidazolyl]methyl group, 3-methylpentyloxycarbonyl-[(1-, 2-, 4-, or 5-)imidazolyl]methyl group, 1-carbamoyl-2-[(1-, 2-, 4-, or 5-)imidazolyl]ethyl group, 1-methoxycarbonyl-2-[(1-, 2-, 4-, or 5-)imidazolyl]ethyl group, 1,1-dimethoxycarbonyl-2-[(1-, 2-, 4-, or 5-)imidazolyl]ethyl group, 1,1-dicarbamoyl-2-[(1-,2-, 4-, or 5-)imidazolyl]ethyl group, 2-carbamoyl-1-[(1-, 2-, 4-, or 5-)imidazolyl]ethyl group, 2-methoxycarbonyl-3-[(1-, 2-, 4-, or 5-)imidazolyl]propyl group, 2-carbamoyl-4-[(1-, 2-, 4-, or 5-)imidazolyl]butyl group, 1-methyl-l-carbamoylmethyl-2-[(1-, 2-, 4-, or 5-)imidazolyl]ethyl group, 2-methoxycarbonyl-5-[(1-, 2-, 4-, or 5-)imidazolyl]pentyl group, 3-carbamoyl-6-[(1-, 2-, 4-, or 5-)imidazolyl]hexyl group, 2-methoxycarbonyl-1-[(1-, 2-, 4-, or 5-)imidazolyl]isopropyl group, and 2-carbamoylmethyl-3-[(1-, 2-, 4-, or 5-)imidazolyl]propyl group.

[0078] Examples of the pyridyl group that may have a group selected from the group consisting of a lower alkyl group, lower alkoxy group, and lower alkylthio lower alkyl group, as a substituent include a pyridyl group that may have 1 to 4 (preferably 1) groups, as a substituent(s), which are selected from the group consisting of a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms), a lower alkoxy group as illustrated above (a linear or branched alkoxy group having 1 to 6 carbon atoms), and a lower alkylthio lower alkyl group in which the two lower alkyl moieties each are composed of a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms). Specific examples thereof include a 2-pyridyl group, 3-pyridyl group, 4-pyridyl group, 4-methyl-2-pyridyl group, 5-methyl-2-pyridyl group, 5-ethyl-3-pyridyl group, 2-n-propyl-3-pyridyl group, 4-n-butyl-2-pyridyl group, 4-tert-butyl-2-pyridyl group, 5-n-pentyl-3-pyridyl group, 4-n-hexyl-2-pyridyl group, 4-methoxy-2-pyridyl group, 5-methoxy-2-pyridyl group, 2-methylthiomethyl-3-pyridyl group, 5-ethylthiomethyl-2-pyridyl group, 4-n-propylthiomethyl-2-pyridyl group, 3-n-butylthiomethyl-2-pyridyl group, 5-n-pentylthiomethyl-3-pyridyl group, 4-n-hexylthiomethyl-3-pyridyl group, 2-(2-methylthioethyl)-3-pyridyl group, 2-(3-methylthiopropyl)-4-pyridyl group, 3-(4-methylthiobutyl)-4-pyridyl group, 3-(5-methylthiopentyl)-2-pyridyl group, 4-(6-methylthiohexyl)-2-pyridyl group, 3,4-dimethyl-2-pyridyl group, 2,4,6-triethyl-3-

pyridyl group, 2,3,5,6-tetramethyl-4-pyridyl group, and 2-methyl-3-methylthiomethyl-4-pyridyl group.

[0079] Examples of the pyrrolidinyl group that may have a group selected from the group consisting of a lower alkyl group, lower alkoxycarbonyl group, lower alkanoyl group, and aroyl group as a substituent include a pyrrolidinyl group that may have 1 to 3, preferably 1 group, as a substituent(s), which is selected from the group consisting of a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms), a lower alkoxycarbonyl group as illustrated above a lower alkanoyl group as described above (a linear or branched alkanoyl group having 1 to 6 carbon atoms), and an aroyl group (preferably a benzoyl group). Specific examples thereof include a pyrrolidin-1-yl group, pyrrolidin-2-yl group, pyrrolidin-3-yl group, 1-methylpyrrolidin-3-yl group, 2-ethylpyrrolidin-3-yl group, 3-n-propylpyrrolidin-3-yl group, 4-n-butylpyrrolidin-3-yl group, 1-tert-butylpyrrolidin-3-yl group, 5-n-pentylpyrrolidin-3-yl group, 1-n-hexylpyrrolidin-2-yl group, 2-methoxycarbonyl-2-yl group, 3-ethoxycarbonylpyrrolidin-2-yl group, 1-tert-butoxycarbonylpyrrolidin-3-yl group, 4-propoxycarbonylpyrrolidin-2-yl group, 5-butoxycarbonylpyrrolidin-2-yl group, 1-pentoxycarbonyl-2-yl group, 2-hexyloxycarbonylpyrrolidin-2-yl group, 1,3-dimethoxycarbonylpyrrolidin-2-yl group, 3,4,5-triethylpyrrolidin-2-yl group, 2,3,4,5-tetramethylpyrrolidin-1-yl group, 2,4-dimethoxycarbonylpyrrolidin-1-yl group, 3,4,5-triethoxycarbonylpyrrolidin-1-yl group, 2-methyl-4-methoxycarbonylpyrrolidin-1-yl group, 1-benzoylpyrrolidin-3-yl group, 1-acetyipyrrolidin-3-yl group, and 1-butyrylpyrrolidin-3-yl group.

[0080] Examples of the piperidyl group that may have a group as a substituent selected from the group consisting of a lower alkyl group, a lower alkoxycarbonyl group, a lower alkanoyl group, and an aroyl group that may have a group selected from the group consisting of a lower alkyl group and a halogen atom include a piperidyl group that may have 1 to 5 (preferably 1 to 4) groups, as a substituent(s), which are selected from the group consisting of
a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);
a lower alkoxy group as illustrated above (a linear or branched alkoxy group having 1 to 6 carbon atoms);
a lower alkanoyl group as illustrated above (a linear or branched alkanoyl group having 1 to 6 carbon atoms); and
an aroyl group that may have 1 to 3 groups (preferably 1 group) selected from the group consisting of a lower alkyl group as illustrated above and a halogen atom as illustrated above (preferably a benzoyl group). Specific examples thereof include a 1-piperidyl group, 2-piperidyl group, 3-piperidyl group, 4-piperidyl group, 1-methyl-4-piperidyl group, 2-ethyl-4-piperidyl group, 3-n-propyl-4-piperidyl group, 4-n-butyl-4-piperidyl group, 1-n-pentyl-4-piperidyl group, 2-n-hexyl-4-piperidyl group, 1-methoxycarbonyl-4-piperidyl group, 1-ethoxycarbonyl-4-piperidyl group, 4-n-propoxycarbonyl-4-piperidyl group, 5-n-butoxycarbonyl-4-piperidyl group, 1-tert-butoxycarbonyl-4-piperidyl group, 1-formyl-4-piperidyl group, 1-acetyl-4-piperidyl group, 1-butyryl-4-piperidyl group, 1-butyryl-3-piperidyl group, 2-propionyl-4-piperidyl group, 3-butyryl-4-piperidyl group, 4-isobutyryl-4-piperidyl group, 1-n-pentanoyl-4-piperidyl group, 2-tert-butylcarbonyl-4-piperidyl group, 3-n-hexanoyl-4-piperidyl group, 1-benzoyl-4-piperidyl group, 1-benzoyl-3-piperidyl group, 1-(2-, 3-, or 4-chlorobenzoyl)-4-piperidyl group, 1-(2-, 3-, or 4-fluorobenzoyl)-4-piperidyl group, 1-(2-, 3-, or 4-methylbenzoyl)-4-piperidyl group, 2,6-dimethyl-4-piperidyl group, 2,4,6-trimethyl-3-piperidyl group, 2,2,6,6-tetramethyl-4-piperidyl group, and 2,2,4,4,6-pentamethyl-3-piperidyl group.

[0081] Examples of the tetrahydrofuryl group that may have an oxo group include a 2-tetrahydrofuryl group, 3-tetrahydrofuryl group, 3-oxo-2-tetrahydrofuryl group, 4-oxo-2-tetrahydrofuryl group, 5-oxo-2-tetrahydrofuryl group, 2-oxo-3-tetrahydrofuryl group, 4-oxo-3-tetrahydrofuryl group, and 5-oxo-4-tetrahydrofuryl group.

[0082] Examples of the hexahydroazepinyl group that may have an oxo group include 2-hexahydroazepinyl group, 3-hexahydroazepinyl group, 4-hexahydroazepinyl group, 2-oxo-3-hexahydroazepinyl group, 3-oxo-2-hexahydroazepinyl group, 4-oxo-2-hexahydroazepinyl group, 5-oxo-2-hexahydroazepinyl-group, and 6-oxo-2-hexahydroazepinyl group.

[0083] Examples of the pyrazolyl group that may have a group selected from the group consisting of a lower alkyl group, aryl group, and furyl group as a substituent include a pyrazolyl group that may have 1 to 3 (preferably 1 to 2) groups, as a substituent(s), which are selected from the group consisting of
a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);
an aryl group as illustrated above and a furyl group. Specific examples thereof include a 1-pyrazolyl group, 3-pyrazolyl group, 4-pyrazolyl group, 1-methyl-5-pyrazolyl group, 1-ethyl-5-pyrazolyl group, 3-n-propyl-5-pyrazolyl group, 4-n-butyl-5-pyrazolyl group, 1-tert-butyl-4-pyrazolyl group, 1-n-pentyl-4-pyrazolyl group, 3-n-hexyl-4-pyrazolyl group, 3-phenyl-5-pyrazolyl group, 1-(2-naphthyl)-3-pyrazolyl group, 4-(2-methylphenyl)-3-pyrazolyl group, 5-(3-ethylphenyl)-3-pyrazolyl group, 1-(4-n-propylphenyl)-4-pyrazolyl group, 3-(2-n-butylphenyl)-4-pyrazolyl group, 5-(3-n-pentylphenyl)-4-pyrazolyl group, 1-(4-n-hexylphenyl)-5-pyrazolyl group, 3-(2-isobutylphenyl)-5-pyrazolyl group, 4-(3-tert-butylphenyl)-5-pyrazolyl group, 3-(2-chlorophenyl)-1-pyrazolyl group, 4-(3-fluorophenyl)-1-pyrazolyl group, 5-(4-bromophenyl)-1-pyrazolyl group, 1-(2-aminophenyl)-3-pyrazolyl group, 4-(2,3-dimethylphenyl)-3-pyrazolyl group, 5-(3,4,5-trimethylphenyl)-3-pyrazolyl group, 1-(2,3-diaminophenyl)-4-pyrazolyl group, 3-(2-furyl)-5-pyrazolyl group, 1,3-dimethyl-5-pyrazolyl group, 1,3,4-triethyl-5-pyrazolyl group, 1,3,5-trimethyl-4-pyrazolyl group, and 1-methyl-3-phenyl-5-pyrazolyl group.

[0084] Examples of the thiadiazolyl group include a 1,2,3-thiadiazolyl group, 1,2,4-thiadiazolyl group, 1,2,5-thiadiazolyl group or 1,3,4-thiadiazolyl group.

[0085] Examples of the thiadiazolyl group that may have a lower alkyl group include a thiadiazolyl group as illustrated above that may have 1 to 3, preferably 1, lower alkyl groups as illustrated above (linear or branched alkyl groups having

1 to 6 carbon atoms). Specific examples thereof include a 4- or 5-(1, 2, 3-thiadiazolyl) group, 3- or 5-(1, 2, 4-thiadiazolyl) group, 3-(1. 2, 5-thiadiazolyl) group, 2-(1, 3, 4-thiadiazolyl) group, 5-methyl-1,3,4-thiadiazol-2-yl group, 4-ethyl-1,2,3-thiadiazol-5-yl group, 5-n-propyl-1,2,4-thiadiazol-3-yl group, 5-n-butyl-1,3,4-thiadiazol-2-yl group, 4-tert-butyl-1,2,3-thiadiazol-5-yl group, 5-n-pentyl-1,2,4-thiadiazol-3-yl group, and 5-n-hexyl-1,3,4-thiadiazol-2-yl group.

[0086] Examples of an isoxazolyl group that may have a lower alkyl group include an isoxazolyl group that may have 1 to 2 lower alkyl group as illustrated above (linear or branched alkyl group having 1 to 6 carbon atoms). Specific examples thereof include a 3-isoxazolyl group, 4-isoxazolyl group, 5-isoxazolyl group, 3-methyl-5-isoxazolyl group, 4-ethyl-5-isoxazolyl group, 4-n-propyl-3-isoxazolyl group, 5-methyl-3-isoxazolyl group, 5-n-butyl-3-isoxazolyl group, 3-tert-butyl-4-isoxazolyl group, 5-n-pentyl-4-isoxazolyl group, 3-n-hexyl-5-isoxazolyl group, and 3,4-dimethyl-5-isoxazolyl group.

[0087] Examples of the indazolyl group include a (1-, 3-, 4-, 5-, 6- or 7-)indazolyl group.

[0088] Examples of the tetrahydrobenzothiazolyl group include a (2-, 4-, 5-, 6-, or 7-) (4,5,6,7-tetrahydrobenzothiazolyl) group.

[0089] Examples of the tetrahydroquinolyl group include a (1-, 2-, 4-, 5-, 6- or -8) (1, 2, 3, 4-tetrahydroquinolyl group.

[0090] Example of a tetrahydroquinolyl group that may have a group selected from the group consisting of a lower alkyl group, lower alkoxy group, halogen atom and oxo group as a substituent include a tetrahydroquinolyl group as illustrated above that may have 1 to 3 (preferably 1 to 2) groups; as a substituent(s), which are selected from the group consisting of

a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);

a lower alkoxy group as illustrated above (a linear or branched alkoxy group having 1 to 6 carbon atoms; a halogen atom; and

an oxo group. Specific examples thereof include a 1-(1,2,3,4-tetrahydroquinolyl) group, 2-(1,2,3,4-tetrahydroquinolyl) group, 3-(1,2,3,4-tetrahydroquinolyl) group, 4-(1,2,3,4-tetrahydroquinolyl) group, 5-(1,2,3,4-tetrahydroquinolyl) group, 6-(1,2,3,4-tetrahydroquinolyl) group, 7-(1,2,3,4-tetrahydroquinolyl) group, 8-(1,2,3,4-tetrahydroquinolyl) group, 2-methyl-3-(1,2,3,4-tetrahydroquinolyl) group, 3-ethyl-2-(1,2,3,4-tetrahydroquinolyl) group, 4-n-propyl-2-(1,2,3,4-tetrahydroquinolyl) group, 5-n-butyl-3-(1,2,3,4-tetrahydroquinolyl) group, 6-tert-butyl-3-(1,2,3,4-tetrahydroquinolyl) group, 7-n-pentyl-2-(1,2,3,4-tetrahydroquinolyl) group, 8-n-hexyl-2-(1,2,3,4-tetrahydroquinolyl) group, 2-methoxy-4-(1,2,3,4-tetrahydroquinolyl) group, 3-ethoxy-4-(1,2,3,4-tetrahydroquinolyl) group, 4-propoxy-5-(1,2,3,4-tetrahydroquinolyl) group, 5-butoxy-6-(1,2,3,4-tetrahydroquinolyl) group, 6-pentoxy-7-(1,2,3,4-tetrahydroquinolyl) group, 7-hexyloxy-8-(1,2,3,4-tetrahydroquinolyl) group, 4-oxo-3-(1,2,3,4-tetrahydroquinolyl) group, 2-oxo-(1-, 3-, 4-, 5-, 6-, 7-, or 8-)-(1,2,3,4-tetrahydroquinolyl) group, 2-oxo-8-methyl-(3-, 4-, 5-, 6-, or 7-)-(1,2,3,4-tetrahydroquinolyl) group, 2-oxo-8-methoxy-3-(1,2,3,4-tetrahydroquinolyl) group, 2-oxo-5-methoxy-(1-, 3-, 4-, 6-, 7-, or 8-)-(1,2,3,4-tetrahydroquinolyl) group, 2-oxo-8-fluoro-(3-, 4-, 5-, 6-, or 7-)-(1,2,3,4-tetrahydroquinolyl) group, and 2-oxo-6,8-dimethyl-3-(1,2,3,4-tetrahydroquinolyl) group.

[0091] Examples of the quinolyl group include a 2-quinolyl group, 3-quinolyl group, 4-quinolyl group, 5-quinolyl group, 6-quinolyl group, 7-quinolyl group, and 8-quinolyl group. Examples of the quinolyl group that may have a lower alkyl group include a quinolyl group that may have 1 to 2 lower alkyl groups as illustrated above (linear or branched alkyl groups having 1 to 6 carbon atoms). Specific examples thereof include a 2-, 3-, 4-, 5-, 6-, 7- or 8-quinolyl group, 2-methyl-6-quinolyl group, 4-ethyl-5-quinolyl group, 4-n-propyl-3-quinolyl group, 5-methyl-3-quinolyl group, 5-n-butyl-3-quinolyl group, 3-tert-butyl-4-quinolyl group, 5-n-pentyll-4-quinolyl group, 3-n-hexyl-5-quinolyl group and 3,4-dimethyl-5-quinolyl group.

[0092] Examples.of the benzodioxolyl lower alkyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 2 (preferably 1) benzodioxolyl groups. Specific examples thereof include a 2-, 4- or 5-(1,3-benzodioxolyl)methyl group, 2-(2-, 4- or 5-)(1,3-benzodioxolyl)ethyl group and 3-(2-, 4- or 5-)(1,3-benzodioxolyl) propyl group.

[0093] Examples of the aryl group that may have a group selected from the group consisting of a halogen atom; a lower alkyl group; a lower alkoxy group; a halogen substituted lower alkyl group; a halogen substituted lower alkoxy group; a lower alkenyl group; an amino group that may have a group selected from the group consisting of a lower alkylsulfonyl group, lower alkyl group, and aryl group; a sulfamoyl group; a lower alkylthio group; a lower alkanoyl group; a lower alkoxycarbonyl group; a pyrrolyl group; lower alkynyl group; cyano group, nitro group; aryloxy group; aryl lower alkoxy group; hydroxy group; hydroxy lower alkyl group; carbamoyl group that may have a group selected from the group consisting of a lower alkyl group and an aryl group; pyrazolyl group; pyrrolidinyl group that may have an oxo group; oxazolyl group; imidazolyl group that may have a lower alkyl group; dihydrofuryl group that may have an oxo group; thiazolidinyl lower alkyl group that may have an oxo group; imidazolyl lower alkanoyl group; and piperidinylcarbonyl group include an aryl group as illustrated above that may have 1 to 7, preferably 1 to 5, more preferably, 1 to 2 groups, as a substituent(s), which are selected from the group consisting of

a halogen atom as illustrated above;

a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);

a lower alkoxy group as illustrated above (a linear or branched alkoxy group having 1 to 6 carbon atoms);

a halogen substituted lower alkyl group as illustrated above (preferably a linear or branched alkyl group having 1 to 6

carbon atoms substituted with 1 to 7 halogen atoms);
a halogen substituted lower alkoxy group as illustrated above (preferably a linear or branched alkoxy group having 1 to 6 carbon atoms substituted with 1 to 7 halogen atoms);
a lower alkenyl group as illustrated above (
a linear or branched alkenyl group having 1 to 3 double bonds and 2 to 6 carbon atoms (including both trans and cis configurations));
an amino group having 1 to 2 lower alkanoyl groups as illustrated above, lower alkyl groups as illustrated above, and aryl groups as illustrated above;
a sulfamoyl group;
a lower alkylthio group whose lower alkyl moiety is a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);
a lower alkanoyl group as illustrated above (
a linear or branched alkanoyl group having 1 to 6 carbon atoms);
a lower alkoxycarbonyl group as illustrated above a pyrrolyl group; an alkynyl group as illustrated below; cyano group; nitro group; aryloxy group whose aryl moiety is as illustrated above; aryl lower alkoxy group whose aryl moiety and lower alkoxy moiety are as illustrated above; hydroxy group; a hydroxy lower alkyl group whose lower alkyl moiety is as illustrated above; a carbamoyl group that may have 1 to 2 groups selected from the group consisting of a lower alkyl group as illustrated above and aryl group as illustrated above; pyrazolyl group; pyrrolidinyl group that may have 1 to 2 (preferably 1) oxo groups; oxazolyl group; imidazolyl group that may have 1 to 3 (preferably 1 to 2) lower alkyl groups as illustrated above; dihydrofuryl group that may have 1 to 2 (preferably 1) oxo groups; thiazolidinyl group that may have 1 to 2 (preferably 1) oxo groups and having an lower alkyl moiety as illustrated above; imidazolyl lower alkanoyl group whose alkanoyl moiety is as illustrated above and piperidinylcarbonyl group. Specific examples thereof include a phenyl group, 1-naphthyl group, 2- naphthyl group, (2-, 3-, or 4-)biphenyl group, (2-, 3-, or 4-)chlorophenyl group, (2-, 3-, or 4-) fluorophenyl group, (2-, 3-, or 4-)bromophenyl group, (2-, 3-, or 4-)methylphenyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)ethyl-1-naphthyl group, (2-, 3-, or 4-)n-propylphenyl group, (2-, 3-, or 4-)n-butylphenyl group, (2-, 3-, or 4-)n-pentylphenyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-hexyl-1-naphthyl group, (2-, 3-, or 4-) isobutylphenyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)tert-butyl-1-naphthyl group, (2-, 3-, or 4-)methoxyphenyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)ethoxy-1-naphthyl group, (2-, 3-, or 4-)n-propoxyphenyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)isopropoxy-1-naphthyl group, (2-, 3-, or 4-)n-butoxyphenyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)isobutoxy-2-naphthyl group, (2-, 3-, or 4-)tert-butoxyphenyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)sec-butoxy-1-naphthyl group, (2-, 3-, or 4-)n-pentyloxyphenyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)isopentyloxy-1-naphthyl group, (2-, 3-, or 4-)neopentyloxyphenyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-hexyloxy-2-naphthyl group, (2-, 3-, or 4-) isohexyloxyphenyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)(3-methylpentyloxy)-1-naphthyl group, (2-, 3-, or 4-)chloromethylphenyl group, (2-, 3-, or 4-)trifluoromethylphenyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)fluoroethyl-1-naphthyl group, (2-, 3-, or 4-)(3-bromopropyl)phenyl group, (2-, 3-, or 4-)(4-chlorobutyl)phenyl group, (2-, 3-, or 4-)(5-fluoropentyl)phenyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)(6-bromohexyl)-1-naphthyl group, (2-, 3-, or 4-)(1,1-dimethyl-2-chloroethyl)phenyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)(2-methyl-3-fluoropropyl)-2-naphthyl group, (2-, 3-, or 4-)chloromethoxyphenyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)(2-fluoroethoxy)-1-naphthyl group, (2-, 3-, or 4-)(3-bromopropoxy)phenyl group, (2-, 3-, or 4-)(4-chlorobutoxy)phenyl group, (2-, 3-, or 4-)(5-fluoropentyloxy)phenyl group, (2-, 3-, or 4-)trifluoromethoxyphenyl group, 4-(6-bromohexyloxy)-1-naphthyl group, (2-, 3-, or 4-)(1,1-dimethyl-2-chloroethoxy)phenyl group, 7-(2-methyl-3-fluoropropoxy)-2-naphthyl group, 2-vinylphenyl group, 2-(1-methylvinyl)phenyl group, 2-(1-propenyl)-1-naphthyl group, (2-, 3-, or 4-)(1-methyl-1-propenyl)phenyl group, 3-(2-methyl-1-propenyl)-1-naphthyl group, (2-, 3-, or 4-)(1-propenyl)phenyl group, (2-, 3-, or 4-)(2-propenyl)phenyl group, 4-(2-butenyl)-1-naphthyl group, (2-, 3-, or 4-)(1-butenyl)phenyl group, 5-(3-butenyl)-1-naphthyl group, (2-, 3-, or 4-)(2-pentenyl) phenyl group, 6-(1-pentenyl)-1-naphthyl group, (2-, 3-, or 4-)(3-pentenyl)phenyl group, 7-(9-pentenyl)-1-naphthyl group, (2-, 3-, or 4-)(1,3-butadienyl)phenyl group, 8-(1,3-pentadienyl)-1-naphthyl group, (2-, 3-, or 4-)(2-penten-4-ynyl)phenyl group, 1-(2-hexenyl)-2-naphthyl group, 4-(1-hexenyl)phenyl group, a 3-(5-hexenyl)-2-naphthyl group, (2-, 3-, or 4-)(3-hexenyl) group, 4-(4-hexenyl)-2-naphthyl group, (2-, 3-, or 4-)(3,3-dimethyl-1-propenyl)phenyl group, 5-(2-ethyl-1-propenyl)-2-naphthyl group, 4-(1,3,5-hexatrienyl)phenyl group, 6-(1,3-hexadienyl)-2-naphthyl group, (2-, 3-, or 4-)(1,4-hexadienyl)phenyl group, (2-, 3-, or 4-)(N-formylamino)phenyl group, (2-, 3-, or 4-)(N-acetylamino)phenyl group, 7-(N-acetylamino)-2-naphthyl group, (2-, 3-, or 4-) (N-propionylamino) phenyl group, 8-(N-butyrylamino)-2-naphthyl group, (2-, 3-, or 4-)(N-isobutyrylamino)phenyl group, 2-(N-pentanoylamino)-1-naphthyl group, (2-, 3-, or 4-)(N-tert-butylcarbonylamino)phenyl group, 3-(N-hexanoylamino)-1-naphthyl group, (2-, 3-, or 4-)(N,N-diformylamino)phenyl group, 4-(N,N-diacetylamino)-1-naphthyl group, (2-, 3-, or 4-)(N,N-dimethylamino)phenyl group, (2-, 3-, or 4-)(N-phenylamino)phenyl group, (2-, 3-, or 4-)sulfamoylphenyl group, 5-sulfamoyl-1-naphthyl group, (2-, 3-, or 4-)methylthiophenyl group, 6-ethylthio-1-naphthyl group, (2-, 3-, or 4-)n-propylthiophenyl group, 7-isopropylthio-1-naphthyl group, (2-, 3-, or 4-)n-butylthiophenyl group, 8-tert-butylthio-1-naphthyl group, (2-, 3-, or 4-)n-pentylthiophenyl group, 1-n-hexylthio-2-naphthyl group, (2-, 3-, or 4-)(N-methyl(sulfonylamino)phenyl group, (2-, 3-, or 4-)formylphenyl group, (2-, 3-, or 4-)acetylphenyl group, (2-, 3-, or 4-)butyrylphenyl group, 3-acetyl-2-naphthyl group, (2-, 3-, or 4-)propionylphenyl group, 4-butyryl-2-naphthyl group, (2-, 3-, or 4-)isobutyrylphenyl group, 5-pentanoyl-2-

naphthyl group, (2-, 3-, or 4-)cyanophenyl group, (2-, 3-, or 4-)methoxycarbonylphenyl group, (2-, 3-, or 4-)tert-butylcarbonylphenyl group, 6-hexanoyl-2-naphthyl group, (2-, 3-, or 4-)ethoxycarbonylphenyl group, 7-ethoxycarbonyl-2-naphthyl group, (2-, 3-, or 4-)n-propoxycarbonylphenyl group, 8-isopropoxycarbonyl-2-naphthyl group, (2-, 3-, or 4-)n-butoxycarbonylphenyl group, 2-isobutoxycarbonyl-1-naphthyl group, (2-, 3-, or 4-)tert-butoxycarbonylphenyl group, 3-sec-butoxycarbonyl-1-naphthyl group, (2-, 3-, or 4-)n-pentyloxycarbonylphenyl group, 4-neopentyloxy-1-naphthyl group, (2-, 3-, or 4-)n-hexyloxycarbonylphenyl group, 5-isohexyloxycarbonyl-1-naphthyl group, (2-, 3-, or 4-)(3-methylpentyloxycarbonyl)phenyl group, 6-(1-pyrrolyl)-1-naphthyl group, (2-, 3-, or 4-)(1-pyrrolyl)phenyl group, (2-, 3-, or 4-)ethynylphenyl group, (2-, 3-, or 4-)(N-methylcarbamoyl)phenyl group, (2-, 3-, or 4-)(N-phenylcarbamoyl)phenyl group, (2-, 3-, or 4-)(2-hydroxyethyl)phenyl group, (2-, 3-, or 4-)phenoxyphenyl group, (2-, 3-, or 4-)nitrophenyl group, (2-, 3-, or 4-)benzyloxyphenyl group, (2-, 3-, or 4-) hydroxyphenyl group, (2-, 3-, or 4-)(2-oxo,-2,5-dihydrofuran-4-yl)phenyl group, (2-, 3-, or 4-)(1-imidazolylacetyl)phenyl group, (2-, 3-, or 4-)(2,4-dioxothiazolidin-5-ylmethyl)phenyl group, (2-, 3-, or 4-)[(1-,2-, 3-, or 4-)piperidylcarbonyl]phenyl group, (2-, 3-, or 4-)[(1-,3-, 4-, or 5-)pyrazolyl]phenyl group, (2-, 3-, or 4-)[2-oxo-(1- or 3-)pyrrolidinyl]phenyl group, (2-, 3-, or 4-)[(2-, 4-, or 5-)oxazolyl]phenyl group, (2-, 3-, or 4-)(2-ethyl-4-methylimidazol-1-yl)phenyl group, (2-, 3-, or 4-)biphenyl group, 2,3-dimethoxyphenyl group, 2,4-dimethoxyphenyl group, 2,5-dimethoxyphenyl group, 2,6-dimethoxyphenyl group, 3,4-dimethoxyphenyl group, 3,5-dimethoxyphenyl group, 2,3-dichlorophenyl group, 2,4-dichlorophenyl group, 3,4-dichlorophenyl group, 2-methoxy-5-chlorophenyl group, 2-methoxy-5-methylphenyl group, 2-methoxy-5-acetylaminophenyl group, 2-vinyl-4-methylphenyl group, 2-vinyl-5-ethylphenyl group, 2,6-disulfamoylphenyl group, 2,4,6-trimethoxyphenyl group, 3,4,5-triethoxyphenyl group, 2-vinyl-3,4,5-triethylphenyl group, pentamethoxyphenyl group, 2-vinylnaphthyl group, 2,3-dimethoxy-1-naphthyl group, 3,4-diethoxyphenyl group, 2-methoxy-5-methoxycarbonylphenyl group, 3,5-dimethoxycarbonylphenyl group, 3-chloro-4-hydroxyphenyl group, 2-chloro-5-(N-acetylamino)phenyl group, 2-chloro-5-cyanophenyl group, 2-chloro-5-carbamoylphenyl group, 2-methoxy-5-(N-acetylamino)phenyl group, 2-chloro-5-ethoxycarbonylphenyl group, 3,5,7-triethoxy-1-naphthyl group, 3,4,5,7-tetramethyl-1-naphthyl group, 2,3,4,5-tetramethyl-7-(N-pentaacetylamino)-1-naphthyl group, 2,3,4,5,6,7-hexaethoxy-1-naphthyl group, and heptamethoxy-1-naphthyl group.

[0094] Examples of the cyano lower alkyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having a single cyano group. Specific examples thereof include a cyanomethyl group, 2-cyanoethyl group, 1-cyanoethyl group, 3-cyanopropyl group, 4-cyanobutyl group, 1,1-dimethyl-2-cyanoethyl group, 5-cyanopentyl group, 6-cyanohexyl group, 1-cyanoisopropyl group, and 2-methyl-3-cyanopropyl group.

[0095] Examples of the lower alkanoylamino lower alkyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 3, preferably 1, amino groups which has 1 to 2 lower alkanoyl groups as illustrated above (a linear or branched alkanoyl group having 1 to 6 carbon atoms). Specific examples thereof include a 2-(N-formylamino)ethyl group, 2-(N-acetylamino)ethyl group, 2-(N-propionylamino)ethyl group, 2-(N-butyrylamino)ethyl group, 2-(N-isobutyrylamino)ethyl group, 2-(N-pentanoylamino)ethyl group, 2-(N-tert-butylcarbonylamino)ethyl group, 2-(N-hexanoylamino)ethyl group, N-acetylaminomethyl group, 1-(N-acetylamino)ethyl group, 3-(N-acetylamino)propyl group, 4-(N-acetylamino)butyl group, 5-(N-acetylamino)pentyl group, 6-(N-acetylamino)hexyl group, 1,1-dimethyl-2-(N-acetylamino)ethyl group, 2-methyl-3-(N-acetylamino)propyl group, and 2-(N,N-diacetylamino) ethyl group.

[0096] Examples of a halogen substituted lower alkylamino group include an amino group having 1 to 2 (preferably 1) halogen substituted lower alkyl groups as illustrated above (preferably a linear or branched halogen substituted alkyl group having 1 to 6 carbon atoms with 1 to 7 (preferably 1 to 3) halogen atoms). Specific examples thereof include an N-fluoromethylamino group, N-difluoromethylamino group, N-trifluoromethylamino group, N-chloromethylamino group, N-dichloromethylamino group, N-trichloromethylamino group, N-bromomethylaminogroup, N-dibromomethylamino group, N-dichlorofluoromethylamino group, N-2,2,2-trifluoroethylamino group, N-pentafluoroethylamino group, N-2-chloroethylamino group, N-3,3,3-trifluoropropylamino group, N-heptafluoropropylamino group, N-heptafluoroisopropylamino group, N-3-chloropropylamino group, N-2-chloropropylamino group, N-3-bromopropylamino group, N-4,4,4-trifluorobutylamino group, N-4,4,4,3,3-pentafluorobutylamino group, N-4-chlorobutylamino group, N-4-bromobutylamino group, N-2-chlorobutylamino group, N-5,5,5-trifluoropentylamino group, N-5-chloropentylamino group, N-6,6,6-trifluorohexylamino group, N-6-chlorohexylamino group, N-(1,1-dimethyl-2-chloroethyl)amino group, N-(2-methyl-3-fluoropropyl)amino group, and N,N-di(fluoromethyl)amino group.

[0097] Examples of the lower alkylthio lower alkyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 3 lower alkylthio groups whose alkyl moiety is a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms). Specific examples thereof include a 2-methylthioethyl group, 2-ethylthioethyl group, 2-n-propylthioethyl group, 2-n-butylthioethyl group, 2-tert-butylthioethyl group, 2-n-pentylthioethyl group, 2-n-hexylthioethyl group, methylthiomethyl group, 1-methylthioethyl group, 3-methylthiopropyl group, 4-methylthiobutyl group, 5-methylthiopentyl group, 6-methylthiohexyl group, 1,1-dimethyl-2-methylthioethyl group, 2-methyl-3-methylthiopropyl group, 2,2-diethylthioethyl group, and 2,2,2-triethylthioethyl group.

[0098] Examples of the amidino group that may have a lower alkyl group include an amidino group that may have 1

to 2 lower alkyl groups as illustrated above (linear or branched alkyl groups having 1 to 6 carbon atoms). Specific examples thereof include an amidino group, N-methylamidino group, N-ethylamidino group, N-n-propylamidino group, N-n-butylamidino group, N-n-pentylamidino group, N-n-hexylamidino group, N-isopropylamidino group, N-tert-butylamidino group, N,N-dimethylamidino group, N,N'-dimethylamidino group, and N-methyl-N'-ethyl-amidino group.

[0099] Examples of the amidino lower alkyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 3 amidino groups. Specific examples thereof include an amidinomethyl group, 2-amidinoethyl group, 3-amidinopropyl group, 4-amidinobutyl group, 5-amidinopropyl group, 6-amidinohexyl group, 1-amidinoethyl group, 1,1-dimethyl-2-amidinoethyl group, 2-methyl-3-amidinopropyl group, 2,2-diamidinoethyl group, and 2,2,2-triamidinoethyl group.

[0100] Examples of the lower alkenyloxy group include a lower alkenyloxy group whose lower alkenyl moiety is one as illustrated above (a linear or branched alkenyloxy group having 1 to 3 double bonds and 2 to 6 carbon atoms). Specific examples thereof include a vinyloxy group, 1-propenyloxy group, 1-methyl-1-propenyloxy group, 2-methyl-1-propenyloxy group, 2-propenyloxy group, 2-butenyloxy group, 1-butenyloxy group, 3-butenyloxy group, 2-pentenyloxy group, 1-pentenyloxy group, 3-pentenyloxy group, 4-pentenyloxy group, 1,3-butadienyloxy group, 1, 3-pentadienyloxy group, 2-penten-4-ynyloxy group, 2-hexenyloxy group, 1-hexenyloxy group, 5-hexenyloxy group, 3-hexenyloxy group, 4-hexenyloxy group, 3,3-dimethyl-1-propenyloxy group, 2-ethyl-1-propenyloxy group, 1,3,5-hexatrienyloxy group, 1,3-hexadienyloxy group, and 1,4-hexadienyloxy group.

[0101] Examples of the lower alkenyloxy lower alkyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 3 lower alkenyloxy groups whose lower alkenyloxy moiety is a lower alkenyloxy group as illustrated above (a linear or branched alkenyl group having 2 to 6 carbon atoms and 1 to 3 double bonds). Specific examples thereof include a vinyloxymethyl group, 2-vinyloxyethyl group, 2-(1-propenyloxy)ethyl group, 2-(1-methyl-1-propenyloxy)ethyl group, 2-(2-methyl-1-propenyloxy)ethyl group, 2-(2-propenyloxy) ethyl group, 2-(2-butenyloxy)ethyl group, 2-(1-butenyloxy)ethyl group, 2-(3-butenyloxy)ethyl group, 2-(2-pentenyloxy) ethyl group, 2-(1-pentenyloxy)ethyl group, 2-(3-pentenyloxy) ethyl group, 2-(4-pentenyloxy)ethyl group, 2-(1,3-butadienyloxy)ethyl.group, 2-(1,3-pentadienyloxy)ethyl group, 2-(2-penten-4-ynyloxy)ethyl group, 2-(2-hexenyloxy)ethyl group, 2-(1-hexenyloxy)ethyl group, 2-(5-hexenyloxy)ethyl group, 2-(3-hexenyloxy)ethyl group, 2-(4-hexenyloxy)ethyl group, 2-(3,3-dimethyl-1-propenyloxy)ethyl group, 2-(2-ethyl-1-propenyloxy)ethyl group, 2-(1,3,5-hexatrienyloxy)ethyl group, 2-(1,3-hexadienyloxy)ethyl group, 2-(1,4-hexadienyloxy)ethyl group, 3-vinyloxypropyl group, 4-vinyloxybutyl group, 5-vinyloxypropyl group, 6-vinyloxyhexyl group, 1-vinyloxyethyl group, 1,1-dimethyl-2-vinyloxyethyl group, 2-methyl-3-vinyloxypropyl group, 2,2-divinyloxyethyl group, and 2,2,2-trivinyloxyethyl group.

[0102] Examples of the arylamino group that may have a substituent selected from the group consisting of a lower alkyl group, lower alkoxy group, halogen substituted lower alkyl group, and halogen substituted lower alkoxy group on the aryl group include

an amino group having 1 to 2 aryl groups as illustrated above that may have 1 to 7, preferably 1 to 5, more preferably 1 to 2 substituents, on the aryl group, which are selected from the group consisting of a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);

a lower alkoxy group as illustrated above (a linear or branched alkoxy group having 1 to 6 carbon atoms);

a halogen substituted alkyl group as illustrated above (preferably a linear or branched alkyl group having 1 to 6 carbon atoms with 1 to 7, preferably 1 to 3 halogen atoms); and

halogen substituted lower alkoxy group as illustrated above (a linear or branched alkoxy group having 1 to 6 carbon atoms with preferably 1 to 7, more preferably 1 to 3 halogen atoms). Specific examples thereof include an N-phenylamino group, N-2-naphthylamino group, N-(2-methylphenyl)amino group, N-(3-ethyl-1-naphthyl)amino group, N-(4-n-propylphenyl)amino group, N-(2-n-butyl-1-phenyl)amino group, N-(3-n-pentylphenyl)amino group, N-(4-n-hexyl-1-naphthyl) amino group, N-(2-isobutylphenyl) amino group, N-(3-tert-butyl-1-naphthyl)amino group, N-(2-methoxyphenyl)amino group, N-(3-ethoxy-1-naphthyl)amino group, N-(4-n-propoxyphenyl)amino group, N-(3-isopropoxy-1-naphthyl)amino group, N-(n-butoxyphenyl)amino group, N-(1-isobutoxy-2-naphthyl)amino group, N-(tert-butoxyphenyl)amino group, N-(5-sec-butoxy-1-naphthyl)amino group, N-(n-pentyloxyphenyl)amino group, N-(5-isopentyloxy-1-naphthyl)amino group, N-(1-neopentyloxyphenyl)amino group, N-(6-n-hexyloxy-2-naphthyl)amino group, N-(isohexyloxyphenyl)amino group, N-(3-methylpentyloxy-1-naphthyl)amino group, N-(2-trifluoromethylphenyl)amino group, N-(4-trifluoromethylphenyl)amino group, N-(2-chloromethylphenyl)amino group, N-[3-(2-fluoroethyl)-1-naphthyl]amino group, N-[4-(3-bromopropyl)phenyl]amino group, N-[2-(4-chlorobutyl)-1-phenyl]amino group, N-[3-(5-fluoropentyl)phenyl]amino group, N-[4-(6-bromohexyl)-1-naphthyl]amino group, N-[2-(1,1-dimethyl-2-chloroethyl)phenyl]amino group, N-[7-(2-methyl-3-fluoropropyl)-2-naphthyl]amino group, N-(2-chloromethoxyphenyl)amino group, N-(4-trifluoromethoxyphenyl)amino group, N-(3-(2-fluoroethoxy)-1-naphthyl)amino group, N-[4-(3-bromopropoxy)phenyl]amino group, N-[2-(4-chlorobutoxy)-1-phenyl]amino group, N-[3-(5-fluoropentyloxy)phenyl]amino group, N-[4-(6-bromohexyloxy)-1-naphthyl]amino group, N-[2-(1,1-dimethyl-2-chloroethoxy)phenyl]amino group, N-[7-(2-methyl-3-fluoropropoxy)-2-naphthyl]amino group, N-(2-chloromethoxyphenyl)amino group, N-[3-(2-fluoroethoxy)-1-naphthyl]amino group, N-[4-(3-bromopropoxy) phenyl]amino group, N-[2-(4-chlorobutoxy)-1-phenyl]amino group, N-[3-(5-fluoropentyloxy)phenyl]amino group, N-[4-(6-

bromohexyloxy)-1-naphthyl]amino group, N-[2-(1,1-dimethyl-2-chloroethoxy)phenyl]amino group, N-[7-(2-methyl-3-fluoropropoxy)-2-naphthyl]amino group, and N,N-diphenylamino group.

[0103] Examples of the aryl lower alkenyl group include a lower alkenyl group as illustrated above having an aryl group as illustrated above (preferably a linear or branched alkenyl group having 1 to 3 aryl groups and 1 to 6 carbon atoms). Specific examples thereof include a 2-phenylethenyl group, 3-phenyl-2-propenyl group, 3-[(1- or 2-)naphthyl]-2-propenyl group, 4-[(2-,3-, or 4-)methylphenyl]-2-butenyl group, 4-[(2-, 3-, or 4-)ethylphenyl]-3-butenyl group, 4-[(2-, 3-, or 4-)n-propylphenyl]-1,3-butadienyl group, 5-[(2-, 3-, or 4-)n-butylphenyl]-1,3,5-hexatrienyl group, 5-[(2-, 3-, or 4-)n-pentylphenyl]-2,4-hexadienyl group, 5-[(2-, 3-, or 4-)n-hexylphenyl]-3-pentenyl group, 3-[(2-, 3-, or 4-)isobutylphenyl]-2-propenyl group, 2-[(2-, 3-, or 4-)tert-butylphenyl]phenyl group, 3-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)methyl-1-naphthyl]-2-propenyl group, 4-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-)methyl-2-naphthyl]-2-butenyl group, 4-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)ethyl-1-naphthyl]-3-butenyl group, 4-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-)ethyl-2-naphthyl]-1,3-butadienyl group, 5-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-propyl-1-naphthyl]-1,3,5-hexatrienyl group, 5-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-propyl-2-naphthyl]-2,4-hexadienyl group, 5-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-butyl-1-naphthyl]-3-pentenyl group, 3-[(1-,3-, 4-, 5-, 6-, 7-, or 8-)n-butyl-2-naphthyl]-2-propenyl group, 2-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-pentyl-1-naphthyl]ethenyl group, 3-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-pentyl-2-naphthyl]-2-propenyl group, 4-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-hexyl-1-naphthyl]-2-butenyl group, 4-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-hexyl-2-naphthyl]-3-butenyl group,4- [(2-, 3-, 4-, 5-, 6-, 7-, or 8-)isobutyl-1-naphthyl]-1,3-butadienyl group, 5-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-)isobutyl-2-naphthyl]-1,3,5-hexatrienyl group, 5-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)tert-butyl-1-naphthyl]-2,4-hexadienyl group, 5-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-)tert-butyl-2-naphthyl]-1,3,5-hexatrienyl group, 5-[(2-, 3-, or 4-)chlorophenyl group, (2-, 3-, or 4-)fluorophenyl]-2,4-hexadienyl group, 5-[(2-, 3-, or 4-)bromophenyl]-3-pentenyl group, 3-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-chloro-1-naphthyl]-2-propenyl group, 2-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-)chloro-2-naphthyl]ethenyl group, 3-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)fluoro-1-naphthyl]-2-propenyl group, 4-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-)fluoro-2-naphthyl]-2-butenyl group, 4-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)bromo-1-naphthyl]-3-butenyl group, 4-[(1-, 3-, 4-, 5-, 6-, 7-, or 8-)bromo-2-naphthyl]-1,3-butadienyl group, 5-[(2-, 3-, or 4-)aminophenyl]-1,3,5-hexatrienyl group, 5-[(2-, 3-, 4-, 5-, 6-, 7-, or 8-)amino-1-naphthyl]-2,4-hexadienyl group, 5-[(1-,3-, 4-, 5-, 6-, 7-, or 8-)amino-2-naphthyl]-3-pentenyl group, 3-(2,3-dimethylphenyl)-2-propenyl group, 2-(3,4-dimethylphenyl)vinyl group, 3-(2,4-dimethylphenyl)-2-propenyl group, 4-(2,5-dimethylphenyl)-2-butenyl group, 4-(2,6-dimethylphenyl)-3-butenyl group, 4-(2,4,6-trimethylphenyl)-1,3-butadienyl group, 5-(3,4,5-trimethylphenyl)-1,3,5-hexatrienyl group, 5-(2,3,4,5-tetraethylphenyl)-2,4-hexadienyl group, 5-(pentamethylphenyl)-3-pentenyl group, 3-(2-methylnaphthyl)-2-propenyl group, 2-(2,3-dimethylnaphthyl)ethenyl group, 3-(3,4-dimethylphenyl)-2-propenyl group, 4-(3,5,7-triethylnaphthyl)-2-butenyl group, 4-(3,4,5,7-tetramethylnaphthyl)-3-butenyl group, 4-(2,3,4,5,7-pentamethylnaphthyl)-1,3-butadienyl group, 5-(2,3,4,5,6,7-hexaethylnaphthyl)-1,3,5-hexatrienyl group, 5-(heptamethylnaphthyl)-2,4-hexadienyl group, 5-(2,3-diaminophenyl)-3-pentenyl group, 3-(2,4,6-triaminophenyl)-2-propenyl group, and 2-(2-methyl-5-chloronaphthyl)ethenyl group.

[0104] Examples of the pyridylamino group that may have a lower alkyl group include a pyridylamino group that may have 1 to 3, preferably 1 to 2 lower alkyl groups as illustrated above (linear or branched alkyl groups having 1 to 6 carbon atoms), on the pyridyl group and/or amino group. Specific examples thereof include an N-(2-, 3-, or 4-)pyridylamino group, N-3-methyl-2-pyridylamino group, N-(4-methyl-2-pyridyl)amino group, N-(5-methyl-2-pyridyl)amino group, N-(6-methyl-2-pyridyl)amino group, N-(2-methyl-3-pyridyl)amino group, N-(4-methyl-3-pyridyl)amino group, N-(5-methyl-3-pyridyl)amino group, N-(6-methyl-3-pyridyl)amino group, N-(2-methyl-4-pyridyl)amino group, N-(3-methyl-4-pyridyl)amino group, N-(3-ethyl-2-pyridyl)amino group, N-(4-n-propyl-2-pyridyl)amino group, N-(5-n-propyl-2-pyridyl)amino group, N-(2-n-butyl-3-pyridyl)amino group, N-(4-n-pentyl-3-pyridyl)amino group, N-(5-n-hexyl-3-pyridyl)amino group, N-(2-isopropyl-4-pyridyl)amino group, N-(3-tert-butyl-4-pyridyl)amino group, N-(3-methyl-2-pyridyl)-N-methyl-amino group, and N-(2,4-diethyl-3-pyridyl)-N-methyl-amino group.

Examples of the aryl lower alkyl group (that may have a group selected from the group consisting of halogen atom, lower alkyl group, halogen substituted alkyl group, halogen substituted lower alkoxy group, lower alkoxy group, carbamoyl group, and lower alkoxycarbonyl group, as a substituent, on the aryl group and/or the lower alkyl group) include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 3 (preferably 1) aryl groups as illustrated above. Note that, on the aryl group and/or the alkyl moiety, there may be 1 to 7, preferably 1 to 5, more preferably, 1 to 2 substituents selected from the group consisting of

a halogen atom as illustrated above;

a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);

a halogen substituted lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms preferably substituted with 1 to 7 halogen atoms);

a lower alkoxy group as illustrated above (a linear or branched alkoxy group having 1 to 6 carbon atoms substituted with 1 to 7 halogen atoms);

a lower alkoxy group as illustrated above (a linear or branched alkoxy group having 1 to 6 carbon atoms);

a carbamoyl group; and

a lower alkoxy-carbonyl group as illustrated above. Specific examples of the aryl lower alkyl group (that may have a substituent selected from the group consisting of a halogen atom, lower alkyl group, halogen substituted lower alkyl

group, halogen substituted lower alkoxy group, lower alkoxy group, carbamoyl group and lower alkoxycarbonyl group, on the aryl group and/or the lower alkyl group) include a benzyl group, 1-phenylethyl group, 2-phenylethyl group, 1-methyl-1-phenylethyl group, 1,1-dimethyl-2-phenylethyl group, 1,1-dimethyl-3-phenylpropyl group, (2-, 3-, or 4-)fluorobenzyl group, 2-[(2-, 3-, or 4-)fluorophenyl]ethyl group, 1-[(2-, 3-, or 4-)fluorophenyl]ethyl group, 1-[(2-, 3-, or 4-)fluorophenyl]propyl group, 2-[(2,6- or 3,5-)difluorophenyl]ethyl group, 1-(3,5-difluorophenyl)ethyl group, 1-(3,5-difluorophenyl)propyl group, (2-, 3-, or 4-)chlorobenzyl group, 2-[(2-, 3-,or 4-)chlorophenyl]ethyl group, 2-(3,4-dichlorophenyl)ethyl group, 1-(3-chlorophenyl)butyl group, 1-(4-chlorophenyl)butyl group, (2-, 3-, or 4-)trifluoromethylphenylbenzyl group, 1-[(2-, 3-, or 4-)trifluoromethylphenyl]ethyl group, 1-[(2-, 3-, or 4-)trifluoromethylphenyl]propyl group, (2-, 3-, or 4-)methylbenzyl group, 2-[(2- 3-, or 4-)methylphenyl]ethyl group, (2-, 3-, or 4-)trifluoromethoxybenzyl group, 1-[(2-, 3-, or 4-)trifluoromethylphenyl]ethyl group, (2-, 3-, or 4-)methoxybenzyl group, 2-[(2-, 3-, or 4-)methylphenyl]ethyl group, 1-[(2-, 3-, or 4-)methoxyphenyl]propyl group, (2-, 3-, or 4-)ethoxybenzyl group, (3,4- or 3,5-)dimethoxybenzyl group, (3,4- or 3,5-)di(n-butoxy)benzyl group, 2-[(3,5-or 3,4-)dimethoxyphenyl]ethyl group, 2-(2-ethoxyphenyl)ethyl group, 1-(4-methoxyphenyl)butyl group, 1-phenyl-1-methoxycarbonylmethyl group, 1-carbamoyl-2-phenylethyl group, 1-methoxycarbonyl-2-phenylethyl group, 2-methoxycarbonyl-2-phenylethyl group, 2-phenyl-2-hydroxyethyl group, 2-(4-hydroxyphenyl)-1-methoxycarbonylethyl group, 3-chloro-4-difluoromethoxyphenylmethyl group, and naphthylmethyl group.

[0105] Examples of the lower alkynyl group include a linear or branched alkynyl group having 2 to 6 carbon atoms. Specific examples thereof include an ethynyl group, 2-propynyl group, 2-butynyl group, 3-butynyl group, 1-methyl-2-propynyl group, 2-pentynyl group, and 2-hexynyl group.

[0106] Examples of the aryloxy lower alkyl group (on the aryl group, a group selected from the group consisting of a lower alkoxy group; a carbamoyl group that may have a group selected from the group consisting of a lower alkoxy group and a lower alkyl group; and a pyrrolidinyl group that may have an oxo group, may be present, include an aryl lower alkyl group whose aryl moiety and lower alkyl group are as illustrated above. On the aryl group herein, 1 to 5 (preferably 1 to 2) groups selected from the group consisting of a lower alkoxy group as illustrated above; a carbamoyl group that may have 1 to 2 groups selected from the group consisting of a lower alkoxy group as illustrated above and a lower alkyl group as illustrated above; and oxo group may be present as a substituent(s). Specific examples thereof include a 2-[(2-, 3- or 4-)methoxyphenoxy]ethyl group, 2-[(2-, 3- or 4-)carbamoylphenoxy]ethyl group, 2-[(2-, 3- or 4-)(N-methyl-N-ethoxycarbamoyl)phenoxy]ethyl group and 2-[(2-, 3- or 4-)(2-oxo-1-pyrolidiny)phenoxy]ethyl group.

[0107] Examples of the isoxazolidinyl group that may have an oxo group include an isoxazolidinyl group that may have 1 to 2 (preferably 1) oxo groups. Specific examples thereof include a 3-oxoisooxazolidin-4- or 5-yl group and 3,5-dioxoisoxazolidin-4-yl group.

[0108] Examples of the dihydroindenyl group include a (1-, 2-, 4- or 5-)-1,2-dihydroindenyl group.

[0109] Examples of the aryl lower alkoxy lower alkyl group include an aryl lower alkoxy lower alkyl group whose aryl moiety, lower alkoxy moiety and lower alkyl group moiety are as illustrated above. Specific examples thereof include a benzyloxymethyl group, 2-benzyloxyethyl group and 2-benzyloxybutyl group.

[0110] Examples of the azetidinyl group that may have a group selected from the group consisting of a lower alkanoyl group and an aroyl group include an azetidinyl group that may have a 1 to 3 (preferably 1) groups selected from a lower alkanoyl group as illustrated above and an aroyl group as illustrated above. Specific examples thereof include a 2- or 3-azetinyl group, 1-acetyl-(2- or 3-)azetidinyl group, 1-butyryl-(2- or 3-)azetidinyl group and 1-benzoyl-(2- or 3-)azetidinyl group.

[0111] Examples of the azetidinyl lower alkyl group that may have a group selected from the group consisting of a lower alkanoyl group and an aroyl group include an azetidinyl lower alkyl group that may have 1 to 3 (preferable 1) groups selected from the group consisting of a lower alkanoyl group as illustrated above and an aroyl group as illustrated above and have a lower alkyl moiety as illustrated above. Specific examples thereof include a 2- or 3-azetidinylmethyl group, 2-(2- or 3-azetidinyl)ethyl group, 1-acetyl-(2-or 3-)azetidinylmethyl group, 1-butyryl-(2- or 3-)azetidinylmethyl group, 1-benzoyl-(2- or 3-)azetidinylmethyl group, 2-[1-acetyl-(2- or 3-)azetidinyl]ethyl group, 2-[1-butyryl-(2- or 3-)azetidinyl]ethyl group and 2-[1-benzoyl-(2- or 3-)azetidinyl]ethyl group.

[0112] Examples of the tetrazolyl group include a (1- or 5-)tetrazolyl group.

[0113] Examples of the indolinyl group that may have an oxo group include an indolinyl group that may have 1 to 2 (preferably 1) oxo groups. Specific examples thereof include a (1-,3-, 5-, 6-,7- or 8-)indolinyl group, 2-oxo-(1-,3-, 5-, 6-, 7- or 8-)indolinyl group and 2,3-dioxo-(1-,5-,6-, 7- or 8-)indolinyl group.

[0114] Examples of the triazolyl group include a 1,2,4,-triazolyl group and a 1,3,5,-triazolyl group.

[0115] Examples of the triazolyl group that may have a group selected from the group consisting of a lower alkyl group and a lower alkylthio group include a triazolyl group as illustrated above that may have 1 to 3 (more preferably 1 to 2) groups selected from the group consisting of a lower alkyl group as illustrated above and a lower alkylthio group as illustrated above. Specific examples thereof include a (1-, 3- or 5-)-1,2,4-triazolyl group, (1-, 2- or 5-)-1,3,5-triazolyl group, 1-methyl-5-methylthio-1,2,4-triazol-3-yl group and 1-methyl-5-methylthio-1,2,3-triazol-2-yl group.

[0116] Examples of the imidazolyl group that may have a carbamoyl group include an imidazolyl group that may have 1 to 2 (preferably 1) carbamoyl groups. Specific examples thereof include a (1-, 2-, 4- or 5-)imidazolyl group and a 4-

carbamoyl-(1, 2- or 5-)imidazolyl group.

[0117] Examples of the oxazolyl group that may have a lower alkyl group include an oxazolyl group that may have 1 to 2 (preferably 1) lower alkyl groups as illustrated above. Specific examples thereof include a (2-, 3- or 4-)oxazolyl group and a 4-methyl-(2- or 3-)oxazolyl group.

[0118] Examples of the isothiazolyl group that may have a lower alkyl group include an isothiazolyl group that may have 1 to 2 (preferably 1) lower alkyl groups as illustrated above. Specific examples thereof include a (3-, 4- or 5-) isothiazolyl group and a (3- or 4-)methyl-2-isothiazolyl group.

[0119] Examples of the dihydrobenzothiazolyl group include a (1-,2-,4-, 5-, 6- or 7-)2,3-dihydrobenzothiazolyl group.

[0120] Examples of the dihydrobenzothiazolyl group that may have an oxo group include a dihydrobenzothiazolyl group that may have a single oxo group. Specific examples thereof include a (1-, 2-, 5-, 6-, 7- or 8-)2,3-dihydrobenzothiazolyl group and a 2-oxo-(1-,5-, 6-, 7- or 8-)2,3-dihydrobenzothiazolyl group.

[0121] Examples of the thienyl group that may have a lower alkoxycarbonyl group include a thienyl group that may have 1 to 2 (preferably 1) lower alkoxycarbonyl groups as illustrated above. Specific examples thereof include a (2- or 3-)thienyl group and a 3-methoxycarbonyl-2-thienyl group.

[0122] Examples of the oxazolyl lower alkyl group that may have a lower alkyl group include an oxazolyl lower alkyl group as illustrated above, whose alkyl group as illustrated above, having 1 to 3 (more preferably 1 to 2) lower alkyl groups as illustrated above on the oxazole ring. Specific examples thereof include a (2-, 4- or 5-)oxazolylmethyl group, 2-(2-, 4-or 5-)oxazolylmethyl group, [2-methyl-(4- or 5-)oxazolyl]methyl group and (2,5-dimethyl-4-oxazolyl)methyl group.

[0123] Examples of the amino lower alkyl group that may have a group, on the amino group, which is selected from the group consisting of a lower alkyl group, halogen substituted lower alkyl group, lower alkoxycarbonyl group, lower alkanoyl group, aryl group, aryl lower alkyl group, aroyl group, and amino substituted alkyl group (on the amino group of the amino substituted alkyl group, a lower alkyl group may be present as a substituent) include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 5, preferable 1 to 3, more preferably 1, amino groups. Note that, on the amino group, 1 to 2 substituents may be present which are selected from the group consisting of

a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);

a halogen substituted lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms with 1 to 13, preferably 1 to 7, more preferably 1 to 3 halogen atoms);

a lower alkoxy-carbonyl group as illustrated above ;

a lower alkanoyl group as illustrated above (

a linear or branched alkanoyl group having 1 to 6 carbon atoms);

an aryl group as illustrated above;

an aryl lower alkyl group as illustrated above;

an aroyl group as illustrated above; and a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) having 1 to 5, preferably 1 to 3, more preferably 1, amino groups (1 to 2 lower alkyl groups as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) may be present on the amino group, as a substituent(s)). Specific examples of the amino lower alkyl group that may have, on the amino group, a group selected from the group consisting of a lower alkyl group, halogen substituted lower alkyl group, lower alkoxycarbonyl group, lower alkanoyl group, aryl group, aryl lower alkyl group, aroyl group, and amino substituted alkyl group ((on the amino group of the amino substituted alkyl group, a lower alkyl group may be present as a substituent) include an N-methylaminomethyl group, N-ethylaminomethyl group, N-n-propylaminomethyl group, N,N-dimethylaminomethyl group, N,N-diethylaminomethyl group, N-methyl-N-n-propylaminomethyl group, N-methyl-N-ethylaminomethyl group, N-(2,2,2-trifluoroethyl)aminomethyl group, N-methyl-N-benzylaminomethyl group, N-phenylaminomethyl group, N-methyl-N-phenylaminomethyl group, N-formylaminomethyl group, N-methyl-N-acetylaminomethyl group, N-methyl-N-propionylaminomethyl group, N-(2-(N,N-diethylamino)ethyl)aminomethyl group, N-methyl-N-benzoylaminomethyl group, N-methylaminoethyl group, N-ethylaminoethyl group, N-(2,2,2-trifluoroethyl)aminoethyl group, N,N-dimethylaminoethyl group, N, N-diethylaminoethyl group, N-methyl-N-acetylaminoethyl group, N-methyl-N-benzoylaminoethyl group, N-methyl-N-propionylaminoethyl group, N-methyl-N-benzylaminoethyl group, and N-methyl-N-tert-butoxycarbonylaminoethyl group.

[0124] Examples of the lower alkyl group substituted with a carbamoyl group that may have a group selected from the group consisting of a lower alkyl group and a halogen substituted lower alkyl group include a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) and substituted with 1 to 3 (preferably 1) carbamoyl groups that may have 1 to 2 groups selected from the group consisting of

a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms); and

a halogen substituted lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms and 1 to 13, preferably 1 to 7, more preferably 1 to 3 halogen atoms). Specific examples thereof include a carbamoylmethyl group, 2-carbamoylethyl group, 1-carbamoylethyl group, 3-carbamoylpropyl group, 4-carbamoylbutyl group, 5-carbamoylpentyl group, 6-carbamoylhexyl group, 1,1-dimethyl-2-carbamoylethyl group, 2-methyl-3-carbamoylpropyl group, 1,2-dicarbamoylethyl group, 2,2-dicarbamoylethyl group, 1,2,3-tricarbamoylpropyl group, N-methylcarbamoylmethyl

group, N-ethylcarbamoylmethyl group, 2-(N-n-propylcarbamoyl)ethyl group, 3-(N-n-butylcarbamoyl)propyl group, 4-(N-isobutylcarbamoyl)butyl group, 5-(N-tert-butylcarbamoyl)pentyl group, 6-(N-pentylcarbamoyl)hexyl group, N,N-dimethylcarbamoylmethyl group, N,N-diethylcarbamoylmethyl group, 2-(N-2-fluoroethylcarbamoyl)ethyl group, 3-(N-2-chloroethylcarbamoyl)propyl group, 4-(N-2-bromoethylcarbamoyl)butyl group, 2-(N-2,2-dichloroethylcarbamoyl)ethyl group, N-2,2,2-trifluoroethylcarbamoylmethyl group, and N-heptafluoropropylcarbamoylmethyl group.

[0125] Examples of the thiocarbamoyl group that may have a lower alkyl group include a thiocarbamoyl group that may have 1 to 2 lower alkyl groups as illustrated above (linear or branched alkyl groups having 1 to 6 carbon atoms). Specific examples thereof include a thiocarbamoyl group, N-methyl-thiocarbamoyl group, N-ethyl-thiocarbamoyl group, N-n-propylthiocarbamoyl group, N-n-butyl-thiocarbamoyl group, N-n-pentyl-thiocarbamoyl group, N-n-hexyl-thiocarbamoyl group, N-isobutyl-thiocarbamoyl group, N-tert-butyl-thiocarbamoyl group, N,N-dimethyl-thiocarbamoyl group, and N-methyl-N-ethyl-thiocarbamoyl group.

[0126] Examples of the oxazolidinyl group that may have an oxo group include an oxazolidinyl group that may have 1 to 2 (preferably 1) oxo groups. Specific examples thereof include an oxazolidin-3-yl group, oxazolidin-4-yl group, oxazolidin-5-yl group, 2-oxo-oxazolidin-4-yl group, 2-oxo-oxazolidin-3-yl group, and 2-oxo-oxazolidin-5-yl group.

[0127] Examples of the imidazolidinyl group that may have a substituent selected from the group consisting of an oxo group and a lower alkyl group include an imidazolidinyl group that may have 1 to 3, preferably 1 to 2 substituents selected from the group consisting of oxo group and a lower alkyl group as illustrated above (preferably a linear or branched alkyl group having 1 to 6 carbon atoms). Specific examples thereof include an imidazolidin-1-yl group, imidazolidin-2-yl group, imidazolidin-4-yl group, 2-oxo-imidazolidin-1-yl group, 4-oxo-imidazolidin-1-yl group, 5-oxo-imidazolidin-1-yl group, 4-oxo-imidazolidin-2-yl group, 2-oxo-imidazolidin-4-yl group, 2-methyl-imidazolidin-1-yl group, 4-ethyl-imidazolidin-1-yl group, 5-n-propyl-imidazolidin-1-yl group, 4-n-butyl-imidazolidin-2-yl group, 2-n-pentyl-imidazolidin-4-yl group, 2-n-hexyl-imidazolidin-1-yl group, 4-isobutyl-imidazolidin-2-yl group, 2-tert-butyl-imidazolidin-4-yl group, 2-oxo-3-methyl-imidazolidin-1-yl group, and 2-oxo-3,4-dimethyl-imidazolidin-1-yl group.

[0128] Examples of the pyrrolidinyl group that may have an oxo group include a pyrrolidinyl group that may have 1 to 2 (preferably 1) oxo groups. Specific examples thereof include a (1-, 2- or 3-)pyrrolidinyl group, (2- or 3-)oxo-1-pyrrolidinyl group, (3-, 4- or 5-)oxo-2-pyrrolidinyl group, and (2-,4- or 5-)oxo-3-pyrrolidinyl group.

[0129] Examples of the imidazolyl group include a (1-,2-, 4- or -5)imidazolyl group.

[0130] Examples of the isoxazolyl group include a (3-, 4- or 5-)isoxazolyl group.

[0131] Examples of the arylsulfonyl group include an arylsulfonyl group whose aryl moiety is phenyl, biphenyl, substituted biphenyl, substituted phenyl, naphthyl and substituted naphthyl, and which may have, on the aryl moiety, 1 to 7, preferably 1 to 5, more preferably 1 to 2 linear or branched alkyl groups having 1 to 6 carbon atoms. Examples of the substituent such as phenyl, biphenyl and naphthyl include a linear or branched alkyl group having 1 to 6 carbon atoms, a halogen atom, an amino group and the like. One to seven, preferably 1 to 5, more preferably 1 to 2 substituents of at least one type of these may be present on the phenyl, biphenyl, naphthyl ring and the like. Specific Examples of the arylsulfonyl group that may have a lower alkyl group on the aryl group include a phenylsulfonyl group, (2-, 3-, or 4-)biphenylsulfonyl group, (1- or 2-)naphthylsulfonyl group, (2-, 3-, or 4-)methylphenylsulfonyl group, (2-, 3-, or 4-)ethylphenylsulfonyl group, (2-, 3-, or 4-)n-propylphenylsulfonyl group, (2-, 3-, or 4-)n-butylphenylsulfonyl group, (2-, 3-, or 4-)n-pentylphenylsulfonyl group, (2-, 3-, or 4-)n-hexylphenylsulfonyl group, (2-, 3-, or 4-)isobutylphenylsulfonyl group, (2-, 3-, or 4-)tert-butylphenylsulfonyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)methyl-2-biphenylsulfonyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)methyl-3-biphenylsulfonyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)methyl-4-biphenylsulfonyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)ethyl-2-biphenylsulfonyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)ethyl-3-biphenylsulfonyl group, (2-, 3-; 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)ethyl-4-biphenylsulfonyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-propyl-2-biphenylsulfonyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-propyl-3-biphenylsulfonyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-propyl-4-biphenylsulfonyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-butyl-2-biphenylsulfonyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-butyl-3-biphenylsulfonyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-butyl-4-biphenylsulfonyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-pentyl-2-biphenylsulfonyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-pentyl-3-biphenylsulfonyl group, (2-, 3-, 5-, 6-, 2'-, 3'- 4'-, 5'-, or 6'-)n-pentyl-4-biphenylsulfonyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-hexyl-2-biphenylsulfonyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-hexyl-3-biphenylsulfonyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)n-hexyl-4-biphenylsulfonyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)isobutyl-2-biphenylsulfonyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)isobutyl-3-biphenylsulfonyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)isobutyl-4-biphenylsulfonyl group, (3-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)tert-butyl-2-biphenylsulfonyl group, (2-, 4-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)tert-butyl-3-biphenylsulfonyl group, (2-, 3-, 5-, 6-, 2'-, 3'-, 4'-, 5'-, or 6'-)tert-butyl-4-biphenylsulfonyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)methyl-1-naphthylsulfonyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)methyl-2-naphthylsulfonyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)ethyl-1-naphthylsulfonyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)ethyl-2-naphthylsulfonyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-propyl-1-naphthylsulfonyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-propyl-2-naphthylsulfonyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-butyl-1-naphthylsulfonyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-butyl-2-naphthylsulfonyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-pentyl-1-naphthylsulfonyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)n-pentyl-2-naphthylsulfonyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)n-hexyl-1-naphthylsulfonyl group, (1-, 3-,

4-, 5-, 6-, 7-, or 8-)n-hexyl-2-naphthylsulfonyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)isobutyl-1-naphthylsulfonyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)isobutyl-2-naphthylsulfonyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)tert-butyl-1-naphthylsulfonyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)tert-butyl-2-naphthylsulfonyl group, (2-, 3-, or 4-)chlorophenylsulfonyl group, (2-, 3-, or 4-) fluorophenylsulfonyl group, (2-, 3-, or 4-)bromophenylsulfonyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)chloro-1-naphthylsulfonyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)chloro-2-naphthylsulfonyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)fluoro-1-naphthylsulfonyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)fluoro-2-naphthylsulfonyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)bromo-1-naphthylsulfonyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)bromo-2-naphthylsulfonyl group, (2-, 3-, or 4-)aminophenylsulfonyl group, (2-, 3-, 4-, 5-, 6-, 7-, or 8-)amino-1-naphthylsulfonyl group, (1-, 3-, 4-, 5-, 6-, 7-, or 8-)amino-2-naphthylsulfonyl group, 2,3-dimethylphenylsulfonyl group, 3,4-dimethylphenylsulfonyl group, 2,4-dimethylphenylsulfonyl group, 2,5-dimethylphenylsulfonyl group, 2,6-dimethylphenylsulfonyl group, 2,4,6-trimethylphenylsulfonyl group, 3,4,5-trimethylphenylsulfonyl group, 2,3,4,5-tetraethylphenylsulfonyl group, pentamethylphenylsulfonyl group, 2-methylnaphthylsulfonyl group, 2,3-dimethylnaphthylsulfonyl group, 3,4-dimethylphenylsulfonyl group, 3,5,7-triethylnaphthylsulfonyl group, 3,4,5,7-tetramethylnaphthylsulfonyl group, 2,3,4,5,7-pentamethylnaphthylsulfonyl group, 2,3,4,5,6,7-hexaethylnaphthylsulfonyl group, heptamethylnaphthylsulfonyl group, 2,3-diaminophenylsulfonyl group, 2,4,6-triaminophenylsulfonyl group, and 2-methyl-5-chloronaphthylsulfonyl group.

[0132] Examples of the piperidyl group that may have a substituent selected from the group consisting of a lower alkyl group; lower alkanoyl group; arylsulfonyl group; oxo group; hydroxy group and amino group that may have a group selected from the group consisting of a lower alkyl group, lower alkanoyl group, lower alkoxycarbonyl group and lower alkanoylamino lower alkanoyl group include a piperidyl group that may have 1 to 5, preferably 1 to 3, more preferably 1 substituent selected from the group consisting of

a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);

a lower alkanoyl group as illustrated above (

a linear or branched alkanoyl group having 1 to 6 carbon atoms); and

an arylsulfonyl group as illustrated above; an oxo group; a hydroxy group; and an amino group that may have 1 to 2 groups selected from the group consisting of a lower alkyl group as illustrated above, lower alkanoyl group as illustrated above, lower alkoxycarbonyl group as illustrated above and lower alkanoyl amino lower alkanoyl group as illustrated above. Specific examples thereof include a (1-, 2-, 3-, or 4-)piperidyl group, 1-methyl-4-piperidyl group, 2-ethyl-4-piperidyl group, 3-n-propyl-4-piperidyl group, 4-isopropyl-4-piperidyl group, 2-n-butyl-1-piperidyl group, 3-isobutyl-1-piperidyl group, 4-tert-butyl-1-piperidyl group, 1-sec-butyl-2-piperidyl group, 2-n-pentyl-2-piperidyl group, 3-(1-ethylpropyl)-2-piperidyl group, 4-iso-pentyl-2-piperidyl group, 5-neopentyl-2-piperidyl group, 6-n-hexyl-2-piperidyl group, 1-(1,2,2-trimethylpropyl)-3-piperidyl group, 2-(3,3-dimethylbutyl)-3-piperidyl group, 3-(2-ethylbutyl)-3-piperidyl group, 4-isohexyl-3-piperidyl group, 5-(3-methylpentyl group)-3-piperidyl group, 6-formyl-3-piperidyl group, 1-acetyl-4-piperidyl group, 2-propionyl-4-piperidyl group, 3-butyryl-4-piperidyl group, 4-isobutyryl-4-piperidyl group, 2-pentanoyl-1-piperidyl group, 3-tert-butylcarbonyl-1-piperidyl group, 4-hexanoyl-1-piperidyl group, 1-phenylsulfonyl-2-piperidyl group, 2-(2-biphenylsulfonyl)-2-piperidyl group, 3-(1-naphthylsulfonyl)-2-piperidyl group, 1-tosyl-4-piperidyl group, 4-(4-ethylphenylsulfonyl)-2-piperidyl group, 5-(2-n-propylphenylsulfonyl)-2-piperidyl group, 6-(3-n-butylphenylsulfonyl)-2-piperidyl group, 1-(4-n-pentylphenylsulfonyl)-3-piperidyl group, 2-(2-n-hexylphenylsulfonyl)-3-piperidyl, group, 3-(3-isobutylphenylsulfonyl)-3-piperidyl group, 4-(4-tert-butylphenylsulfonyl)-3-piperidyl group, 5-(2-chlorophenylsulfonyl)-3-piperidyl group, 6-(4-fluorophenylsulfonyl)-3-piperidyl group, 1-(3-bromophenylsulfonyl)-4-piperidyl group, 2-(2-aminophenylsulfonyl)-4-piperidyl group, 3-(2,3-dimethylphenylsulfonyl)-4-piperidyl group, 4-(3,4,5-trimethylphenylsulfonyl)-4-piperidyl group, 2-(2,3-diaminophenylsulfonyl)-1-piperidyl group, 4-oxo-1-piperidyl group, 2-oxo-3-piperidyl group, 4-hydroxy-1-piperidyl group, 2-hydroxy-3-piperidyl group, 4-amino-1-piperidyl group, 2-amino-4-piperidyl group, 4-methylamino-1-piperidyl group, 2-methylamino-4-piperidyl group, 4-ethylamino-1-piperidyl group, 2-ethylamino-4-piperidyl group, 2-dimethylamino-4-piperidyl group, 4-diethylamino-1-piperidyl group, 4-formylamino-1-piperidyl group, 4-acetylamino-1-piperidyl group, 4-(N-methyl-N-acetylamino)-1-piperidyl group, 4-(N-methyl-N-methoxycarbonylamino)-1-piperidyl group, 4-(N-metbyl-N-tert-butoxycarbonylamino)-1-piperidyl group, 4-[N-methyl-N-(N-acetylamino)acetylamino]-1-piperidyl group.

[0133] Examples of the piperidylcarbonyl group that may have a substituent selected from the group consisting of a lower alkyl group, hydroxy group, hydroxy lower alkyl group, lower alkanoyl group, carboxy lower alkyl group, lower alkyl carbamoyl lower alkyl group, carbamoyl group, lower alkoxy group, carboxy group, lower alkoxycarbonyl group, amino group (on which 1 to 2. groups selected from the group consisting of a lower alkyl group, lower alkanoyl group, lower alkoxycarbonyl group and aroyl group may be present), piperidyl group (on which a group selected from the group consisting of a lower alkanoyl group, lower alkoxycarbonyl group and aroyl group may be present), piperazinyl group (on which a lower alkyl group may be present as a substituent), 1,4-dioxa-8-azasprio[4.5]decyl group, morpholinyl group, hexahydro-1,4-diazepinyl group (on which a lower alkyl group may be present as a substituent), pyridyl group, pyridyloxy group, pyridyl lower alkoxy group, tetrahydroquinolyl group (on which an oxo group may be present), benzodioxolyl group, aryl lower alkoxy group (that may have on the aryl group a group selected from the group consisting of a halogen atom, lower alkyl group, lower alkoxy group and halogen substituted lower alkoxy group), aryl group(on which a group selected from the group consisting of a halogen atom, lower alkoxy group and hydroxy group may be present), aryloxy

group (that may have on the aryl group a group selected from the group consisting of a cyano group, halogen atom, lower alkyl group, lower alkoxy group and halogen substituted lower alkyl group), aryl lower alkyl group (that may have on the aryl group a group selected from the group consisting of a halogen atom, lower alkyl group, lower alkoxy group and halogen substituted lower alkyl group) and aroyl group (that may have on the aryl group a group selected from the group consisting of a halogen atom and a lower alkoxy group) include

a piperidylcarbonyl group that may have 1 to 3 (preferably 1) substituents, on the piperidyl group, selected from the group consisting of

a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);

a hydroxy group;

a hydroxy lower alkyl group as illustrated above (preferably a linear or branched alkyl group having 1 to 6 carbon atoms and having 1 to 3 hydroxy groups);

a lower alkanoyl group as illustrated above;

a carboxy lower alkyl group as illustrated above having a lower alkyl moiety as illustrated above;

a linear or branched alkyl group having 1 to 6 carbon atoms and substituted with a carbamoyl group having 1 to 2 lower alkyl groups as illustrated above (linear or branched alkyl groups having 1 to 6 carbon atoms);

a carbamoyl group;

a lower alkoxy group as illustrated above (a linear or branched alkoxy group having 1 to 6 carbon atoms);

a carboxy group;

a lower alkoxycarbonyl group as illustrated

an amino group (on which 1 to 2 groups selected from the group consisting of a lower alkyl group as illustrated above, a lower alkanoyl group as illustrated above, lower alkoxycarbonyl group as illustrated above and aroyl group as illustrated above may be present);

a piperidyl group (on which 1 to 3 groups (preferably 1) selected from the group consisting of a lower alkanoyl group as illustrated above, lower alkoxycarbonyl group as illustrated above and aroyl group as illustrated above may be present);

a piperazinyl group (on which 1 to 3 lower alkyl groups as illustrated above (linear or branched alkyl groups having 1 to 6 carbon atoms) may be present as a substituent(s));

a 1,4-dioxa-8-azasprio[4.5]decyl group;

a morpholinyl group;

a hexahydro-1,4-diazepinyl group (on which 1 to 3 lower alkyl groups as illustrated above (linear or branched alkyl groups having 1 to 6 carbon atoms) may be present as a substituent(s));

a pyridyl group;

a pyridyloxy group;

a pyridyl lower alkoxy group having a lower alkoxy moiety as illustrated above;

a tetrahydroquinolyl group (on which 1 to 2 (preferably 1) oxo groups may be present);

a benzodioxolyl group (preferably benzo[1.3]dioxolyl group);

an aryl lower alkoxy group having an aryl moiety and lower alkoxy moiety as illustrated above (that may have on the aryl group 1 to 3 (preferably 1 to 2) groups selected from the group consisting of a halogen atom as illustrated above, lower alkyl group as illustrated above, lower alkoxy group as illustrated above and halogen substituted lower alkoxy group as illustrated above);

an aryl group as illustrated above (that may have on the aryl group 1 to 3 (preferably 1 to 2) groups selected from the group consisting of a halogen atom as illustrated above, lower alkoxy group as illustrated above and hydroxy group);

an aryloxy group having an aryl moiety as illustrated above (that may have on the aryl group 1 to 3 (preferably 1 to 2) groups selected from the group consisting of a cyano group, halogen atom, lower alkyl group as illustrated above, lower alkoxy group as illustrated above and halogen substituted lower alkyl group as illustrated above);

an aryl lower alkyl group having an aryl moiety and lower alkyl moiety as illustrated above (that may have on the aryl group 1 to 3 (preferably 1 to 2) groups selected from the group consisting of a halogen atom, lower alkyl group, lower alkoxy group and halogen substituted lower alkyl group); and

an aroyl group as illustrated above (that may have on the aryl group 1 to 3 (preferably 1 to 2) groups selected from the group consisting of a halogen atom as illustrated above and a lower alkoxy group as illustrated above). Specific examples thereof include a (1-, 2-, 3-, or 4-)piperidylcarbonyl group, (1-, 2-, 3-, or 4-)ethyl-4-piperidylcarbonyl group, (2-, 3-, or 4-)methyl-1-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)methyl-2-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)methyl-3-piperidylcarbonyl group, (1-, 2-, 3-, or 4-)methyl-4-piperidylcarbonyl group, (2-, 3-, or 4-)hydroxy-1-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)hydroxy-2-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)hydroxy-3-piperidylcarbonyl group, (1-, 2-, 3-, or 4-)hydroxy-4-piperidylcarbonyl group, (2-, 3-, or 4-)hydroxymethyl-1-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)hydroxymethyl-2-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)hydroxymethyl-3-piperidylcarbonyl group, (1-, 2-, 3-, or 4-)hydroxymethyl-4-piperidylcarbonyl group, (1-, 2-, 3-, or 4-)(2-hydroxyethyl)-4-piperidylcarbonyl group, (2-, 3-, or 4-)(N-ethyl-carbamoylmethyl)-1-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)(N-ethyl-carbamoyl-methyl)-2-piperidylcarbonyl group, (1-, 2-, 3-,4-, 5-, or 6-)(N-ethyl-carbamoylmethyl)-3-piperidylcarbonyl group, (1-, 2-,

3-, or 4-)N-ethyl-carbamoylmethyl-4-piperidylcarbonyl group, (2-, 3-, or 4-)carbamoyl-1-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)carbamoyl-2-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)carbamoyl-3-piperidylcarbonyl group, (1-, 2-, 3-, or 4-)carbamoyl-4-piperidylcarbonyl group, (2-, 3-, or 4-)carboxy-1-piperidylcarbonyl group, (2-, 3-, or 4-)carboxymethyl-1-piperidylcarbon group, (2-, 3-, or 4-)ethoxycarbonyl-1-piperidylcarbonyl group, (2-, 3-, or 4-)methoxy-1-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)methoxy-2-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)methoxy-3-piperidylcarbonyl group, (1-, 2-, 3-, or 4-)methoxy-4-piperidylcarbonyl group 2-, 3-, or 4-)methoxycarbonyl-1-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)methoxycarbonyl-2-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)methoxycarbonyl-3-piperidylcarbonyl group, (1-, 2-, 3-, or 4-)methoxycarbonyl-4-piperidylcarbonyl group, (2-, 3-, or 4-)ethoxycarbonyl-1-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 5-)ethoxycarbonyl-2-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)ethoxycarbonyl-3-piperidylcarbonyl group, (1-, 2-, 3-, or 4-)ethoxycarbonyl-4-piperidylcarbonyl group, (2-, 3-, or 4-) acetylamino-1-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)acetylamino-2-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)acetylamino-3-piperidylcarbonyl group, (1-, 2-, 3-, or 4-) acetylamino-4-piperidylcarbonyl group, (2-, 3-, or 4-)tert-butoxycarbonylamino-1-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)tert-butoxycarbonylamino-2-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)tert-butoxycarbonylamino-3-piperidylcarbonyl group, (1-, 2-, 3-, or 4-)tert-butoxycarbonylamino-4-piperidylcarbonyl group, (2-, 3-, or 4-)butyrylamino-1-piperidylcarbonyl group, (2-, 3-, or 4-)benzoylamino-1-piperidylcarbonyl group, (2-, 3-, or 4-)(N-methyl-N-acetylamino)-1-piperidylcarbonyl group, (2-, 3-, or 4-)(N-methyl-N-butyrylamino)-1-piperidylcarbonyl group, (2-, 3-, or 4-)(N-methyl-N-tert-butoxycarbonylamino)-1-piperidylcarbonyl group, (2-, 3-, or 4-)(N-methyl-N-benzoylamino)-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(1-, 2-, 3-, or 4-)piperidyl]-1-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)[(1-, 2-, 3-, or 4-)piperidyl)-2-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)[(1-, 2-, 3-, or 4-)piperidyl]-3-piperidylcarbonyl group, (1-, 2-, 3-, or 4-)[(1-, 2-, 3-, or 4-)piperidyl]-4-piperidylcarbonyl group, (2-, 3-, or 4-)[1-acetyl-(2-, 3-, or 4-)piperidyl]-1-piperidylcarbonyl group, (2-, 3-, or 4-)[1-butyryl-(2-, 3-, or 4-)piperidyl]-1-piperidylcarbonyl group, (2-, 3-, or 4-)[1-tert-butoxycarbonyl-(2-, 3-, or 4-)piperidyl]-1-piperidylcarbonyl, groups, (2-, 3-, or 4-)[1-benzoyl-(2-,3-, or 4-)piperidyl]-1-piperidylcarbonyl group, (2-, 3-, or 4-)(1-piperazinyl)-1-piperidylcarbonyl group, (2-, 3-, or 4-)[1-(3,4-dimethylpiperazinyl)]-1-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)[1-(3,4-dimethylpiperazinyl)]-2-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)[1-(3,4-dimethylpiperazinyl)]-3-piperidylcarbonyl group, (1-, 2-, 3-, or 4-)[1-(3,4-dimethylpiperazinyl)]-4-piperidylcarbonyl group, (2-, 3-, or 4-)[1-(4-methylpiperazinyl)]-1-piperidylcarbonyl group, (1-, 3-, or 4-)[1-(4-methylpiperazinyl)]-2-piperidylcarbonyl group, (1-, 2-, or 4-)[1-(4-methylpiperazinyl)]-3-piperidylcarbonyl group, (1-, 2-, or 3-)[1-(4-methylpiperazinyl)]-4-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)morpholinyl]-1-piperidylcarbonyl group, (1-, 3-, or 4-)[(2-, 3-, or 4-)morpholinyl]-2-piperidylcarbonyl group, (1-, 2-, 4-, 5-, or 6-)[(2-, 3-, or 4-)morpholinyl]-3-piperidylcarbonyl group, (1-, 2-, or 3-)[(2-, 3-, or 4-)morpholinyl]-4-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, 6-, or 7-)(4-methyl-hexahydro-1,4-diazepinyl)-1-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)(4-methyl-hexahydro-1,4-diazepinyl)-2-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)(4-methyl-hexahydro-1,4-diazepinyl)-3-piperidylcarbonyl group, (1-, 2-, 3-, or 4-)(4-methyl-hexahydro-1,4-diazepinyl)-4-piperidylcarbonyl group, (2-, 3-, or 4-)(1,4-dioxa-8-azaspiro[4.5]dec-8-yl)-1-piperidylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)(1,4-dioxa-8-azaspiro[4.5]dec-8-yl)-2-piperidylcarbonyl group, (1-,2-, 3-, 4-, 5-, or 6-)(1,4-dioxa-8-azaspiro[4.5]dec-8-yl)-3-piperidylcarbonyl group, (1-, 2-, 3-, or 4-)(1,4-dioxa-8-azaspiro[4.5]dec-8-yl)-4-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-,4-, or 5-)benzo[1.3]dioxolyl]-1-piperidylcarbonyl group, (2-, 3-, or 4-)[2-oxo-(1-, 3-, 4-, 5-, 6-, 7-, or 8-)-1,2,3,4-tetrahydroquinolyl]-1-piperidylcarbonyl group, 4-[2-oxo-(1-,3-, 4-, 5-, 6-, 7-, or 8-)-1,2,3,4-tetrahydroquinolyl]-(2-or 3-methyl)-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)pyridyl]-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-,3-, or 4-)pyridyloxy]-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)pyridylmethoxy]-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)fluorobenzyloxy]-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)chlorobenzyloxy}-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)bromobenzyloxy]-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)methylbenzyloxy]-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)trifluoromethoxybenzyloxy]-1-piperidylcarbonyl group, (2-, 3-, or 4-)(3,4-dichlorobenzyloxy)-1-piperidylcarbonyl group, (2-, 3-, or 4-)(3,4-dimethoxybenzyloxy)-1-piperidylcarbonyl group, (2-, 3-, or 4-)(3-chloro-4-methoxybenzyloxy)-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-,3-, or 4-)fluorophenoxy]-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)chlorophenoxy]-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)cyanophenoxy]-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-,3-, or 4-)methoxyphenoxy]-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)methylphenoxy]-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)trifluoromethoxyphenoxy]-1-piperidylcarbonyl group, (2-, 3-, or 4-)phenyl-1 piperidylcarbonyl group, 4-hydroxy-(2-, 3-, or 4-)phenyl-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)chlorophenyl]-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)methoxyphenyl]-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)hydroxyphenoxy]-1-piperidylcarbonyl group, 4-hydroxy-(2-, 3-, or 4-)phenyl-1-piperidylcarbonyl group, 4-ethoxycarbonyl-(2-, 3-, or 4-)phenyl-1-piperidylcarbonyl group, 4-hydroxy-(2-, 3-, or 4-)[(2-, 3-, or 4-)chlorophenyl]-1-piperidylcarbonyl group, (2-, 3-, or 4-)benzyl-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)chlorobenzyl]-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)methylbenzyl]-1-piperidylcarbonyl group, (2-, 3-, or 4-) [(2-, 3-, or 4-)methoxybenzyl]-1-piperidylcarbonyl group, (2-, 3-, or 4-) [(2-, 3-, or 4-)trifluoromethoxybenzyl]-1-piperidylcarbonyl group, 4-hydroxy-(2-, 3-, or 4--)benzyl-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)chlorobenzoyl]-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)methoxybenzoyl]-1-piperidylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)fluorobenzoyl]-1-piperidylcarbonyl group, and (2-, 3-, or 4-)[(2-, 3-, or 4-)trifluoromethoxybenzyl]-1-

piperidylcarbonyl group.

[0134] Examples of the pyrrolidinylcarbonyl group that may have a substituent selected from the group consisting of a hydroxy lower alkyl group, carbamoyl group; hydroxy group, amino group (that may have a group selected from the group consisting of a lower alkyl group, lower alkanoyl group, and aroyl group thereon) morpholinyl lower alkyl group, pyrrolidinyl lower alkyl group, piperidyl lower alkyl group, piperazinyl lower alkyl group (that may have a lower alkyl group thereon as a substituent), amino lower alkyl group (that may have a lower alkyl group thereon as a substituent) and aryl oxy group (that may have on the aryl group a halogen substituted lower alkoxy group), aryloxy lower alkyl group (on the aryl group, a halogen substituted lower alkoxy group may be present) and a tetrahydroquinolyl group (on which an oxo group may be present) include a pyrrolidinylcarbonyl group that may have 1 to 3 (preferably 1) substituents, on the pyrrolidinyl group, which are selected from the group consisting of

a lower alkyl group as illustrated above having 1 to 3 hydroxy groups (a linear or branched alkyl group having 1 to 6 carbon atoms);

a carbamoyl group;

a hydroxy group;

an amino group (that may have 1 to 2 groups selected from the group consisting of a lower alkyl group as illustrated above, a lower alkanoyl group as illustrated above, and an aroyl group as illustrated above);

a morpholinyl lower alkyl group whose lower alkyl moiety is one as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);

a pyrrolidinyl lower alkyl group whose lower alkyl moiety is one as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);

a piperidyl lower alkyl group whose lower alkyl moiety is one as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);

a piperazinyl lower alkyl group whose lower alkyl moiety is one as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) (1 to 3 (preferably 1) lower alkyl groups as illustrated above (linear or branched alkyls group having 1 to 6 carbon atoms) may be present on the piperazinyl group, as a substituent(s));

an amino lower alkyl group whose lower alkyl moiety is one as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) (1 to 2 lower alkyl groups as illustrated above (linear or branched alkyl groups having 1 to 6 carbon atoms) may be present on the amino group, as a substituent(s)), aryloxy group having an aryl moiety as illustrated above (which may have on the aryl group, 1 to 3 (preferably 1) halogen substituted lower alkoxy groups), aryloxy lower alkyl group having an aryl moiety and lower alkyl moiety as illustrated above (which may have on the aryl group, 1 to 3 (preferably 1) halogen substituted lower alkoxy groups) and a tetrahydroquinolyl group (on which a single oxo group may be present). Specific examples thereof include a (1-, 2-, or 3-)pyrrolidinylcarbonyl group, (2- or 3-)hydroxymethyl-1-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)hydroxymethyl-2-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)hydroxymethyl-3-pyrrolidinylcarbonyl group, (2- or 3-)carbamoyl-1-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)carbamoyl-2-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)carbamoyl-3-pyrrolidinylcarbonyl group, (2-or 3-)hydroxy-1-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)hydroxy-2-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)hydroxy-3-pyrrolidinylcarbonyl group, (2- or 3-)amino-1-pyrrolidinylcarbonyl group, (2- or 3-)acetamido-1-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)acetamido-2-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)acetamido-3-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)butyrylamino-3-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)(N-methyl-N-acetylamino)-3-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)(N-methyl-N-butyrylamino)-3-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-) benzoylamino-3-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)(N-methyl-N-benzoylamino)-3-pyrrolidinylcarbonyl group, (2- or 3-)[(2-, 3-, or 4-)morpholinylmethyl]-1-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)[(2-, 3-, or 4-)morpholinylmethyl]-2-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)[(2-, 3-, or 4-)morpholinylmethyl]-3-pyrrolidinylcarbonyl group, (2- or 3-) [(1-, 2-, or 3-)pyrrolidinylrnethyl]-1-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-) [(1-, 2-, or 3-)pyrrolidinylmethyl]]-2-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-) [(1-, 2-, or 3-)pyrrolidinylmethyl]]-3-pyrrolidinylcarbonyl group, (2- or 3-)[(1-, 2-, 3-, or 4-)piperidylmethyl]]-1-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)[(1-, 2-, 3-, or 4-)piperidylmethyl]]-2-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)[(1-, 2-, 3-, or 4-)piperidylmethyl)]-3-pyrrolidinylcarbonyl group, (2- or 3-)(4-methyl-1-piperazinylmethyl)-1-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)(4-methyl-1-piperazinylmethyl)-2-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)(4-methyl-1-piperazinylmethyl)-3-pyrrolidinylcarbonyl group, (2- or 3-)N, N-dimethylaminomethyl-1 pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)N,N-dimethylaminomethyl-2-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)N,N-dimethylaminomethyl-3-pyrrolidinylcarbonyl group, (2- or 3-)N,N-diethylaminomethyl-1-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)N,N-diethylaminomethyl-2-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)N,N-diethylaminomethyl-3-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)(4-trifluoromethoxyphenoxymethyl)- 3-pyrrolidinylcarbonyl group, (1-, 2-, 3-, 4-, or 5-)(4-trifluoromethoxyphenoxy)-3-pyrrolidinylcarbonyl group, and (1-, 3-, 4-, 5-, 6-, 7-, or 8-) (2-oxy-1, 2, 3, 4-tetrahydroquinolyl)-3-pyrrolidinylcarbonyl group.

[0135] Examples of a piperazinylcarbonyl group that may have a substituent selected from the group consisting of a lower alkyl group, cyclo C3-C8 alkyl group, lower alkanoyl group, hydroxy lower alkyl group, lower alkoxy lower alkyl group, lower alkoxycarbonyl group, amino lower alkyl group (a lower alkyl group may be present on the amino group,

as a substituent), piperidyl lower alkyl group (a lower alkyl group may be present on the piperidyl group, as a substituent), morpholinyl lower alkyl group, pyrrolidinyl lower alkyl group, 1,3-dioxolanyl lower alkyl group, tetrahydrofuryl lower alkyl group, pyridyl lower alkyl group (a phenyl group may be present on the lower alkyl group as a substituent), imidazolyl lower alkyl group, furyl lower alkyl group, pyrrolidinyl carbonyl lower alkyl group, piperidyl group that may have a lower alkyl group as a substituent, pyridyl group (a substituent selected from the group consisting of a lower alkyl group, cyano group, and halogen substituted lower alkyl group may be present on the pyridyl group, as a substituent), thieno[2,3-c] pyridyl group aryl group (on which a group selected from the group consisting of a halogen atom and a lower alkyl group may be present), aroyl group, furyl lower alkyl group, aryl lower alkoxycarbonyl group and oxo group, include a piperazinylcarbonyl group that may have 1 to 3 (preferably 1) substituents, on the piperazinyl group, which are selected from the group consisting of a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);
a cyclo C3-C8 alkyl group as illustrated above;
a lower alkanoyl group as illustrated above (
a linear or branched alkanoyl group having 1 to 6 carbon atoms);
a hydroxy lower alkyl group as illustrated above (preferably a linear or branched alkyl group having 1 to 6 carbon atoms with 1 to 3 hydroxy groups);
a lower alkoxy lower alkyl group as illustrated above (preferably a linear or branched alkyl group having 1 to 6 carbon atoms and 1 to 3 lower alkoxy groups as illustrated above (linear or branched alkoxy groups having 1 to 6 carbon atoms));
a lower alkoxycarbonyl group as illustrated above ;
an amino lower alkyl group whose lower alkyl moiety is one as illustrated above, preferably a linear or branched alkyl group having 1 to 6 carbon atoms (1 to 2 lower alkyl groups as illustrated above (
linear or branched alkyl groups having 1 to 6 carbon atoms) may be present on the amino group, as substituent(s));
a piperidyl lower alkyl group whose lower alkyl moiety is one as illustrated above, preferably a linear or branched alkyl group having 1 to 6 carbon atoms (1 to 3 lower alkyl groups as illustrated above (linear or branched alkyl groups having 1 to 6 carbon atoms) may be present on the piperidyl group as a substituent(s));
a morpholinyl lower alkyl group whose alkyl moiety is one as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);
a pyrrolidinyl lower alkyl group whose alkyl moiety is one as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);
a 1,3 dioxolanyl lower alkyl group whose lower alkyl moiety is one as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms)
a tetrahydrofuryl lower alkyl group whose lower alkyl moiety is one as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);
a pyridyl lower alkyl group whose lower alkyl moiety is one as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) (1 to 3 phenyl groups may be present on the alkyl group, as a substituent(s));
an imidazolyl lower alkyl group, whose lower alkyl moiety is one as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);
a furyl lower alkyl group, whose lower alkyl moiety is one as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);
a pyrrolidinyl carbonyl lower alkyl group, whose lower alkyl moiety is one as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms);
a piperidyl group that may have 1 to 3 lower alkyl groups as illustrated above (linear or branched alkyl groups having 1 to 6 carbon atoms); a pyridyl group (1 to 3 groups (preferably 1) selected from the group consisting of a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms), cyano group, and halogen substituted lower alkyl group as illustrated above (preferably a linear or branched alkyl group having 1 to 6 carbon atoms substituted with 1 to 7 halogen atoms) may be present on the pyridyl group): a tieno[2,3-c]pyridyl group; aryl group as illustrated above (which may have on the aryl group 1 to 3 (preferably 1) groups selected from the group consisting of a halogen atom and a lower alkyl group), aroyl group as illustrated above, furyl lower alkyl group having a lower alkyl moiety as illustrated above, aryl lower alkoxy carbonyl group having an aryl moiety and lower alkoxy carbonyl moiety as illustrated above and oxo group. Specific examples thereof include a (1-or 2-)piperazinylcarbonyl group, (2-, 3-, or 4-)methyl-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)methyl-2-piperazinylcarbonyl group, (2-, 3-, or 4-)ethyl-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)ethyl-2-piperazinylcarbonyl group, (2-, 3-, or 4-)n-propyl-1-piperazinylcarbonyl group; (1-, 2-, 3-, 4-, 5-, or 6-)n-propyl-2-piperazinylcarbonyl group, (2-, 3-, or 4-)n-butyl-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)n-butyl-2-piperazinylcarbonyl group, (2-, 3-, or 4-1[(1-ethyl-n-propyl)]-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)[(1-ethyl-n-propyl)]-2-piperazinylcarbonyl group, (2-, 3-, or 4-)isopropyl-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)isopropyl-2-piperazinylcarbonyl group, (2-, 3-, or 4-)tert-butyl-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)tert-butyl-2-piperazinylcarbonyl group, (2-, 3-, or 4-)n-hexyl-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)n-hexyl-2-piperazinylcarbonyl group, (2-, 3-, or 4-)cyclopentyl-1-piperazinylcarbonyl group, (1-, 2-, 3-,

4-, 5-, or 6-)cyclopentyl-2-piperazinylcarbonyl group, (2-, 3-, or 4-)cycloheptyl-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)cycloheptyl-2-piperazinylcarbonyl group, (2-, 3-, or 4-)acetyl-1-piperazinylcarbonyl group, (2-, 3-, or 4-) butyryl-1-piperazinyl carbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)acetyl-2-piperazinylcarbonyl group, (2-, 3-, or 4-)(2-hydroxyethyl)-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)(2-hydroxyethyl)-2-piperazinylcarbonyl group, (2-, 3-, or 4-) (2-methoxyethyl)-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)(2-methoxyethyl)-2-piperazinylcarbonyl group, (2-, 3-, or 4-)(3-methoxypropyl)-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)(3-methoxypropyl)-2-piperazinylcarbonyl group, (2-, 3-, or 4-)(4-methoxybutyl)-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)(4-methoxybutyl)-2-piperazinylcarbonyl group, (2-, 3-, or 4-)ethoxycarbonyl-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)ethoxycarbonyl-2-piperazinylcarbonyl group, (2-, 3-, or 4-)tert-butoxycarbonyl-1-piperazinylcarbonyl group, (1-, 2-; 3-, 4-, 5-, or 6-)tert-butoxycarbonyl-2-piperazinylcarbonyl group, (2-, 3-, or 4-)methoxycarbonyl-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)methoxycarbonyl-2-piperazinylcarbonyl group, (2-, 3-, or 4-)[3-(N,N-dimethylamino)propyl]-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)[3-(N,N-dimethylamino)propyl]-2-piperazinylcarbonyl group, (2-, 3-, or 4-) [2-(N,N-dimethylamino)ethyl]-1-pipera2inylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)(2-(N,N-dimethylamino)ethyl)-2-piperazinylcarbonyl group, (2-, 3-, or 4-)(2-(1-piperidyl)ethyl)-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-) (2- (1-piperidyl) ethyl) -2-piperazinylcarbonyl group, (2-, 3-, or 4-)[(1-methyl-3-piperidyl)methyl]-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)[(1-methyl-3-piperidyl)methyl]-2-piperazinylcarbonyl group, (2-, 3-, or 4-) [(1-methyl-4-piperidyl)methyl]-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)[(1-methyl-4-piperidyl)methyl]-2-piperazinylcarbonyl group, (2-, 3-, or 4-)[2-(4-morpholinyl)ethyl]-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)[2-(4-morpholinyl)ethyl]-2-piperazinylcarbonyl group, (2-, 3-, or 4-)[2-(1-pyrrolidinyl)ethyl]-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)[2-(1-pyrrolidinyl) ethyl]-2-piperazinylcarbonyl group, (2-, 3-, or 4-)[2-(1,3-dioxolanyl)methyl]-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)[2-(1,3-dioxolanyl)methyl]-2-piperazinylcarbonyl group, (2-, 3-, or 4-){2-[2-(1,3-dioxolanyl)]ethyl}-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)(-2-[2-(1,3-dioxolanyl)]ethyl)-2-piperazinylcarbonyl group, (2-, 3-, or 4-)(2-tetrahydrofurylmethyl)-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)(2-tetrahydrofurylmethyl)-2-piperazinylcarbonyl group, (2-, 3-, or 4-) (2-pyridylmethyl)-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-) (2-pyridylmethyl)-2-piperazinylcarbonyl group, (2-, 3-, or 4-)(3-pyridylmethyl)-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)(3-pyridylmethyl)-2-piperazinylcarbonyl group, (2-, 3-, or 4-)(4-pyridylmethyl)-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-) (4-pyridylmethyl)-2-piperazinylcarbonyl group, (2-, 3-, or 4-)[2-(4-pyridyl)ethyl]-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)[2-(4-pyridyl)ethyl]-2-piperazinylcarbonyl group, (2-, 3-, or 4-)[2-(2-pyridyl)ethyl]-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)[2-(2-pyridyl)ethyl]-2-piperazinylcarbonyl group, (2-, 3-, or 4-)[2-phenyl-2-(4-pyridyl)ethyl]-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)[2-phenyl-2-(4-pyridyl)ethyl]-2-piperazinylcarbonyl group, (2-, 3-, or 4-)[2-(1-imidazolyl)ethyl]-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-) [2-(1-imidazolyl) ethyl] -2-piperazinylcarbonyl group, (2-, 3-, or z) (3-furylmethyl)-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)(3-furylmethyl)-2-piperazinylcarbonyl group, (2-, 3-, or 4-)(1-pyrrolidinylcarbonylmethyl)-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)(1-pyrrolidinylcarbonylmethyl)-2-piperazinylcarbonyl group, (2-, 3-, or 4-) (1-methyl-4-piperidyl)-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)(1-methyl-4-piperidyl)-2-piperazinylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)pyridyl]-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)(2-, 3-, or 4-pyridyl)-2-piperazinylcarbonyl group, (2-, 3-, or 4-)(3-cyano-2-pyridyl)-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)(3-cyano-2-pyridyl)-2-piperazinylcarbonyl group, (2-3-, or 4-){4-methyl-2-pyridyl}-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)(4-methyl-2-pyridyl)-2-piperazinylcarbonyl group, (2-, 3-, or 4-) (3-methyl-2-pyridyl)-1-piperazinylcarboriyl group, (1-, 2-, 3-, 4-, 5-, or 6-) 3-methyl-2-pyridyl)-2-piperazinylcarbonyl group, (2-, 3-, or 4-)(3-trifluoromethyl-2-pyridyl)-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)(3-trifluoromethyl-2-pyridyl)-2-piperazinylcarbonyl group, (2-, 3-, or 4-) [(2-, 3-, 4-, 5-, or 6-)thieno[2,3-c]pyridyl]-1-piperazinylcarbonyl group, (1-, 2-, 3-, 4-, 5-, or 6-)[(2-, 3-, 4-, 5-, or 6-)thieno[2,3-c]pyridyl]-2-piperazinylcarbonyl group, (2-, 3-, or 4-) phenyl-1-piperazinylcarbonyl group, (2-, 3-, or 4-)[(2-, 3-, or 4-)chlorophenyl]-1-piperazinylcarbonyl group, (2-, 3-, or 4-) [(2-, 3-, or 4-)methylphenyl]-1-piperazinylcarbonyl group, 3-oxo-(2- or 4-)phenyl-1-piperazinylcarbonyl group, (2-, 3-, or 4-)benzolyl-1-piperazinylcarbonyl group, (2-, 3-, or 4-)[(2- or 3-)furylcarbonyl]-1-piperazinylcarbonyl group, and (2-, 3-, or 4-)benzyloxycarbonyl-l-piperazinylcarbonyl group.

[0136] Example of a hexahydroazepinylcarbonyl group include a (1-, 2-, 3- or 4-)hexahydroazepinylcarbonyl group.

[0137] Example of a hexahydro-1,4-diazepinylcarbonyl group that may have a substituent selected from the group consisting of a lower alkyl group and a pyridyl group include a hexahydro-1,4-diazepinylcarbonyl group that may have 1 to 3, preferably 1, substituents selected from the group consisting of a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) and a pyridyl group. Specific examples thereof include a (hexahydro-1,4-diazepin-(1-,2-, 5- or 6-)yl)carbonyl group, (4-methyl-hexahydro-1,4-diazepin-1-yl)carbonyl group, and (4-(4-pyridyl)-methyl-hexahydro-1,4-diazepin-1-yl)carbonyl group.

[0138] Example of a dihydropyrrolylcarbonyl group include a 2,3-dihydropyrrolylcarbonyl group and a 2, 5-dihydropyrrolylcarbonyl group.

[0139] Examples of the dihydropyrrolylcarbonyl group that may have a lower alkyl group include a dihydropyrrolylcarbonyl group as illustrated above that may have 1 to 4, preferably 1 to 2 lower alkyl groups as illustrated above (linear or branched alkyl groups having 1 to 6 carbon atoms). Specific examples thereof include a (1-, 2- or 3-)(2,5-dihydropyr-

rolylcarbonyl) group, 2,5-dimethyl-1-(2,5-dihydropyrrolylcarbonyl) group, and 2,5-dimethyl-1-(2,3-dihydropyrrolylcarbonyl) group.

[0140] Examples of the thiomorpholinylcarbonyl group include a (2-, 3- or 4-)thiomorpholinylcarbonyl group.

[0141] Examples of the morpholinylcarbonyl group that may have a group selected from the group consisting of a lower alkyl group, and piperidyl lower alkyl group, and aryl group include a morpholinylcarbonyl group that may have 1 to 5 groups, more preferably 1 to 2 groups selected from the group consisting of a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) (on which 1 to 3 (preferably 1) piperidyl groups may be present as substituent(s)) an aryl group as described above. Specific examples thereof include a (2-, 3- or 4-)morpholinylcarbonyl group, 2,6-dimethyl-4-morpholinylcarbonyl group, 2-(1-piperidylmethyl)-4-morpholinylcarbonyl group, and 2-phenyl-4-morpholinylcarbonyl group.

[0142] Examples of the thiazolidinylcarbonyl group include a (2-, 3-, 4- or 5-) thiazolidinylcarbonyl group.

[0143] Examples of the thiazolidinylcarbonyl group that may have an aryl group that may have a group selected from the group consisting of a lower alkoxy group and a cyano group include a thiazolidinylcarbonyl group that may have 1 to 3 (preferably 1) aryl groups that may have 1 to 3 (preferably 1) groups selected from the group consisting of a lower alkoxy group and a cyano group as illustrated above. Specific examples thereof include a (2-, 3-, 4- or 5-)thiazolidinylcarbonyl group, (2-, 4- or 5-)[(2-, 3-or 4-)methoxyphenyl]-3-thiazolidinylcarbonyl group and (2-, 4- or 5-)[(2-, 3- or 4-)cyanophenyl]-3-thiazolidinylcarbonyl group.

[0144] Examples of the azabicyclo[3.2.2]nonylcarbonyl group include a 1-azabicyclo[3.2.2]non-(2-, 3-, 5-, or 6-)ylcarbonyl group, 2-azabicyclo[3.2.2]non-(1-, 2-, 3-, 4-, 5-, 6-or 7-)ylcarbonyl group, 3-azabicyclo[3.2.2]non-(1-, 2-, 3-, or 6-)ylcarbonyl group, and 6-azabicyclo[3.2.2]non-(1-, 2-, 3-, 4-, 5-, 6-, 7-, 8- or 9-)ylcarbonyl group.

[0145] Examples of the azabicyclo[3.2.1]octylcarbonyl group that may have a halogen substituted or unsubstituted aryloxy group include an azabicyclo[3.2.1]octylcarbonyl group that may have 1 to 2 (preferably 1) halogen substituted aryl groups as illustrated above (preferably an aryl group that may be substituted with 1 to 3, preferably 1 halogen atom), or an azabicyclo[3.2.1]octylcarbonyl group that may have 1 to 2 (preferably 1) unsubstituted aryl groups as illustrated above. Specific examples thereof include a 1-azabicyclo[3.2.1]oct-(2-, 3-, 4-, 5-, 6-, 7-, or 8-)ylcarbonyl group, 2-azabicyclo[3.2.1]oct-(1-, 2-, 3-, 4-, 5-, 6-, 7-, or 8-)ylcarbonyl group, 3-azabicyclo[3.2.1]oct-(1-, 2-, 3-, 6-, or 8-)ylcarbonyl group, 6-azabicyclo[3.2.1]oct-(1-, 2-, 3-, 4-, 5-, 6-, 7-, .or 8-)ylcarbonyl group, 8-azabicyclo[3.2.1]oct-(1-, 2-, 3-, 6-, or 8-)ylcarbonyl group, 3-(phenyloxy)-1-azabicyclo[3.2.1]oct-2-ylcarbonyl group, 3-(2-biphenyloxy)-1-azabicyclo[3.2.1]oct-3-ylcarbonyl group, 3-(1-naphthyloxy)-1-azabicyclo[3.2.1]oct-4-ylcarbonyl group, 3-(3-methylphenyloxy)-1-azabicyclo[3.2.1]oct-5-ylcarbonyl group, 3-(4-ethylphenyloxy)-1-azabicyclo[3.2.1]oct-6-ylcarbonyl group, 3-(2-n-propylphenyloxy)-1-azabicyclo[3.2.1]oct-7-ylcarbonyl group, 3-(3-n-butylphenyloxy)-1-azabicyclo[3.2.1]oct-8-ylcarbonyl group, 3-(4-n-pentylphenyloxy)-2-azabicyclo[3.2.1]oct-1-ylcarbonyl group, 3-(2-n-hexylphenyloxy)-2-azabicyclo[3.2.1]oct-2-ylcarbonyl group, 3-(3-isobutylphenyloxy)-2-azabicyclo[3.2.1]oct-3-ylcarbonyl group, 3-(4-tert-butylphenyloxy)-2-azabicyclo[3.2.1]oct-4-ylcarbonyl group, 3-(2-chlorophenyloxy)-2-azabicyclo[3.2.1]oct-5-ylcarbonyl group, 3-(3-fluorophenyloxy)-8-aza-bicyclo[3.2.1]oct-8-ylcarbonyl group, 3-(3-bromophenyloxy)-2-azabicyclo[3.2.1]oct-6-ylcarbonyl group, 3-(2-aminophenyloxy)-2-azabicyclo[3.2.1]oct-7-ylcarbonyl group, 3-(2,3-dimethylphenyloxy)-2-azabicyclo[3.2.1]oct-8-ylcarbonyl group, 3-(3,4,5-trimethylphenyloxy)-8-azabicyclo[3.2.1]oct-1-ylcarbonyl group, and 3-(2,3-diaminophenyloxy)-8-azabicyclo[3.2.1]oct-2-ylcarbonyl group.

[0146] Examples of the indolinylcarbonyl group include a (1-, 2-, 3-, 4-, 5-, 6-, or 7-)indolinylcarbonyl group.

[0147] Examples of the tetrahydropyrido[3.4-b]indolylcarbonyl group include a (1-, 2-, 3-, 4-, 5-, 6-, 7-, 8- or 9-)(2-, 3-, 4-, 9-tetrahydropyrido(3.4-b]indolylcarbonyl) group.

[0148] Examples of the piperazinyl lower alkyl group that may have a lower alkyl group on the piperazinyl group include a piperazinyl lower alkyl group whose lower alkyl moiety is a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) and 1 to 7, preferably 1 to 5, more preferably 1, lower alkyl groups as illustrated above (linear or branched alkyl groups having 1 to 6 carbon atoms) may be present on the piperazinyl group. Specific examples thereof include a (1- or 2-)piperazinylmethyl group, 2-[(1- or 2-)piperazinyl]ethyl group, 1-[(1- or 2-)piperazinyl]ethyl group, 3-[(1- or 2-)piperazinyl]propyl group, 4-[(1- or 2-)piperazinyl]butyl group, 5-[(1- or 2-)piperazinyl]pentyl group, 6-[(1- or 2-)piperazinyl]hexyl group, 1,1-di.methyl-2-[(1- or 2-)piperazinyl]ethyl group, 2-methyl-3-[(1- or 2-)piperazinyl]propyl group, 4-methyl-1-piperazinylmethyl group, 2-(4-methyl-2-piperazinyl)ethyl group, 3-(2-ethyl-1 piperazinyl)propyl group, 4-(3-n-propyl-1-piperazinyl)butyl group, 5-(4-n-butyl-1-piperazinyl)pentyl group, 6-(1-n-pentyl-2-piperazinyl)hexyl group, 2-n-hexyl-2-piperazinylmethyl group, 2-(3-isobutyl-2-piperazinyl)ethyl group, and 3-(4-tert-butyl-2-piperazinyl)propyl group.

[0149] Examples of the morpholinylcarbonyl lower alkyl group include a morpholinylcarbonyl lower alkyl group whose lower alkyl moiety is a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms). Specific examples thereof include a 2-morpholinylcarbonylmethyl group, 3-morpholinylcarbonylmethyl group, 4-morpholinylcarbonylmethyl group, 2-(2-morpholinylcarbonyl)ethyl group, 2-(3-morpholinylcarbonyl)ethyl group, 2-(4-morpholinylcarbonyl)ethyl group, 1-(2-morpholinylcarbonyl)ethyl group, 1-(3-morpholinylcarbonyl)ethyl group, 1-(4-morpholinylcarbonyl)ethyl group, 3-(2-morpholinylcarbonyl)propyl group, 3-(3-morpholinylcarbonyl)propyl group, 3-(4-mor-

pholinylcarbonyl)propyl group, 4-(2-morpholinylcarbonyl)butyl group, 4-(3-morpholinylcarbonyl)butyl group, 4-(4-morpholinylcarbonyl)butyl group, 5-(2-morpholinylcarbonyl)pentyl group, 5-(3-morpholinylcarbonyl)pentyl group, 5-(4-morpholinylcarbonyl)pentyl group, 6-(2-morpholinylcarbonyl)hexyl group, 6-(3-morpholinylcarbonyl)hexyl group, 6-(4-morpholinylcarbonyl)hexyl group, 3-methyl-3-(2-morpholinylcarbonyl)propyl group, 3-methyl-3-(3-morpholinylcarbonyl)propyl group, 3-methyl-3-(4-morpholinylcarbonyl)propyl group, 1,1-dimethyl-2-(2-morpholinylcarbonyl)ethyl group, 1,1-dimethyl-2-(3-morpholinylcarbonyl)ethyl group, and 1,1-dimethyl-2-(4-morpholinylcarbonyl)ethyl group.

[0150] Examples of the piperazinylcarbonyl lower alkyl group that may have a lower alkyl group on the piperazinyl group include a piperazinylcarbonyl lower alkyl group whose lower alkyl moiety is a lower alkyl group as illustrated above (a linear or branched alkyl group having 1 to 6 carbon atoms) and which may have 1 to 7, preferably 1 to 5, more preferably 1, lower alkyl groups as illustrated above (a linear or branched alkyl groups having 1 to 6 carbon atoms) on the piperazinyl group. Specific examples thereof include a (1- or 2-)piperazinylcarbonylmethyl group, 2-[(1- or 2-)piperazinylcarbonyl]ethyl group, 1-[(1- or 2-)piperazinylcarbonyl]ethyl group, 3-[(1- or 2-)piperazinylcarbonyl]propyl group, 4-[(1- or 2-)piperazinylcarbonyl]butyl group, 5-[(1- or 2-)piperazinylcarbonyl]pentyl group, 6-[(1- or 2-)piperazinylcarbonyl]hexyl group, 1,1-dimethyl-2-(1-or 2-)piperazinylcarbonyl]ethyl group, 2-methyl-3-[(1-or 2-)piperazinylcarbonyl]propyl group, 4-methyl-1-piperazinylcarbonylmethyl group, 2-(4-methyl-2-piperazinylcarbonyl)ethyl group, 3-(2-ethyl-1-piperazinylcarbonyl)propyl group, 4-(3-n-propyl-1-piperazinylcarbonyl)butyl group, 5-(4-n-butyl-1-piperazinylcarbonyl)pentyl group, 6-(1-n-pentyl-2-piperazinylcarbonyl)hexyl group, 2-n-hexyl-2-piperazinylcarbonylmethyl group, 2-(3-isobutyl-2-piperazinylcarbonyl)ethyl group, and 3-(4-tert-butyl-2-piperazinylcarbonyl)propyl group.

[0151] Examples of the amino lower alkoxy group (on the amino group, a lower alkyl group may be present) include a lower alkoxy group as illustrated above (a linear or branched alkoxy group having 1 to 6 carbon atoms) having 1 to 5 (preferably 1) amino groups that may have 1 to 2 lower alkyl groups as illustrated above. Specific examples thereof include an amino methoxy group, 2-amino ethoxy group, 1-aminoethoxy group, 3-aminopropoxy group, 4-aminobutoxy group, 5-aminopentoxy group, 6-aminohexyloxy group, 1,1-dimethyl-2-aminoethoxy group, N,N-dimethylaminomethoxy group, N-methyl-N-ethylaminomethoxy group, N-methylaminomethoxy group, 2-(N-methylamino)ethoxy group, 2-(N,N-dimethylamino)ethoxy group, 2-(N,N-diethylamino)ethoxy group, 2-(N,N-diisopropylamino)ethoxy group and 3-(N,N-dimethylamino)propoxy group.

[0152] Examples of the lower alkoxy lower alkoxy group include a lower alkoxy lower alkoxy group having a lower alkoxy moiety as illustrated above. Specific examples thereof include a methoxymethoxy group, 2-methoxyethoxy group, 1-ethoxyethoxy group, 2-ethoxyethoxy group, 2-isobutoxyethoxy group, 2,2-dimethtoxyethoxy group and 2-methoxy-1-methylethoxy group.

[0153] Examples of the piperazinyl group that may have a group selected from the group consisting of an oxo group, lower alkyl group, lower alkanoyl group and lower alkoxy carbonyl group include a piperazinyl group that may have a group 1 to 3 (1 to 2) groups selected from the group consisting of an oxo group, lower alkyl group as illustrated above, lower alkanoyl group as illustrated above and lower alkoxy carbonyl group as illustrated above. Specific examples thereof include a (1- or 2-)piperazinyl group, (2-, 3- or 4-)methyl-1-piperazinyl group, (1-, 2-, 3-, 4-, 5- or 6-)ethyl-2-piperazinyl group, (2-, 3- or 4-)ethyl-1-piperazinyl group, (1-, 2-, 3-, 4-, 5- or 6-)ethyl-2-piperazinyl group, (2-, 3- or 4-)n-propyl-l-piperazinyl group, (1-, 2-, 3-, 4-, 5- or 6-)n-propyl-2-piperazinyl group, (2-, 3- or 4-)formyl-l-piperazinyl group, (2-, 3- or 4-)acetyl-l-piperazinyl group, (2-, 3- or 4-)propionyl-1-piperazinyl group, (1-, 2-, 3-, 4-, 5- or 6-)propionyl-2-piperazinyl group, (2-, 3- or 4-)butyryl-1-piperazinyl group, (1-, 2-, 3-, 4-, 5- or 6-)butyryl-2-piperazinyl group, (2-, 3- or 4-)methoxycarbonyl-1-piperazinyl group, (2-, 3- or 4-)ethoxycarbonyl-1-piperazinyl group, (2-, 3- or 4-)tert-butoxycarbonyl-1-piperazinyl group, (2- or 3-)oxo-1-piperazinyl group, 2-oxo-(3-, 4-,S- or 6-)acetyl-1-piperazinyl group, 2-oxo-(3-, 4-, 5- or 6-)butyryl-1-piperazinyl group, 2-oxo-(3-, 4-, 5- or 6-)methoxycarbonyl-1-piperazinyl group and 2-oxo-(3-, 4-, 5- or 6-)methoxycarbonyl-1-piperazinyl group.

[0154] Examples of the 1,3,8-triazaspiro[4.5]decanylcarbonyl group that may have a group selected from the group consisting of an oxo group and an aryl group include a 1,3,8-triazaspiro[4.5]decanylcarbonyl group that may have 1 to 3 (1 to 2) groups selected from the group consisting of an oxo group and an aryl group as illustrated above. Specific examples thereof include a 1,3,8-triazaspiro[4.5]decanyl-(1, 2, 3, 4 or 8-)ylcarbonyl group, 1-phenyl-1,3,8-triazaspiro[4.5]decanyl-8-ylcarbonyl group and 1-phenyl-4-oxo-1,3,8-triazaspiro[4.5]decanyl-8-ylcarbonyl group.

[0155] Examples of the tetrahydropyridyl group included a (1-, 2-, 3-, 4-, 5- or 6-)-1,2,3,4-tetrahydropyridyl group and (1-, 2-, 3-, 4-, 5- or 6-)-1,2,3,6-tetrahydropyridyl group.

[0156] Examples of the tetrahydropyridylcarbonyl group that may have a pyridyl group include a tetrahydropyridylcarbonyl group as illustrated above that may have 1 to 3 (preferably 1) pyridyl groups. Specific examples thereof include a (2-, 3- or - 4)pyridyl-1,2,3,6-tetrahydropyridyl-1-ylcarbonyl group.

[0157] Examples of the imidazolidinylcarbonyl group that may have a thioxo group include an imidazolidinylcarbonyl group that may have 1 to 2 (preferably 1) thioxo groups. Specific examples thereof include a 2-thioxo-1-imidazolidinylcarbonyl group.

[0158] Examples of the tetrahydronaphthyl group include a (1- or 2-)-1,2,3,4-tetrahydronaphthyl group.

[0159] Examples of the saturated or unsaturated heteromonocyclic group having 1 to 4 heteroatoms selected from

the group consisting of a nitrogen atom, oxygen atom and sulfur atom include a heteromonocyclic groups represented by (1) to (9) below.

(1) a saturated 3 to 8 (preferably 5 to 6) membered heteromonocyclic group having 1 to 4 (preferably 1 to 2) nitrogen atoms (for example, pyrrolidinyl group, imidazolidinyl group, piperidyl group, hexahydropyrimidinyl group, piperazinyl group, azepanyl group and azocanyl group);
(2) an unsaturated 3 to 8 (preferably 5 to 6) membered heteromonocyclic group having 1 to 4 (preferably 1 to 3) nitrogen atoms, for example, a pyrrolyl group, dihydropyrrolyl group such as 1H-2,5-dihydropyrolyl group, imidazolyl group (such as 1H-imidazolyl group), dihydroimidazolyl group (such as 1H-2,3-dihydroimidazolyl group), triazolyl group (such as 9H-1,2,4-trizaolyl group, 1H-1,2,3-trizaolyl group, and 2H-1,2,3-trizaolyl group), dihydrotriazolyl group (such as 1H-4,5-dihydro-1,2,4-triazolyl group), pyrazolyl group, pyridyl group, dihydropyridyl group (such as 1,2-dihydropyridyl group), pyrimidinyl group, dihydropyrimidinyl group (such as 1,6-dihydropyrimidinyl group), pyrazinyl group, dihydropyrazinyl group (such as 1,2-dihydropyrazinyl), pyridazinyl group, and tetrazolyl group (such as 1H-tetrazolyl group and 2H-tetrazolyl group);
(3) an unsaturated 3 to 8 (preferably 5 to 6) membered heteromonocyclic group having 1 to 2 (preferably 1) oxygen atoms and 1 to 3 (preferably 1 to 2) nitrogen atoms, for example, an oxazolyl group, isoxazolyl group, oxadiazolyl group (such as 1,2,4-oxadiazolyl group, 1,3,4-oxadiazolyl group and 1,2,5-oxadiazolyl group) and a saturated 3 to 8 (preferably 5 to 6) membered heteromonocyclic group having 1 to 2 (preferably 1) oxygen atoms and 1 to 3 (preferably 1 to 2) nitrogen atoms, for example an oxazolidinyl group, isoxazolidinyl group and morpholinyl group;
(4) an unsaturated 3 to 8 (preferably 5) membered heteromonocyclic group having 1 to 2 sulfur atoms and 1 to 3 nitrogen atoms, for example, a thiazolyl group, dihydrothiazolyl group (such as 2,3-dihydrothiazolyl group), isothiazolyl group, thiadiazolyl group (such as, 1,2,3-thiadiazolyl group, 1,2,4-thiadiazolyl group, 1,3,4-thiadiazolyl group, and 1,2,5-thiadiazolyl group) and dihydrothiazinyl group.
(5) a saturated 3 to 8 (preferably 5 to 6) membered heteromonocyclic group having 1 to 2 sulfur atoms and 1 to 3 nitrogen atoms, for example, a thiazolidinyl group;
(6) a saturated 3 to 8 (preferably 5 to 6) membered heteromonocyclic group having 1 to 2 oxygen atom, for example, a tetrahydrofuryl group and a tetrahydropyranyl group;
(7) an unsaturated 3 to 8 (preferably 5 to 6) membered heteromonocyclic group having 1 to 2 oxygen atoms, for example, a pyranyl group (such as 2H-pyranyl group);
(8) a saturated 3 to 8 (preferably 5 to 6) membered heteromonocyclic group having 1 to 2 sulfur atoms, for example, a tetrahydrothiofuryl group and a tetrahydrothiopyranyl group; and
(9) an unsaturated 3 to 8 (preferably 5 to 6) membered heteromonocyclic group having 1 to 2 sulfur atoms, for example, a thienyl group and a thiopyranyl group (such as 2H-thiopyranyl).

[0160] Of them, mention may be preferably made of a saturated or unsaturated heteromonocyclic group having a 1 to 2 hetero atoms selected from a nitrogen atom, oxygen atom and sulfur atom and selected from the group consisting of a pyrrolidinyl group, piperidyl group, pyrazolyl group, pyridyl group, pyrimidinyl group, pyrazinyl group, isoxazolyl group, thiazolyl group, pyranyl group and thienyl group; and further preferably made of a saturated or unsaturated heteromonocyclic group having a 1 to 2 nitrogen atoms and selected from the group a pyrrolidinyl group, piperidyl group, pyrazolyl group, pyridyl group, pyrimidinyl group and thiazolyl group.

[0161] Examples of the tetrahydroquinoxalinyl group include a (1-, 2-, 5- or 6-)-1,2,3,4-tetrahydroquinoxalinyl group and (1-, 2-, 5- or 6-)-5,6,7,8-tetrahydroquinoxalinyl group.

[0162] Examples of the tetrahydroquinazolinyl group include a (1-, 2-, 3-, 4-, 5-, 6-, 7- or 8-)-1,2,3,4-tetrahydroquinazolinyl group and (1-, 2-, 3-, 4-, 5-, 6-, 7- or 8-)-5,6,7,8-tetrahydroquinazolinyl group.

[0163] Examples of the dihydroquinazolinyl group include a (1-, 2-, 3-, 4-, 5-, 6-, 7- or 8-) -3, 4-dihydroquinazolinyl group and (1-, 2-, 3-, 4-, 5-, 6-, 7- or 8-)-1,2-dihydroquinazolinyl group.

[0164] Examples of the dihydrobenzimidazolyl group include a (1-, 2-, 4- or 5-)-2.3-dihydro-1H-benzimidazolyl group.

[0165] Examples of the tetrahydrobenzazepinyl group include a (1-, 2-, 3-, 4-, 5-, 6-, 7-, 8- or 9-)-2,3,4,5-tetrahydro-1H-benzo[b]azepinyl group and (1-, 2-, 3-, 4-, 5-, 6-, 7-, 8- or 9-)-2,3,4,5-tetrahydro-1H-benzo[c]azepinyl group.

[0166] Examples of the tetrahydrobenzodiazepinyl group include a (1-, 2-, 3-, 4-, 5-, 6-, 7-, 8- or 9-)-2,3,4,5-tetrahydro-1H-benzo[b][1.4]diazepinyl group and (1-, 2-, 3-, 4- 5-, 6-, 7-, 8- or 9-)-2,3,4,5-tetrahydro-1H-benzo[e][1.4]diazepinyl group.

[0167] Examples of the hexahydrobenzazocinyl group include a (1-, 2-, 3-, 4-, 5-, 6-, 7-, 8-, 9-, or 10-)-1,2,3,4,5,6-tetrahydrobenzo[b]azocinyl group and (1-, 2-, 3-, 4-, 5-, 6-, 7-, 8-, 9- or 10-)-1, 2, 3, 4, 5, 6-hexahydrobenzo[c]azocinyl group.

[0168] Examples of the dihydrobenzoxazinyl group include a (2-, 3-, 4-, 5-, 6-, 7- or 8-)-3,4-dihydro-2H-benzo[b][1.4] oxazinyl group and (1-, 2-, 4-, 5-, 6-, 7- or 8-)-2,4-dihydro-1H-benzo[d][1.3]oxazinyl group.

[0169] Examples of the dihydrobenzoxazolyl group include a (2-, 3-, 4-, 5-, 6- or 7-)-2,3-dihydrobenzoxazolyl group.

[0170] Examples of the benzisoxazolyl group include a (3-, 4-, 5-, 6- or 7-)-benzo[d]-isoxazolyl group and (3-, 4-, 5-, 6- or 7-)-benzo[c]-isoxazolyl group.

[0171] Examples of the benzoxadiazolyl group include a (4- or 5-)-benzo[c][1.2.5]oxadiazolyl group.

[0172] Examples of the tetrahydrobenzoxazepinyl group include a (2-, 3-, 4-, 5-, 6-, 7-, 8- or 9-)-2,3,4,5-tetrahydrobenzo [b][1.4]oxazepinyl group, (1-, 3-, 4-, 5-, 6-, 7-, 8- or 9-)-1,3,4,5-tetrahydrobenzo[e][1.3]oxazepinyl group and (2-, 3-, 4-, 5-, 6-, 7-, 8- or 9-)-2,3,4,5-tetrahydrobenzo[f] [1.4]oxazepinyl group.

[0173] Examples of the dihydrobenzothiazinyl group include a (2-, 3-, 4-, 5-, 6-, 7- or 8-)-3,4-dihydro-2H-benzo[b] [1.4] thiazinyl group and (2-, 3-, 4-, 5-, 6-, 7- or 8-)-3,4-dihydro-2H-benzo[e][1.3]thiazinyl group.

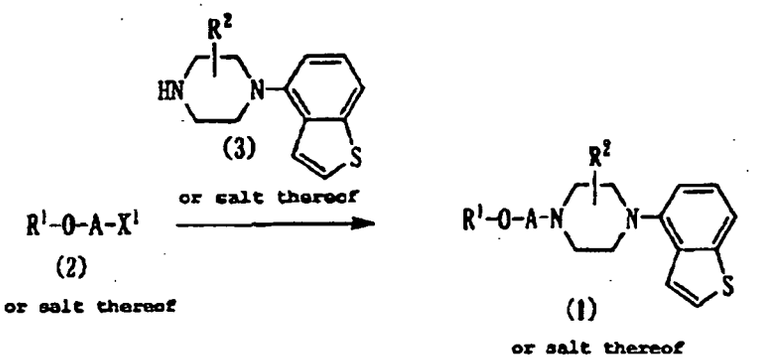
[0174] Examples of the benzoxathiolyl group include a (2-, 4-, 5-, 6- or 7-)-benzo[d][1.3]oxathiolyl group, (3-, 4-, 5-, 6- or 7-)-3H-benzo[c][1.2]oxathiolyl group and,(3-, 4-, 5-, 6- or 7-)-3H-benzo[d][1.2]oxathiolyl group.

[0175] Examples of the dihydrobenzofuryl group include a (2-, 3-, 4-, 5-, 6- or 7-)-2,3-dihydrobenzofuryl group.

[0176] A heterocyclic compound (hereinafter referred to as a compound (1)) represented by the general formula (1) can be produced by various kinds of methods, for example, a method shown in the following reaction formula-1 or reaction formula 2.

[Formula 4]

Reaction formula-1



wherein R^1, R^2 and A are the same as defined above; and X^1 is a halogen atom or a group mediating the same substitution reaction as in a halogen atom.

[0177] Examples of the group mediating the same substitution reaction as in a halogen atom include a lower alkanesulfonyloxy group, arylsulfonyloxy group, and aralkylsulfonyloxy group.

[0178] A halogen atom represented by X^1 in the general formula (2) is a fluorine atom, chlorine atom, bromine atom and iodine atom.

[0179] Specific examples of the lower alkanesulfonyloxy group represented by X^1 include a linear or branched alkanesulfonyloxy group having 1 to 6 carbon atoms such as a methanesulfonyloxy group ethanesulfonyloxy group, isopropanesulfonyloxy group, n-propanesulfonyloxy group, n-butanesulfonyloxy group, tert-butanesulfonyloxy group, n-pentanesulfonyloxy group, and n-hexanesulfonyloxy group.

[0180] Specific examples of the arylsulfonyloxy group represented by X^1 include a phenylsulfonyloxy group and naphthylsulfonyloxy group that may have 1 to 3 substituents selected from the group consisting of a linear or branched alkyl group having 1 to 6 carbon atoms, a linear or branched alkoxy group having 1 to 6 carbon atoms, a nitro group, and a halogen atom, on the phenyl ring. Specific examples of the phenylsulfonyloxy group that may have a substituent include a phenylsulfonyloxy group, 4-methylphenylsulfonyloxy group, 2-methylphenylsulfonyloxy group, 4-nitrophenylsulfonyloxy group, 4-methoxyphenylsulfonyloxy group, 2-nitrophenylsulfonyloxy group, and 3-chlorophenylsulfonyloxy group. Specific examples of the naphthylsulfonyloxy group include α-naphthylsulfonyloxy group and β-naphthylsulfonyloxy group.

[0181] Examples of the aralkylsulfonyloxy group represented by X^1 include a linear or branched alkylsulfonyloxy group having 1 to 6 carbon atoms and substituted with a phenyl group; and a linear or branched alkylsulfonyloxy group having 1 to 6 carbon atoms and substituted with a naphthyl group; both of which may have 1 to 3 substituents selected from the group consisting of a linear or branched alkyl group having 1 to 6 carbon atoms, a linear or branched alkoxy group having 1 to 6 carbon atoms, a nitro group and a halogen atom, on the phenyl ring.

Specific examples of the alkylsulfonyloxy group substituted with a phenyl group as mentioned above include a benzyl-

sulfonyloxy group, 2-phenylethylsulfonyloxy group, 4-phenylbutylsulfonyloxy group, 2-methylbenzylsulfonyloxy group, 4-methoxybenzylsulfonyloxy group, 4-nitrobenzylsulfonyloxy group, and 3-chlorobenzylsulfonyloxy group. Specific examples of the alkylsulfonyloxy group substituted with a naphthyl group include an α-naphthylmethylsulfonyloxy group and β-naphthylmethylsulfonyloxy group.

[0182] The compound (1) can be produced by reacting a compound (hereinafter referred to as a compound (2)) represented by the general formula (2) and a compound (hereinafter referred to as a compound (3)) represented by the general formula (3).

[0183] This reaction is generally performed in a conventional solvent that may not negatively affect the reaction, such as water; an alcohol based solvent such as methanol, ethanol, isopropanol, n-butanol, trifluoroethanol, and ethylene glycol; a ketone based solvent such as acetone and methylethyl ketone; an ether based solvent such as tetrahydrofuran, dioxane, diethyl ether, and diglyme; an ester based solvent such as methyl acetate and ethyl acetate; a non-proton polar solvent such as acetonitrile, N,N-dimethylformamide, and dimethylsulfoxide; a halogenated hydrocarbon based solvent such as methylene chloride and ethylene chloride; or other organic solvents. Furthermore, the reaction can be performed in a solution mixture of these conventional solvents. The reaction is generally performed in the presence of an inorganic base such as an alkali metal (e.g., sodium and potassium), an alkaline metal hydrogen carbonate (e.g., lithium hydrogen carbonate, sodium hydrogen carbonate, and potassium hydrogen carbonate), alkali metal hydroxide (e.g., lithium hydroxide, sodium hydroxide, potassium hydroxide, and cesium hydroxide), alkali metal carbonate (e.g., lithium carbonate, sodium carbonate, potassium carbonate, and cesium carbonate), alkali metal lower alkoxide (e.g., sodium methoxide and sodium ethoxide), and a hydride (e.g., sodium hydride and potassium hydride); or in the presence of an organic base such as a trialkylamine (e.g., trimethylamine, triethylamine, N-ethyl diisopropylamine), pyridine, quinoline, piperidine, imidazole, picoline, dimethylaminopyridine, dimethylaniline, N-methylmorpholine, 1,5-diazabicyclo[4.3.0]non-5-ene (DEN), 1,4-diazabicyclo[2.2.2]octane (DABCO), and 1,8-diazabicyclo[5.4.0]undecene-7 (DBU). When these bases take liquid form, they can be used as solvents.

[0184] These basic compounds may be used alone or in a mixture of two types or more.

[0185] A basic compound may be used in a molar amount, which is generally 0.5 to 10 times, preferably 0.5 to 6 times as large as that of the compound (2).

[0186] The reaction mentioned above may be performed, if necessary, with the addition of an alkaline metal iodide serving as an accelerator, such as potassium iodide and sodium iodide.

[0187] The ratio of a compound (2) to a compound (3) used in the reaction formula-1 may be at least about 0.5 times mole, preferably about 0.5-5 times by mole.

[0188] The reaction temperature is not particularly limited and may be generally performed under cool or heating conditions and preferably performed at a temperature from near room temperature to about 150˚C for 1 to 30 hours.

[0189] The compound (2) serving as a starting material for a compound according to the present invention include a novel compound and can be produced by various methods, for example, a method represented by the following reaction formula-3.

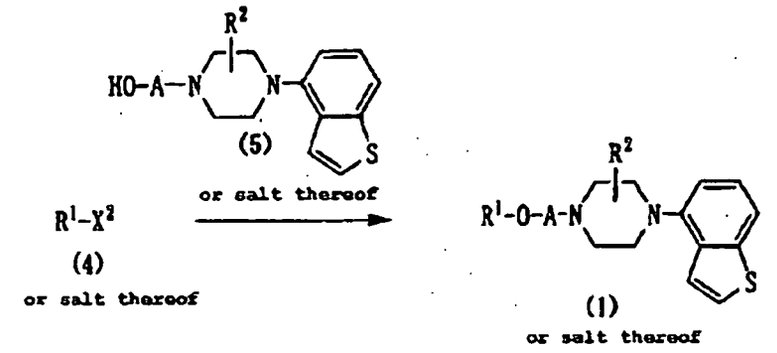
[0190] The compound (3) serving as a starting material for a compound according to the present invention is a known compound or a compound that can be easily produced from a known compound.

[0191] A salt of a compound (2) in place of the compound (2) and a salt of a compound (3) in place of the compound (3) may be used. The salts of compounds (2) and (3) include acid-addition salts. These acid addition salts may be prepared by reacting a pharmaceutically acceptable acid with a compound (2) or (3). Examples of the acid used herein include inorganic acids such as sulfuric acid, nitric acid, hydrochloric acid, phosphoric acid, and hydrobromic acid; sulfonic acids such as p-toluene sulfonic acid, methane sulfonic acid, and ethane sulfonic acid; and organic acids such as acetic acid, oxalic acid, maleic acid, fumaric acid, malic acid, tartaric acid, citric acid, succinic acid, and benzoic acid.

[0192] Of the compounds (2), a compound having an acidic group can easily produce a salt by reacting with a pharmaceutically acceptable basic compound. Examples of such a basic compound include metal hydroxides such as sodium hydroxide, potassium hydroxide, lithium hydroxide, and calcium hydroxide; alkali metal carbonates or bicarbonates such as sodium carbonate, sodium hydrogen carbonate, potassium hydrogen carbonate; and alkali metal alcoholates such as sodium methylate and potassium ethylate.

[Formula 5]

Reaction formula-2



wherein R^1, R^2 and A are the same as defined above; and X^2 is a hydroxy group, halogen atom or a group mediating the same substitution reaction as in a halogen atom.

[0193] Examples of the halogen atom represented by X^2 and the group mediating the same substitution reaction as in a halogen atom in connection with the general formula (4) are the same as mentioned above. The compound (1) can be produced by reacting a compound (hereinafter referred to as a compound (4)) represented by the general formula (4) and a compound (hereinafter referred to as a "compound (5)") represented by the general formula (5).

[0194] The reaction can be performed under the similar conditions as in reaction formula-1.

[0195] In the case of a compound (4) in which X^2 is a hydroxy group, the reaction can be performed in an appropriate solvent in the presence of an appropriate condensing agent.

[0196] This reaction is generally performed in a conventional solvent that may not negatively affect the reaction, such as water; an alcohol based solvent such as methanol, ethanol, isopropanol, n-butanol, trifluoroethanol, and ethylene glycol; a ketone based solvent such as acetone and methylethyl ketone; an ether based solvent such as tetrahydrofuran, dioxane, diethyl ether, and diglyme; an ester based solvent such as methyl acetate and ethyl acetate; a non-proton polar solvent such as acetonitrile, N,N-dimethylformamide, and dimethylsulfoxide; a halogenated hydrocarbon based solvent such as methylene chloride and ethylene chloride; or other organic solvents. Furthermore, as a solvent to be used herein, a solution mixture of these conventional solvents may be mentioned.

[0197] As the condensing agent, a mixture of an azocarboxylate such as diethyl azodicarboxylate and a phosphine compound such as triphenylphosphine may be mentioned.

[0198] The amount of the condensing agent used herein is generally at least equimolar, preferably equimolar to twice as large as that of a compound (4).

[0199] The ratio of a compound (4) to a compound (5) used in the reaction formula-2 may be generally at least equimole preferably about 2 times by mole.

[0200] The reaction temperature is not particularly limited and may generally be performed under cool or heating conditions, and preferably performed at a temperature from 0˚C to about 150˚C for 1 to 10 hours.

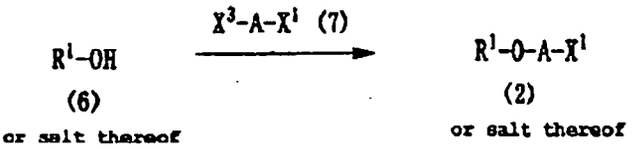
[0201] The compound (4) serving as a starting material for a compound according to the present invention is a known compound or a compound that can be easily produced from a known compound.

[0202] The compound (5) serving as a starting material for a compound according to the present invention include a novel compound and a compound that can be produced by various methods, for example, a method represented by the following reaction formula-4 or -5.

[0203] A salt of a compound (4) in place of the compound (4) and a salt of a compound (5) in place of the compound (5) may be used. As a preferable salt of a compound (4), the same salt as shown in a compound (2) may be mentioned. As a preferable salt of a compound (5), the same salt as shown in a compound (3) may be mentioned.

[Formula 6]

Reaction formula-3



wherein R^1, X^1 and A are the same as defined above; and X^3 is a halogen atom or a group mediating the same substitution reaction as in a halogen atom.

[0204] Examples of the halogen atom represented by X^3 and the group mediating the same substitution reaction as in a halogen atom in connection with the general formula (7) are the same as mentioned above.

[0205] The compound (2) can be produced by reacting a compound (hereinafter referred to as a compound (6)) represented by the general formula (6) and a compound (hereinafter referred to as a compound (7)) represented by the general formula (7).

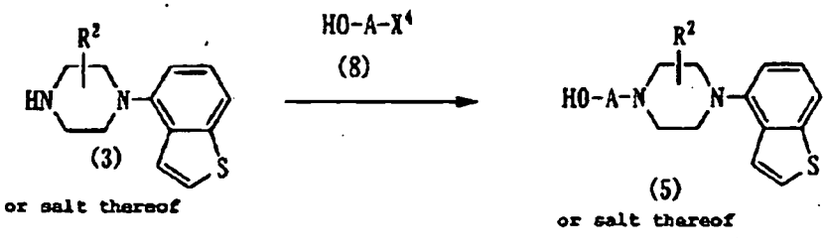
[0206] The reaction can be performed under the similar conditions as in reaction formula-1.

[0207] The compounds (6) and (7) serving as starting materials for a compound according to the present invention are known compounds or compounds that can be easily produced from known compounds.

[0208] In place of a compound (6), a salt of the compound (6) may be used. As a preferable salt of a compound (6), the same salt as shown in a compound (2) may be mentioned.

[Formula 7]

Reaction formula-4



wherein R^2 and A are the same as defined above; and X^4 is a halogen atom or a group mediating the same substitution reaction as in a halogen atom.

[0209] Examples of the halogen atom represented by X^4 and the group mediating the same substitution reaction as in a halogen atom in connection with the general formula (8) are the same as mentioned above.

[0210] The compound (5) can be produced by reacting a compound (3) and a compound (hereinafter referred to as a compound (8)) represented by the general formula (8) .

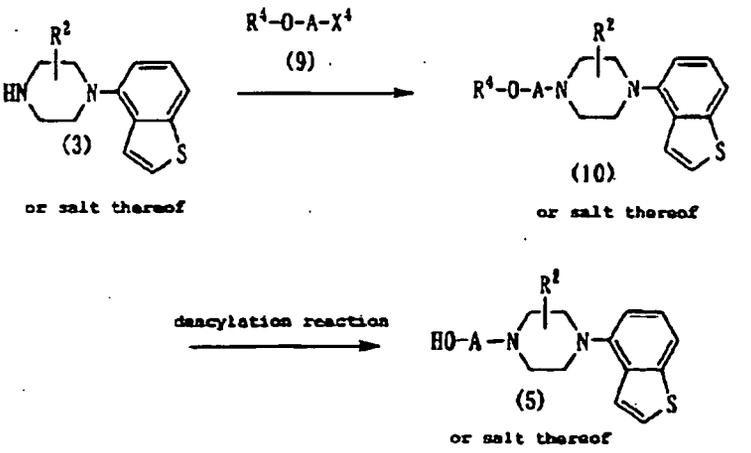
[0211] The reaction can be performed under the similar conditions as in reaction formula-1.

[0212] The compound (8) serving as a starting material for a compound according to the present invention is a known compound or a compound that can be easily produced from a known compound.

[0213] In place of a compound (3), a salt of the compound (3) may be used. As a preferable salt of a compound (3), the same salts as above may be mentioned.

[Formula 8]

Reaction formula-5



wherein R^2 and A are the same as defined above; R^4 is a lower alkanoyl group; and X^4 is a halogen atom or a group mediating the same substitution reaction as in a halogen atom.

[0214] Examples of the lower alkanoyl group represented by R^4 in the general formulas (9) and (10) are the same as mentioned above.

[0215] Furthermore, examples of the halogen atom represented by X^4 and the group mediating the same substitution reaction as in a halogen atom in connection with the general formula (9) are the same as mentioned above.

[0216] A compound (hereinafter referred to as a compound (10)) represented by the general formula (10) can be produced by reacting a compound (3) and a compound (9).

[0217] The reaction can be performed under the similar conditions as in reaction formula-1.

[0218] The compound (9) serving as a starting material for a compound according to the present invention is a known compound or a compound that can be easily produced from a known compound.

[0219] In place of a compound (3), a salt of the compound (3) may be used. As a preferable salt of a compound (3), the same salts as above may be mentioned.

[0220] Subsequently, the compound (10) is subjected to a reaction for removing an acyl group to produce a compound (5).

[0221] As a preferable method of the reaction, a conventional reaction such as hydrolysis may be mentioned. The hydrolysis reaction may be preferably performed in the presence of a base or an acid including Lewis acid. Examples of the preferable base include inorganic salts such as an alkali metal (e.g., sodium and potassium), an alkaline metal hydrogen carbonate (e.g., lithium hydrogen carbonate, sodium hydrogen carbonate, and potassium hydrogen carbonate), an alkali metal hydroxide (e.g., lithium hydroxide, sodium hydroxide, potassium hydroxide, and cesium hydroxide), an alkali metal carbonate (e.g., lithium carbonate, sodium carbonate, potassium carbonate, and cesium carbonate), an alkali metal lower alkoxide (e.g., sodium methoxide and sodium ethoxide), and hydrides (e.g., sodium hydride and potassium hydride); and organic bases such as a trialkylamine (e.g., trimethylamine, triethylamine, and N-ethyl diisopropylamine), pyridine, quinoline, piperidine, imidazole, picoline, dimethylaminopyridine, dimethylaniline, N-methylmorpholine, DBN, DABCO, and DBU. As a preferable acid, mention can be made of organic acids (such as formic acid, acetic acid, propionic acid, trichloroacetic acid, trifluoroacetic acid) and inorganic acids (such as hydrochloric acid, hydrobromic acid, sulfuric acid, hydrogen chloride, and hydrogen bromide). The removal reaction using a Lewis acid such as a trihaloacetic acid (e.g., trichloroacetic acid and trifluoroacetic acid) may be preferably performed in the presence of a cation-trapping agent (e.g., anisole and phenol).

[0222] This reaction is generally performed in a conventional solvent that may not negatively affect the reaction, such as water; an alcohol based solvent such as methanol, ethanol, isopropanol, n-butanol, trifluoroethanol, and ethylene glycol; a ketone based solvent such as acetone and methylethyl ketone; an ether based solvent such as tetrahydrofuran, dioxane, diethyl ether, and diglyme; an ester based solvent such as methyl acetate and ethyl acetate; a non-proton polar solvent such as acetonitrile, N,N-dimethylformamide, and dimethylsulfoxide; a halogenated hydrocarbon based solvent such as methylene chloride and ethylene chloride; or other organic solvents. Furthermore, the reaction may be performed in a solution mixture of these conventional solvents. Of them, ethanol is preferable. The reaction temperature is not

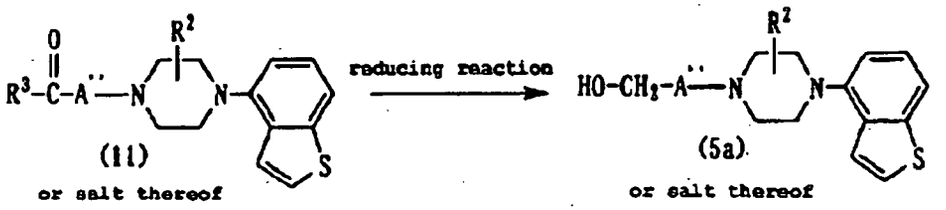
particularly limited and may generally be performed under cool or heating conditions, and preferably performed at near room temperature to near a boiling point of the solvent to be used for 0.5 to 75 hours.

[0223] In place of -a compound (10), a salt of the compound (10) may be used. As a preferable salt of a compound (10), the same salt as shown in a compound (3) may be mentioned.

[0224] Furthermore, a compound (hereinafter referred to as a compound (5a)) where A of the compound (5) represents $-CH_2A''-$ where A" represents-a C1 to C5 alkylene group can be produced by a method represented by the following reaction formula-6.

[Formula 9]

Reaction formula-6



wherein R^2 is the same as defined above; and R^3 is a lower alkoxy group. A" represents a C1 to C5 alkylene group. The lower alkoxy group represented by R^3 in the general formula (11) is the same as defined above.

[0225] Examples of the C1 to C5 alkylene group represented by A" in the general formulas (11) and (5a) include a linear or branched alkylene group having 1 to 5 carbon atoms such as methylene, ethylene, methyl methylene, trimethylene, tetramethylene, 1-methyl trimethylene, 2-methyl trimethylene, 3-methyl tetramethylene, pentamethylene, and 2,2-dimethyl trimethylene.

[0226] The compound (5a) can be produced by subjecting a compound (hereinafter referred to as a compound (11)) represented by the general formula (11) to a reducing reaction.

[0227] The reaction can be performed by the method shown in Reference Example 6 or a similar method thereof. The reaction also can be performed by a conventional method using a reducing agent.

[0228] As a preferable reducing agent, mention may be made of a hydride (such as lithium aluminum hydride, sodium borohydride, lithium borohydride, diborane, and sodium cyanoborohydride).

[0229] This reaction is generally performed in a conventional solvent that may not negatively affect the reaction, such as an alcohol based solvent such as methanol, ethanol, isopropanol, n-butanol, trifluoroethanol, and ethylene glycol; a ketone based solvent such as acetone and methylethyl ketone; an ether based solvent such as tetrahydrofuran, dioxane, diethyl ether, and diglyme; an ester based solvent such as methyl acetate and ethyl acetate; a non-proton polar solvent such as acetonitrile, N,N-dimethylformamide, and dimethylsulfoxide; a halogenated hydrocarbon based solvent such as methylene chloride and ethylene chloride; or other organic solvents. Furthermore, the reaction may be performed in a solution mixture of these conventional solvents. The reaction temperature is not particularly limited and may generally be performed under cool or heating conditions, and preferably performed at near room temperature to near a boiling point of the solvent to be used for 0.5 to 75 hours.

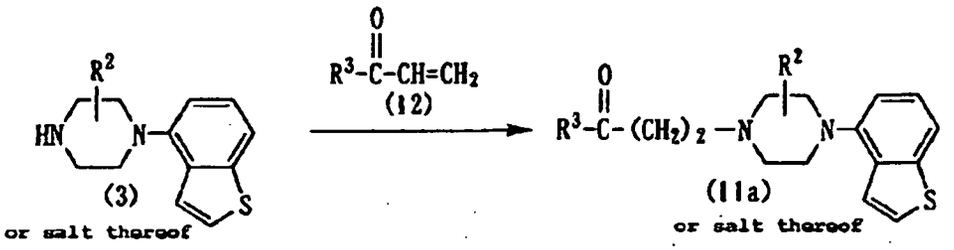
[0230] The compound (11) serving as a starting material for a compound according to the present invention is a known compound or a compound that can be easily produced from a known compound.

[0231] In place of a compound (11), a salt of the compound (11) may be used. As a preferable salt of a compound (11), the same salt as shown in a compound (2) may be mentioned.

[0232] Furthermore, a compound (hereinafter referred to as a compound (11a)) where A" of the compound (11) represents "$-(CH_2)_2-$" can be produced by a method represented by the following reaction formula-7.

[Formula 10]

Reaction formula-7



where R^2 and R^3 are the same as defined above.

[0233] The compound (11a) can be produced by reacting a compound (3) and a compound (hereinafter referred to as a compound (12)) represented by the general formula (12).

[0234] The reaction can be performed by the method shown in Reference Example 5 or a similar method thereof. This reaction is generally performed in a conventional solvent that may not negatively affect the reaction, such as water, an alcohol based solvent such as methanol, ethanol, isopropanol, n-butanol, trifluoroethanol, and ethylene glycol; a ketone based solvent such as acetone and methylethyl ketone; an ether based solvent such as tetrahydrofuran, dioxane, diethyl ether, and diglyme; an ester based solvent such as methyl acetate and ethyl acetate; a non-proton polar solvent such as acetonitrile, N,N-dimethylformamide, and dimethylsulfoxide; a halogenated hydrocarbon based solvent such as methylene chloride and ethylene chloride; or other organic solvents. Furthermore, the reaction may be performed in a solution mixture of these conventional solvents. The reaction temperature is not particularly limited and may generally be performed under cool or heating conditions, and preferably performed at near room temperature to near a boiling point of the solvent to be used for 0.5 to 75 hours.

[0235] The compound (12) serving as a starting material for a compound according to the present invention is a known compound or a compound that can be easily produced from a known compound.

[0236] A salt of a compound (3) in place of the compound (3) and a salt of a compound (12) in place of the compound (12) may be used. As a preferable salt of a compound (3), the same salt as shown above may be mentioned. As a preferable salt of a compound (12), the same salt as shown in a compound (2) may be mentioned.

[0237] The object compound obtained by each of the above reaction formula may form a suitable salt. Such suitable salts include the preferable salts of compound (1) exemplified below.

[0238] The preferable salts of compound (1) are pharmacologically acceptable salts and examples include metal salts such as alkali metal salts (for example, sodium salt potassium salt, etc.), alkaline earth metal salts (for example, calcium salt, magnesium salt, etc.), salts of inorganic bases such as ammonium salt, alkaline metal carbonates (for example, lithium carbonate, potassium carbonate, sodium carbonate, cesium carbonate, etc.), alkaline metal hydrogen carbonates (for example, lithium hydrogen carbonate, sodium hydrogen carbonate, potassium bicarbonate, etc.), alkali metal hydroxides (for example, lithium hydroxide, sodium hydroxide, potassium hydroxide, cesium hydroxide, etc.); for example, salts of organic bases such as tri(lower)alkylamine (for example, trimethylamine, triethylamine, N-ethyldiisopropylamine), pyridine, quinoline, piperidine, imidazole, picoline, dimethylaminopyridine, dimethylaniline, N-(lower)alkyl-morpholine (for example, N-methylmorpholine), 1,5-diazabicyclo[4.3.0]nonene-5 (DBN), 1,8-diazabicyclo[5.4.0]undecene-7 (DBU), 1,4-diazabicyclo[2.2.2] octane (DABCO); salts of inorganic acids such as hydrochloride, hydrobromide, hydroiodide, sulfate, nitrate, phosphate; salts of organic acids such as formate, acetate, propionate, oxalate, malonate, succinate, fumarate, maleate, lactate, malate, citrate, tartrate, carbonate, picrate, methanesulfonate, ethanesulfonate, p-toluenesulfonate, glutamate.

[0239] In addition, compounds in the form in which solvate (for example, hydrate, ethanolate, etc.) was added to the starting compounds and object compound shown in each of the reaction formulae are included in each of the general formulas. As a preferable solvate, hydrate can be mentioned.

[0240] Each of the object compounds obtained by each of the general formulas can be isolated and purified from the reaction mixture by, for example, subjecting the reaction mixture to isolation operation such as filtration, concentration and extraction after cooling to separate a crude reaction product followed by conventional purification operation such as column chromatography or recrystallization.

[0241] The compound represented by the general formula (1) of the present invention naturally encompasses isomers such as geometrical isomer, stereoisomer and enantiomer.

[0242] A compound and a salt thereof represented by the general formula (1) may be used in the form of general pharmaceutical preparation. The preparation may be prepared by use of a diluent or an excipient such as a filler, extending agent, binder, humectant, disintegrator, surfactant, and lubricant. As a pharmaceutical preparation, various forms can be selected depending upon the therapeutic purpose. Typical forms thereof include a tablet, pill, powder, liquid, suspension, emulsion, granule, encapsulate, suppository, and injection (liquid, suspension).

[0243] In forming a tablet, a wide variety of types of carriers conventionally known in the art may be used. Examples of the carrier that may be used include an excipient such as lactose, saccharose, sodium chloride, glucose, urea, starch, calcium carbonate, kaolin, crystalline cellulose, and silicate; a binder such as water, ethanol, propanol, simple syrup, glucose solution, starch solution, gelatine solution, carboxymethylcellulose, shellac, methyl cellulose, potassium phosphate, and polyvinylpyrrolidine; a disintegrator such as dried starch, sodium alginate, powdered agar, powdered laminaran, sodium hydrogen carbonate, calcium carbonate, polyoxyethylene sorbitan fatty acid ester, sodium lauryl sulfate, stearic acid monoglyceride, starch, and lactose; a disintegration suppressant such as saccharose, stearin, cocoa butter, and hydrogenated oil; a sorbefacient such as quaternary ammonium base and sodium lauryl sulfate; a humectant such as glycerin and starch; an adsorbing agent such as starch, lactose, kaolin, bentonite, and colloidal silica; and a lubricant such as refined talc, stearate, powdered boric acid, and polyethylene glycol. Furthermore, if necessary, a tablet may be coated with a general film. Examples of such a coated tablet include a sugar-coated tablet, gelatine encapsulated tablet, enteric-coated tablet, film coated tablet or double-layer tablet, and multi-layer tablet.

[0244] In forming a pill, a wide variety of types of carriers conventionally known in the art may be used. Examples of the carrier that may be used include an excipient such as glucose, lactose, starch, cacao butter, hardened vegetable oil, kaolin and talc; a binder such as powdered gum Arabic, powdered tragacanth, gelatine and ethanol; and a disintegrator such as laminaran and agar.

[0245] In forming a suppository, a wide variety of types of carriers conventionally known in the art may be used. Examples of the carrier that may be used include polyethylene glycol, cacao butter, higher alcohol, esters of a higher alcohol, gelatine, and semisynthetic glyceride.

[0246] A capsule is usually prepared by mixing an active ingredient compound with a carrier as illustrated above in accordance with a conventional method and filling the mixture in a hard gelatine capsule or a soft capsule.

[0247] In preparing an injection, a liquid agent, emulsion and suspension are preferably sterilized and isotonic with blood. When they are prepared into an injection, any diluent can be used as long as it is conventionally used as a diluent in the art. Examples of the diluent that may be used include water, ethyl alcohol, macrogol, propylene glycol, ethoxylated isostearyl alcohol, polyoxylated isostearyl alcohol, polyoxyethylene sorbitan fatty acid esters.

[0248] Note that, in this case, a pharmaceutical preparation may contain a salt, glucose or glycerin in a sufficient amount to prepare an isotonic solution. Alternatively, a general auxiliary solubilizer, buffer, soothing agent may be added. Furthermore, a pigment, preservative, aroma, flavor, sweetening agent and other medicinal substances may be added to a pharmaceutical preparation, if necessary.

[0249] The amount of a compound of the general formula (1) and a salt thereof to be contained in a pharmaceutical preparation according to the present invent is not particularly limited and appropriately selected from the wide range; however generally about 1 to 70 wt%, preferably about 1 to 30 wt% in a preparation composition.

[0250] A method of administrating a pharmaceutical preparation according to the present invention is not limited and administered by a method in accordance with the form of a preparation, the age, gender and other conditions of a patient, and severity of a disease. For example, in the case of a tablet, pill, liquid agent, suspension, emulsion, granule and capsule, it is perorally administrated. In addition, in the case of an injection, it is intravenously administered by itself or by mixing with a general replenisher such as glucose and amino acids, and, if necessary, it is solely administered intramuscularly, intracutaneously, subcutaneously or intraperitoneally. In the case of a suppository, it is administered into the rectum.

[0251] The dose of a pharmaceutical preparation according to the present invention is appropriately selected depending upon the dosage regimen (direction for use), age, gender and other conditions of a patient, and severity of a disease, etc.; however, the dose of an active ingredient compound may be generally and preferably set at about 0.1 to 10 mg/weight (kg) per day. It is desirable that an active ingredient compound be contained in the range of about 1 to 200 mg per dosage unit of a preparation.

[Advantages of the Invention)

[0252] A compound according to the present invention has a D_2 receptor partial agonist effect, 5-HT_{2A} receptor antagonist effect and serotonin uptake inhibitory effect.

[0253] The D_2 receptor partial agonist effect refers to an action which decelerates dopaminergic (DA) neurotransmission when it is enhanced, whereas accelerates dopaminergic (DA) neurotransmission when it is lowered. In this manner,

the D_2 receptor partial agonist acts as a dopamine system stabilizer, which stabilizes DA neurotransmission into a normal state. By virtue of this effect, the compound of the present invention produces an excellent clinical improvement effect on symptoms caused by abnormal DA neurotransmission (acceleration or deceleration) without developing side effects. As the excellent clinical improvement effect, mention may be made of, effects of improving positive and negative symptoms, cognitive impairment and depressive symptom (see Michio Toru, Psychiatry, Vol. 46, page 855-864 (2004); Tetsuro Kikuchi and Hirose Takeshi, Brain Science, vol. 25, page 579-583 (2004); and Harrison, T. S. and Perry, C.M.: Drugs 64: 1715-1736, 2004).

[0254] 5-HT_{2A} receptor antagonist effect refers to an action which reduces extrapyramidal side effects and develops a superior clinical response and more specifically effectively works for improving negative symptoms, cognitive impairment, depressive symptom, and insomnia (see Jun Ishigooka and Ken Inada: Japanese Journal of Clinical Psychopharmacology, vol. 4, page 1653-1664 (2001); Mitsukuni Murasaki: Japanese Journal of Clinical Psychopharmacology, vol. 1, page 5-22 (1998), and Meltzer, H. Y. et al.: Prog. Neuro-Psychopharmacol. Biol. Psychiatry 27: 1159-1172, 2003).

[0255] The serotonin uptake inhibitory effect is, for example, effective in improving depressive symptoms (see Mitsukuni Murasaki: Japanese Journal of Clinical Psychopharmacology, vol. 1, page 5-22 (1998)).

[0256] The compound of the present invention is excellent in all these three effects or significantly excellent in one or two effects of them.

[0257] In addition, some of the compounds according to the present invention has an α_1 receptor antagonist effect in addition to the effects mentioned above. The α_1 receptor antagonist effect is effective in improving positive symptoms of schizophrenia (see Svensson, T. H.: Prog. Neuro-Psychopharmacol. Biol. Psychiatry 27: 1145-1158, 2003)

[0258] Therefore, a compound of the present invention has a wide treatment spectrum for schizophrenia and other central nervous system disorder and possesses a superior clinical response.

[0259] Accordingly, a compound of the present invention is extremely effective for improving various kinds of disorders of the central nervous system such as schizophrenia; refractory, intractable or chronic schizophrenia; emotional disturbance; psychotic disorder; mood disorder; bipolar disorder (for example, bipolar Type-I disorder and bipolar Type-II disorder); depression, endogenous depression, major depression; melancholy and refractory depression; dysthymic disorder; cyclothymic disorder; anxiety disorder (for example, panic attack, panic disorder, agoraphobia, social phobia, obsessive-compulsive disorder, post-traumatic stress disorder, generalized anxiety disorder, and acute stress disorder); somatoform disorder (for example, hysteria, somatization disorder, conversion disorder, pain disorder, and hypochondriasis), factitious disorder; dissociative disorder; sexual disorder (for example, sexual dysfunction, sexual desire disorder, sexual arousal disorder, and erectile dysfunction); eating disorder (for example, anorexia nervosa and bulimia nervosa); sleep disorder; adjustment disorder; substance-related disorder (for example, alcohol abuse; alcohol intoxication; drug addiction, stimulant intoxication, and narcotism); anhedonia (for example, iatrogenic anhedonia, anhedonia of a psychic or mental cause, anhedonia associated with depression, and anhedonia associated with schizophrenia); delirium; cognitive impairment; cognitive impairment associated with Alzheimer's disease, Parkinson's disease and other neurodegenerative diseases; cognitive impairment caused by Alzheimer's disease; Parkinson's disease and associated neurodegenerative diseases; cognitive impairment of schizophrenia; cognitive impairment caused by refractory, intractable or chronic schizophrenia; vomiting; motion sickness; obesity; migraine; pain (ache); mental retardation; autism disorder (autism); Tourette's disorder; tic disorder; attention-deficit/hyperactivity disorder; conduct disorder; and Down's syndrome.

[0260] Furthermore, a compound of the present invention has few side effects, and excellent in tolerability and safety.

[0261] The starting compounds used in each of the above reaction formula may be suitable salt, the object compound obtained by each of the reaction may form a suitable salt. Such suitable salts include the preferable salts of compound (1) exemplified below.

[0262] The preferable salts of compound (1) aren pharmacologically acceptable salts and examples include metal salts such as alkali metal salts (for example, sodium salt potassium salt, etc.), alkaline earth metal salts (for example, calcium salt, magnesium salt, etc.), salts of inorganic bases such as ammonium salt, alkaline metal carbonates (for example, lithium carbonate, potassium carbonate, sodium carbonate, cesium carbonate, etc.), alkaline metal hydrogen carbonates (for example, lithium hydrogen carbonate, sodium hydrogen carbonate, potassium bicarbonate, etc.), alkali metal hydroxides (for example, lithium hydroxide, sodium hydroxide, potassium hydroxide, cesium hydroxide, etc.); for example, salts of organic bases such as tri(lower)alkylamine (for example, trimethylamine, triethylamine, N-ethyldiisopropylamine), pyridine, quinoline, piperidine, imidazole, picoline, dimethylaminopyridine, dimethylaniline, N-(lower)alkylmorpholine (for example, N-methylmorpholine), 1,5-diazabicyclo[4.3.0]nonene-5 (DBN), 1,8-diazabicyclo[5.4.0]undecene-7 (DBU), 1,4-diazabicyclo[2.2.2] octane (DABCO); salts of inorganic acids such as hydrochloride, hydrobromide, hydroiodide, sulfate, nitrate, phosphate; salts of organic acids such as formate, acetate, propionate, oxalate, malonate, succinate, fumarate, maleate, lactate, malate, citrate, tartrate, carbonate, picrate, methanesulfonate, ethanesulfonate, p-toluenesulfonate, glutamate.

[0263] In addition, compounds in the form in which solvate (for example, hydrate, ethanolate, etc.) was added to the starting compounds and object compound shown in each of the reaction formulae are included in each of the general

formulas. As a preferable solvate, hydrate can be mentioned.

[0264] Each of the object compounds obtained by each of the general formulas can be isolated and purified from the reaction mixture by, for example, subjecting the reaction mixture to isolation operation such as filtration, concentration and extraction after cooling to separate a crude reaction product followed by conventional purification operation such as column chromatography or recrystallization.

[0265] The compound represented by the general formula (1) of the present invention naturally encompasses isomers such as geometrical isomer, stereoisomer and enantiomer.

[0266] The compound of the general formula (1) and a salt thereof can be used in a common form of pharmaceutical preparation. The pharmaceutical preparation is prepared by using usually used diluent or excipient such as filler, extending agent, binder, humectant, disintegrating agent, surfactant and lubricant. As for this pharmaceutical preparation, various forms can be selected depending on the purpose of treatment, and typical examples include a tablet, pill, powder, solution, suspension, emulsion, granule, capsule, suppository, and injection (solution, suspension).

[0267] For shaping in tablet form, various materials conventionally well known as carrier in the art can be widely used. As examples, excipient such as lactose, saccharose, sodium chloride, glucose, urea, starch, calcium carbonate, kaolin, crystalline cellulose, silicate; binder such as water, ethanol, propanol, simple syrup, glucose solution, starch liquid, gelatine solution, carboxymethylcellulose, shellac, methylcellulose, potassium phosphate, polyvinylpyrrolidone; disintegrating agent such as dried starch, sodium alginate, agar powder, laminaran powder, sodium hydrogen carbonate, calcium carbonate, polyoxyethylene sorbitan fatty acid ester, sodium lauryl sulfate, stearic acid monoglyceride, starch, lactose; disintegration preventing agent such as saccharose, stearin, cacao butter, hydrogenated oil; sorbefacient such as quaternary ammonium base, sodium lauryl sulfate; moisturizing agent such as glycerine, starch; absorbing agent such as starch, lactose, kaolin, bentonite, colloidal silica; lubricant such as purified talc, stearate, borate powder, polyethylene glycol can be used, for example. Furthermore, the tablet may be a tablet provided with conventional coating as required, for example, sugar-coated tablet, gelatine encapsulated tablet, enteric coating tablet, film coated tablet or double tablet, multilayer tablet.

[0268] For shaping in pill form, various materials conventionally well known as carrier in the art can be widely used. As examples, excipient such as glucose, lactose, starch, cacao butter, hydrogenated vegetable oil, kaolin, talc; binder such as powdered gum arabic, powdered tragacanth, gelatine, ethanol; disintegrating agent such as laminaran, agar can be used, for example.

[0269] For shaping in suppository form, various materials conventionally well known as carrier can be widely used. Examples thereof include polyethylene glycol, cacao butter, higher alcohol, esters of higher alcohol, gelatine, semisynthesized glyceride, for example.

[0270] A capsule is usually prepared according to a conventional method by mixing active ingredient compounds with various carrier exemplified above and filling them into a hard gelatin capsule, a soft capsule or the like.

[0271] When prepared as injection liquid, it is preferable that solution, emulsion and suspension are sterilized and isotonic to the blood and for forming in these modes, any of those conventionally used in the art as diluent can be used, and, for example, water, ethyl alcohol, macrogol, propylene glycol, ethoxylated isostearyl alcohol, polyoxylated isostearyl alcohol, polyoxyethylene sorbitan fatty acid ester, etc. can be used.

[0272] The pharmaceutical preparation may contain common salt, glucose or glycerine in an amount sufficient to prepare an isotonic solution in this case, and conventional solubilizer, buffer, soothing agent may be also added. Pigment, preservative, aromatic, flavor, sweetening and other pharmaceuticals may be further contained as required.

[0273] The amount of a compound of the general formula (1) or a salt thereof to be contained in the pharmaceutical preparation of the present invention is not particularly limited but usually about 1 to 70% by weight in the preparation composition is suitable and preferably about 1 to 30% by weight.

[0274] There is not limitation in particular in the way of administration of the pharmaceutical preparation of the present invention and may be administered by a method in accordance with specific form of the preparation, age, sex and the other conditions of a patient, severity of disease, etc. For example, in the case of tablet, pill, solution, suspension, emulsion, granule and capsule, it is orally administered. In the case of injection, it is intravenously administered alone or in a mixture with conventional replacement fluid such as glucose and amino acids, and if necessary, and the preparation alone may be also administered intramuscularly, intracutaneously, subcutaneously or interperitoneally. It is administered in rectum in the case of suppository.

[0275] Applied dose of the pharmaceutical preparation of the present invention is appropriately selected in accordance with dosage regimen, age, sex and the other conditions of a patient, severity of disease, etc., but it is suitable that the amount of the active ingredient compound is usually about 0.1 to 10 mg per 1 kg of body weight per day. In addition, it is desirable that the active ingredient compound is contained in the preparation of a dosage unit form in the range of about 1 to 200 mg.

[0276] The compound of the present invention has D_2 receptor partial agonist effect, 5-HT_{2A} receptor antagonist effect and serotonin uptake inhibitory effect (or serotonin uptake inhibitory effect).

[0277] The D_2 receptor partial agonist effect suppresses dopaminergic (DA) neurotransmission when it is enhanced,

and accelerates the DA neurotransmission when it is lowered and thus has a function to stabilize the DA neurotransmission to a normal state (dopamine system stabilizer). According to this function, excellent clinically improving effect on the conditions based on the DA abnormal neurotransmission (enhancement and lowering), for example, improving effect on positive and negative symptoms, improving effect on cognitive impairment, improving effect on depressive symptom, etc. are developed without developing side effects (See Michio Toru: Seishin-Igaku (Psychiatry), Vol. 46, pp. 855-864 (2004), Tetsuro Kikuchi and Tsuyoshi Hirose: Nou-no-Kagaku (Brain Science), Vol. 25, pp. 579-583 (2003) and Harrison, T.S. and Perry, C.M.: Drugs 64: 1715-1736, 2004).

[0278] 5-HT_{2A} receptor antagonist effect reduces extrapyramidal side effects, develops superior clinical effects, and is effective for improvement of negative symptoms, improvement of cognitive impairment, improvement of depression condition, improvement of insomnia, for example (See Jun Ishigooka and Ken Inada: Rinsho-Seishin-Yakuri (Japanese Journal of Clinical Psychopharmacology), Vol. 4, pp. 1653-1664 (2001), Mitsukuni Murasaki: Rinsho-Seishin-Yakuri (Japanese Journal of Clinical Psychopharmacology), Vol. 1, pp. 5-22 (1998), Puller, I.A. et al., Eur. J. Pharmacol., 407: 39-46, 2000, and Meltzer, H.Y. et al, Prog. Neuro-Psychopharmacol. Biol. Psychiatry 27: 1159-1172, 2003).

[0279] Serotonin uptake inhibitory effect (or serotonin reuptake inhibitory effect) is effective for improving depressive symptoms, for example (See Mitsukuni Murasaki: Rinsho-Seishin-Yakuri (Japanese Journal of Clinical Psychopharmacology), Vol. 1, pp. 5-22 (1998)).

[0280] The compounds of the present invention are excellent in all of these three effects, or remarkably excellent in one or two of these effects.

[0281] In addition, some of the compounds of the present invention have α_1 receptor antagonist effect in addition to the above-described effects. The α_1 receptor antagonist effect is effective for improving positive symptoms of schizophrenia (See Svensson, T.H.: Prog. Neuro-Psychopharmacol. Biol. Psychiatry 27: 1145-1158, 2003).

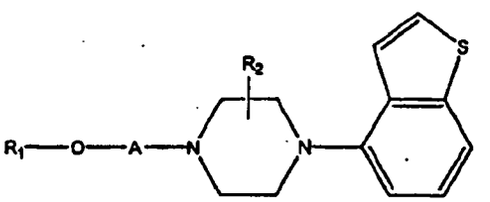
[0282] Therefore, the compounds of the present invention have a wide treatment spectrum for and excellent clinical effect on schizophrenia and other central nervous system disorders.

[0283] Accordingly, the compounds of the present invention are extremely effective for the treatment or prevention of central nervous system disorders including the group consisting of schizophrenia; refractory, intractable or chronic schizophrenia; emotional disturbance: psychotic disorder; mood disorder; bipolar disorder (for example, bipolar I type disorder and bipolar II type disorder); depression; endogenous depression; major depression; melancholy and refractory depression; dysthymic disorder; cyclothymic disorder; anxiety disorder (for example, panic attack, panic disorder, agoraphobia, social phobia, obsessive-compulsive disorder, post-traumatic stress disorder, generalized anxiety disorder, acute stress disorder, etc.); somatoform disorder (for example, hysteria, somatization disorder, conversion disorder, pain disorder, hypochondriasis, etc.); factitious disorder; dissociative disorder; sexual disorder (for example, sexual dysfunction, sexual desire disorder, sexual arousal disorder, erectile dysfunction, etc.); eating disorder (for example, anorexia nervosa, bulimia nervosa, etc.); sleep disorder; adjustment disorder; substance-related disorder (for example, alcohol abuse, alcohol intoxication, drug addiction, stimulant intoxication, narcotism, etc.); anhedonia (for example, iatrogenic anhedonia, anhedonia of a psychic or mental cause, anhedonia associated with depression, anhedonia associated with schizophrenia, etc.); delirium; cognitive impairment; cognitive impairment associated with Alzheimer's disease, Parkinson's disease, and other neurodegenerative diseases; cognitive impairment caused by Alzheimer's disease, Parkinson's disease and associated neurodegenerative diseases; cognitive impairment of schizophrenia; cognitive impairment caused by refractory, intractable or chronic schizophrenia; vomiting; motion sickness; obesity; migraine; pain (ache); mental retardation; autism disorder (autism); Tourette's disorder; tic disorder; attention-deficit/hyperactivity disorder; conduct disorder; and Down's syndrome.

[0284] Furthermore, the compounds of the present invention have little or no side effects and they are excellent in safety and tolerability.

[0285] A preferable example of a desired compound (1) is as follows:

[Formula 1]



(1)

where R^2 represents a hydrogen atom or a lower alkyl group;
A represents a lower alkylene group or a lower alkenylene group (preferably a lower alkylene group); and
R^1 represents a

(II) an aromatic group selected from a phenyl group, naphthyl group, dihydroindenyl group and tetrahydronaphthyl group (more preferably a phenyl group);

wherein, on the aromatic group represented by R^1, 1 to 5 (more preferably 1 to 3) groups selected from the group consisting of the groups (1) to (66) below may be present as a substituent:

(1) a lower alkyl group,
(2) a lower alkenyl group,
(3) a halogen substituted lower alkyl group,
(4) a lower alkoxy group,
(5) a phenoxy group,
(6) a lower alkylthio group,
(7) a halogen substituted lower alkoxy group,
(8) a hydroxy group,
(9) a phenyl lower alkoxy group,
(10) a hydroxy lower alkyl group,
(11) a lower alkoxy lower alkyl group,
(12) a halogen atom,
(13) a cyano group,
(14) a phenyl aryl group,
(15) a nitro group,
(16) an amino group,
(17) an amino group having 1 to 2 groups selected from the group consisting of a lower alkyl group, a lower alkanoyl group, a lower alkoxycarbonyl group, a lower alkylsulfonyl group, a carbamoyl group, a lower alkyl carbamoyl group, an amino lower alkanoyl group, a lower alkanoylamino lower alkanoyl group and a lower alkoxycarbonylamino lower alkanoyl group as a substituent(s) (more preferably an N-lower alkylamino group, N,N-di lower alkylamino group, N-lower alkanoylamino group, N-lower alkoxycarbonylamino group, N-lower alkylsulfonylamino group, N-lower alkyl-N-lower alkanoylamino group, N-lower alkyl-N-lower alkoxycarbonylamino group, N-[carbamoyl]amino group, N-[N-lower alkylcarbamoyl]amino group, N-[N,N-di lower alkylcarbamoyl]amino group, N-[amino lower alkanoyl]amino group, N-[[N-lower alkanoylamino] lower alkanoyl]amino group, or N-[[N-lower alkoxycarbonylamino] lower alkanoyl] amino group),
(18) a lower alkanoyl group,
(19) a phenyl sulfonyl group that may have a lower alkyl group on the phenyl group (more preferably a lower alkylphenylsulfonyl group),
(20) a carboxy group,
(21) a lower alkoxycarbonyl group,
(22) a carboxy lower alkyl group,
(23) a lower alkoxycarbonyl lower alkyl group,
(24) a lower alkanoylamino lower alkanoyl group,
(25) a carboxy lower alkenyl group,
(26) a lower alkoxycarbonyl lower alkenyl group,
(27) a carbamoyl lower alkenyl group that may have as a substituent(s) 1 to 2 groups selected from the group consisting of a lower alkyl group and a lower alkyl group substituted with 1 to 3 halogen atoms (more preferably a carbamoyl lower alkenyl group, an N-lower alkylcarbamoyl lower alkenyl group, an N,N-di lower alkylcarbamoyl lower alkenyl group or N-[a lower alkyl substituted with 1 to 3 halogen atoms] carbamoyl lower alkenyl),
(28) a carbamoyl group that may have 1 to 2 groups selected from the group consisting of the groups (i) to (lxxviii) below as a substituent(s):

(i) a lower alkyl group,
(ii) a lower alkoxy group,
(iii) a hydroxy lower alkyl group,
(iv) a lower alkoxy lower alkyl group,
(v) an phenyloxy lower alkyl group,
(vi) a halogen substituted lower alkyl group,

(vii) an amino lower alkyl group that may have 1 to 2 groups selected from the group consisting of a lower alkyl group, a lower alkanoyl group, a benzoyl group and a carbamoyl group (more preferably an N,N-di lower alkylamino lower alkyl group, an N-lower alkanoylamino lower alkyl group, an N-lower alkyl-N-lower alkanoylamino lower alkyl group, an N-lower alkyl-N-benzoylamino lower alkyl group, or an N-carbamoylamino lower alkyl group)
(viii) a cyclo C3-C8 alkyl group that may have 1 to 3 groups (preferably 1 to 2 groups, and more preferably 1 group) selected from the group consisting of a lower alkyl group, a hydroxy group, a lower alkoxycarbonyl group and a phenyl lower alkoxy group as a substituent,
(ix) a cyclo C3-C8 alkyl substituted lower alkyl group,
(x) a lower-alkenyl group,
(xi) a lower alkyl group having 1 to 2 carbamoyl groups which may have 1 to 2 groups (preferably 1 group) selected from the group consisting of a lower alkyl group, a phenyl group that may have a single lower alkyl group and a phenyl group that may have a single lower alkoxy group as a substituent(s) (more preferably a carbamoyl lower alkyl group, a dicarbamoyl lower alkyl group, an N-lower alkylcarbamoyl lower alkyl group, an N,N-di lower alkylcarbamoyl lower alkyl group, an N-[lower alkylphenyl]carbamoyl lower alkyl group, or an N-[lower alkoxyphenyl]carbamoyl lower alkyl group),
(xii) a lower alkyl group having 1 to 2 lower alkoxycarbonyl groups,
(xiii) a furyl lower alkyl group (that may have 1 to 2 lower alkyl groups as a substituent(s) on the furyl group),
(xiv) a tetrahydrofuryl lower alkyl group,
(xv) a 1,3-dioxolanyl lower alkyl group,
(xvi) a tetrahydropyranyl lower alkyl group,
(xvii) a pyrrolyl lower alkyl group (that may have 1 to 2 lower alkyl groups as a substituent(s) on the pyrrolyl group),
(xviii) a dihydropyrazolyl lower alkyl group that may have a single oxo group,
(xix) a pyrazolyl lower alkyl group (that may have 1 to 3 lower alkyl groups as a substituent(s) on the pyrazolyl group),
(xx) an imidazolyl lower alkyl group,
(xxi) a pyridyl lower alkyl group,
(xxii) a pyrazinyl lower alkyl group (that may have 1 to 3 (preferably 1) lower alkyl groups as a substituent on the pyrazinyl group),
(xxiii) a pyrrolidinyl lower alkyl group (that may have 1 to 2 groups selected from the group consisting of an oxo group and a lower alkyl group as a substituent(s) on the pyrrolidinyl group),
(xxiv) a piperidyl lower alkyl group (that may have 1 to 3 groups (preferably 1 group) selected from the group consisting of a benzoyl group and a lower alkanoyl group as a substituent(s) on the piperidyl group),
(xxv) a piperazinyl lower alkyl group (that may have 1 to 3 (preferably 1) lower alkyl groups as a substituent(s) on the piperazinyl group),
(xxvi) a morpholinyl lower alkyl group,
(xxvii) a thienyl lower alkyl group (that may have 1 to 3 (preferably 1) lower alkyl group as a substituent(s) on the thienyl group),
(xxviii) a thiazolyl lower alkyl group,
(xxix) a dihydrobenzofuryl lower alkyl group,
(xxx) a benzopyranyl lower alkyl group (that may have a single oxo group as a substituent on the benzopyranyl group),
(xxxi) a benzimidazolyl lower alkyl group,
(xxxii) an indolyl lower alkyl group that may have 1 to 3 (preferably 1) lower alkoxycarbonyl groups on the lower alkyl group),
(xxxiii) an imidazolyl lower alkyl group that has 1 to 3 substituents (preferably 1 substituent) selected from the group consisting of a carbamoyl group and a lower alkoxycarbonyl group on the lower alkyl group,
(xxxiv) a pyridyl group that may have 1 to 3 groups (preferably 1 group) selected from the group consisting of a lower alkyl group, a lower alkoxy group and a lower alkylthio lower alkyl group as a substituent(s),
(xxxv) a pyrrolidinyl group that may have 1 to 3 groups (preferably 1 group) selected from the group consisting of a lower alkyl group, a lower alkoxycarbonyl group, a lower alkanoyl group and a benzoyl group as a substituent,
(xxxvi) a piperidyl group that may have 1 to 3 groups (preferably 1 group) selected from the group consisting of a lower alkyl group, a lower alkoxycarbonyl group, a lower alkanoyl group and a benzoyl group that may have 1 to 3 groups (preferably 1 group) selected from the group consisting of a lower alkyl group and a halogen atom on the phenyl group,
(xxxvii) a tetrahydrofuryl group that may have a single oxo group,
(xxxviii) a hexahydroazepinyl group that may have a single oxo group,
(xxxix) a pyrazolyl group that may have 1 to 3 groups (preferably 1 group) selected from the group consisting

of a lower alkyl group, a phenyl group and a furyl group as a substituent,
(xl) a thiazolyl group,
(xli) a thiadiazolyl group that may have 1 to 3 (preferably 1) lower alkyl groups,
(xlii) an isoxazolyl group that may have 1 to 3 (preferably 1 to 2) lower alkyl groups,
(xliii) an indazolyl group,
(xliv) an indolyl group,
(xlv) a tetrahydrobenzothiazolyl group,
(xlvi) a tetrahydroquinolyl group that may have 1 to 3 (preferably 1 to 2) groups selected from the group consisting of a lower alkyl group, a lower alkoxy group, a halogen atom and an oxo group as a substituent,
(xlvii) a quinolyl group that may have 1 to 3 (preferably 1) lower alkyl groups,
(xlviii) a benzodioxolyl lower alkyl group,
(xlix) a phenyl group or naphthyl group that may have 1 to 3 groups as a substituent(s), selected from the group consisting of
a halogen atom; a lower alkyl group; a lower alkoxy group; a halogen substituted lower alkyl group; a halogen substituted lower alkoxy group; a lower alkenyl group; an amino group that may have 1 to 2 groups selected from the group consisting of a lower alkanoyl group, a lower alkyl sulfonyl group, a lower alkyl group and an aryl group; a sulfamoyl group; a lower alkylthio group; a lower alkanoyl group; a lower alkoxycarbonyl group; a pyrrolyl group; a lower alkynyl group; a cyano group; a nitro group; a phenyloxy group; a phenyl lower alkoxy group; a hydroxy group; a hydroxy lower alkyl group; a carbamoyl group that may have a group selected from the group consisting of a lower alkyl group and a phenyl group; a pyrazolyl group; a pyrrolidinyl group that may have a single oxo group; an oxazolyl group; an imidazolyl group that may have 1 to 3 (preferably 1 to 2) lower alkyl groups; a dihydrofuryl group that may have a single oxo group; a thiazolidinyl lower alkyl group that may have two oxo groups; an imidazolyl lower alkanoyl group and a piperidinylcarbonyl group,
(l) a cyano lower alkyl group,
(li) a dihydroquinolyl group that may have 1 to 3 (more preferably 1 to 2) groups selected from the group consisting of a lower alkyl group and an oxo group,
(lii) a halogen substituted lower alkylamino group,
(liii) a lower alkylthio lower alkyl group,
(liv) an amidino group that may have 1 to 2 lower alkyl groups,
(lv) an amidino lower alkyl group,
(lvi) a lower alkenyloxy lower alkyl group,
(lvii) a phenyl amino group that may have 1 to 3 substituents (more preferably 1 substituent) selected from the group consisting of a lower alkyl group, a lower alkoxy group, a halogen substituted lower alkyl group and a halogen substituted lower alkoxy group on the phenyl group,
(lviii) a phenyl lower alkenyl group,
(lix) a pyridylamino group that may have 1 to 3 (more preferably 1 to 2) lower alkyl groups (more preferably N-lower alkyl-N-[lower alkylpyridyl]amino group),
(lx) a phenyl lower alkyl group (that may have 1 to 3 groups (more preferably 1 to 2 groups) selected from the group consisting of a halogen atom, a lower alkyl group, a halogen substituted lower alkyl group, a halogen substituted lower alkoxy group, a lower alkoxy group, a carbamoyl group and a lower alkoxycarbonyl group as a substituent on the phenyl group and/or the lower alkyl group),
(lxi) a lower alkynyl group,
(lxii) a phenyloxy lower alkyl group (that may have as a substituent(s) on the phenyl group 1 to 3 groups (preferably 1 group) selected from the group consisting of a lower alkoxy group, an N-lower alkoxy-N-lower alkylcarbamoyl group and an oxopyrrolidinyl group),
(lxiii) an isoxazolidinyl group that may have a single oxo group,
(lxiv) a dihydroindenyl group,
(lxv) a phenyl lower alkoxy lower alkyl group,
(lxvi) a tetrahydropyranyl group,
(lxvii) an azetidinyl group that may have 1 to 3 groups (more preferably 1 group) selected from the group consisting of a lower alkanoyl group and a benzoyl group,
(lxviii) an azetidinyl lower alkyl group that may have 1 to 3 groups (more preferably 1 group) selected from the group consisting of a lower alkanoyl group and a benzoyl group,
(lxix) a tetrazolyl group,
(lxx) an indolinyl group that may have a single oxo group,
(lxxi) a triazolyl group that may have 1 to 3 groups (more preferably 1 to 2 groups) selected from the group consisting of a lower alkyl group and a lower alkylthio group,
(lxxii) an imidazolyl group that may have 1 to 3 (more preferably 1) carbamoyl groups,

(lxxiii) an oxazolyl group that may have 1 to 3 (more preferably 1) lower alkyl groups,
(lxxiv) an isothiazolyl group that may have 1 to 3 (more preferably 1) lower alkyl groups,
(lxxv) a benzimidazolyl group,
(lxxvi) a dihydrobenzothiazolyl group that may have a single oxo group,
(lxxvii) a thienyl group that may have 1 to 3 (more preferably 1) lower alkoxycarbonyl groups, and
(lxxviii) an oxazolyl lower alkyl group that may have 1 to 3 (more preferably 1 to 2) lower alkyl groups

(29) an amino lower alkyl group that may have 1 to 2 groups selected from the group consisting of a lower alkyl group, a halogen substituted lower alkyl group, a lower alkoxycarbonyl group, a lower alkanoyl group, a phenyl group, a phenyl lower alkyl group, a benzoyl group and an amino substituted alkyl group (that may have 1 to 2 (more preferably 2) lower alkyl groups as a substituent(s) on the amino group) on the amino group,
(30) a lower alkyl group substituted with a single carbamoyl group that may have 1 to 2 groups selected from the group consisting of a lower alkyl group and a halogen substituted lower alkyl group,
(31) a thiocarbamoyl group that may have 1 to 2 (more preferably 1) lower alkyl group,
(32) a sulfamoyl group,
(33) an oxazolidinyl group that may have a single oxo group (more preferably an oxazolidinyl group substituted with a single oxo group),
(34) an imidazolidinyl group that may have 1 to 2 substituents selected from the group consisting of an oxo group and a lower alkyl group,
(35) a pyrrolidinyl group that may have a single oxo group,
(36) an imidazolyl group,
(37) a triazolyl group,
(38) an isoxazolyl group,
(39) a piperidyl group that may have 1 to 3 (more preferably 1 to 2, and still more preferably 1) substituents selected from the group consisting of a lower alkyl group, a lower alkanoyl group, a lower alkylphenylsulfonyl group, an oxo group, a hydroxy group, and amino group that may have 1 to 2 groups selected from the group consisting of a lower alkyl group, a lower alkanoyl group, a lower alkoxycarbonyl group and lower alkanoylamino lower alkanoyl group (more preferably a piperidyl group that may have 1 to 3 (more preferably 1 to 2, and still more preferably 1) substituents selected from the group consisting of a lower alkyl group, a lower alkanoyl group, a lower alkylphenylsulfonyl group, an oxo group, a hydroxy group, an amino group, an N-lower alkylamino group, an N,N-di lower alkylamino group, an N-lower alkanoylamino group, an N-lower alkyl-N-lower alkoxycarbonylamino group, an N-lower alkyl-N-lower alkanoylamino group, and an N-lower alkanoylamino lower alkanoylamino group),
(40) a piperidylcarbonyl group that may have 1 to 3 (more preferably 1 to 2) substituents selected from the group consisting of a lower alkyl group, a hydroxy group, a hydroxy lower alkyl group, a lower alkanoyl group, a carboxy lower alkyl group, a lower alkyl carbamoyl lower alkyl group, a carbamoyl group, a lower alkoxy group, a carboxy group, a lower alkoxycarbonyl group, an amino group (on which 1 to 2 groups selected from the group consisting of a lower alkyl group, a lower alkanoyl group, a lower alkoxycarbonyl group and a benzoyl group may be present), a piperidyl group (on which 1 to 3 groups (more preferably 1 group) selected from the group consisting of a lower alkanoyl group, a lower alkoxycarbonyl group and a benzoyl group may be present), a piperazinyl group (on which 1 to 3 (more preferably 1 to 2) lower alkyl groups may be present as a substituent), a 1,4-dioxa-8-azaspiro[4.5]decyl group, a morpholinyl group, a hexahydro-1,4-diazepinyl group (on which a single lower alkyl group may be present as a substituent), pyridyl group, pyridyloxy group, pyridyl lower alkoxy group, tetrahydroquinolyl group (on which a single oxo group may be present), benzodioxolyl group, phenyl lower alkoxy group (that may have 1 to 3 groups (more preferably 1 to 2 groups) selected from the group consisting of a halogen atom, a lower alkyl group, a lower alkoxy group and a halogen substituted lower alkoxy group on the phenyl group), phenyl group (on which 1 to 3 groups (preferably 1 to 2 groups) selected from the group consisting of a halogen atom, a lower alkoxy group and a hydroxy group may be present), a phenyloxy group (that may have on the phenyl group 1 to 3 groups (preferably 1 to 2 groups) selected from the group consisting of a cyano group, a halogen atom, a lower alkyl group, a lower alkoxy group and a halogen substituted lower alkyl group), 4 phenyl lower alkyl group (that may have on the phenyl group 1 to 3 groups (more preferably 1 to 2 groups) selected from the group consisting of a halogen atom, a lower alkyl group, a lower alkoxy group and a halogen substituted lower alkyl group), and a benzoyl group (that may have on the phenyl group 1 to 3 groups (more preferably 1 to 2 groups) selected from the group consisting of a halogen atom and a lower alkoxy group),
(41) a pyrrolidinylcarbonyl group that may have 1 to 3 (more preferably 1) groups as a substituent, selected from the group consisting of a hydroxy lower alkyl group, a carbamoyl group, a hydroxy group, an amino group (that may have on the amino group 1 to 2 groups selected from the group consisting of a lower alkyl group, a lower alkanoyl group and a benzoyl group), morpholinyl lower alkyl group, a pyrrolidinyl lower alkyl group, a piperidyl lower alkyl group, a piperazinyl lower alkyl group (that may have a single lower alkyl group as a substituent on the piperazinyl

group), an amino lower alkyl group (that may have 1 to 2 lower alkyl groups as a substituent on the amino group), phenyloxy group (that may have 1 to 3 (more preferably 1) halogen substituted lower alkoxy groups on the phenyl group), a phenyloxy lower alkyl group (that may have 1 to 3 (more preferably 1) halogen substituted lower alkoxy groups on the phenyl group) and a tetrahydroquinolyl group (on which an oxo group may be present),

(42) a piperazinylcarbonyl group that may have 1 to 3 groups (more preferably 1 to 2 groups), as a substituent, selected from the group consisting of a lower alkyl group, a cyclo C3-C8 alkyl group, a lower alkanoyl group, a hydroxy lower alkyl group, a lower alkoxy lower alkyl group, a lower alkoxycarbonyl group, an amino lower alkyl group (that may have 1 to 2 lower alkyl groups as a substituent on the amino group), piperidyl lower alkyl group (that may have 1 to 2 (more preferably 1) lower alkyl groups as a substituent(s) on the piperidyl group), a morpholinyl lower alkyl group, a pyrrolidinyl lower alkyl group, a 1,3-dioxolanyl lower alkyl group, a tetrahydrofuryl lower alkyl group, a pyridyl lower alkyl group (that may have 1 to 2 (more preferably 1) phenyl groups as a substituent(s) on the lower alkyl group), an imidazolyl lower alkyl group, a furyl lower alkyl group, a pyrrolidinylcarbonyl lower alkyl group, a piperidyl group that may have 1 to 2 (more preferably 1) lower alkyl groups as a substituent(s), a pyridyl group (that may have on the pyridyl group 1 to 3 groups (more preferably 1 group) selected from the group consisting of a lower alkyl group, a cyano group and a halogen substituted lower alkyl group as a substituent), a thieno[2,3-b] pyridyl group, a phenyl group (on which 1 to 3 groups (more preferably 1 group) selected from the group consisting of a halogen atom and a lower alkyl group may be present), a benzoyl group, a furyl carbonyl group, a phenyl lower alkoxycarbonyl group and an oxo group,

(43) a hexahydroazepinylcarbonyl group,

(44) a hexahydro-1,4-diazepinylcarbonyl group that may have 1 to 3 substituents (more preferably 1 substituent) selected from the group consisting of a lower alkyl group and a pyridyl group,

(45) a dihydropyrrolylcarbonyl group that may have 1 to 3 (more preferably 1 to 2) lower alkyl groups,

(46) a thiomorpholinylcarbonyl group,

(47) a morpholinylcarbonyl group that may have 1 to 3 groups (more preferably 1 group) selected from the group consisting of a lower alkyl group, a piperidyl lower alkyl group and a phenyl group,

(48) a thiazolidinyl carbonyl group that may have 1 to 3 (more preferably 1) phenyl groups that may have 1 to 3 groups (more preferably 1 group) selected from the group consisting of a lower alkoxy group and a cyano group,

(49) an azabicyclo[3.2.2]nonylcarbonyl group,

(50) an 8-azabicyclo[3.2.1]octylcarbonyl group that may have 1 to 3 (more preferably 1) halogen substituted or unsubstituted phenyloxy groups,

(51) an indolinylcarbonyl group,

(52) a tetrahydroquinolylcarbonyl group,

(53) a tetrahydropyrido[3.4-b]indolylcarbonyl group,

(54) a morpholinyl lower alkyl group,

(55) a piperazinyl lower alkyl group that may have 1 to 3 (more preferably 1) lower alkyl groups on the piperazinyl group,

(56) a morpholinylcarbonyl lower alkyl group,

(57) a piperazinylcarbonyl lower alkyl group that may have 1 to 3 (more preferably 1) lower alkyl groups on the piperazinyl group,

(58) an oxo group,

(59) an amino lower alkoxy group (that may have 1 to 2 (more preferably 2) lower alkyl groups on the amino group),

(60) a lower alkoxy lower alkoxy group,

(61) a piperazinyl group that may have 1 to 3 groups (more preferably 1 to 2 groups) selected from the group consisting of an oxo group, a lower alkyl group, a lower alkanoyl group and a lower alkoxycarbonyl group (more preferably, a piperazinyl group substituted with a single oxo group, a piperazinyl group substituted with a single lower alkyl group, a piperazinyl group substituted with a single lower alkanoyl group, a piperazinyl group substituted with a single oxo group and a single lower alkanoyl group, and a piperazinyl group substituted with a single oxo group and a single lower alkoxy carbonyl group),

(62) a morpholinyl group,

(63) a 1,3,8-triazaspiro[4.5]decanylcarbonyl group that may have 1 to 3 groups (more preferably 1 to 2 groups) selected from the group consisting of an oxo group and a phenyl group,

(64) a tetrahydropyridylcarbonyl group that may have 1 to 3 (more preferably 1) pyridyl groups,

(65) an imidazolidinylcarbonyl group that may have one thioxo group, and

(66) a 1,4-dioxa-8-azaspiro[4.5]decanyl group.

[0286] In the general formula (1), R^1 is preferably a phenyl group. The ring of the phenyl group is preferably substituted with 1 to 3 groups selected from the group consisting of:

(1) a lower alkyl group,
(4) a lower alkoxy group,
(10) a hydroxy lower alkyl group,
(17) an amino group having 1 to 2 groups selected from the group consisting of a lower alkyl group, a lower alkanoyl group, a lower alkoxy carbonyl group, a lower alkyl sulfonyl group, a carbamoyl group, a lower alkyl carbamoyl group, an amino lower alkanoyl group, a lower alkanoylamino lower alkanoyl group and a lower alkoxycarbonylamino lower alkanoyl group as a substituent(s),
(21) a lower alkoxycarbonyl group,
(28) a carbamoyl group that may have 1 to 2 substituents selected from the group consisting of the groups (i), (ii), (iv), (xii) and (xxi) below:

(i) a lower alkyl group,
(ii) a lower alkoxy group,
(iv) a lower alkoxy lower alkyl group,
(xii) a lower alkyl group having 1 to 2 lower alkylcarbonyl groups,
(xxi) a pyridyl lower alkyl group,

(29) an amino lower alkyl group that may have 1 to 2 groups selected from the group consisting of a lower alkyl group, a halogen substituted lower alkyl group, a lower alkoxycarbonyl group, a lower alkanoyl group, a phenyl group, a phenyl lower alkyl group, a benzoyl group and an amino substituted alkyl group (that may have 1 to 2 lower alkyl groups as a substituent(s) on the amino group) on the amino group,
(30) a lower alkyl group substituted with a single carbamoyl group that may have 1 to 2 groups selected from the group consisting of a lower alkyl group and a halogen substituted lower alkyl group,
(33) an oxazolidinyl group that may have a single oxo group,
(34) an imidazolidinyl group that may have 1 to 2 substituents selected from the group consisting of an oxo group and a lower alkyl group,
(35) a pyrrolidinyl group that may have a single oxo group,
(36) an imidazolyl group,
(39) a piperidyl group that may have a single substituent selected from the group consisting of a lower alkyl group, a lower alkanoyl group, a lower alkyl phenylsulfonyl group, an oxo group, a hydroxy group, an amino group, an N-lower alkylamino group, an N-N di-lower alkyl amino group, an N-lower alkanoylamino group, an N-lower alkyl-N-lower alkoxycarbonylamino group, an N-lower alkyl-N-lower alkanoylamino group, and an N-lower alkanoylamino lower alkanoylamino group,
(61) a piperazinyl group that may have 1 to 2 groups selected from the group consisting of an oxo group, a lower alkyl group, a lower alkanoyl group and a lower alkoxy carbonyl group, and
(62) a morpholinyl group.

EXAMPLE

[0287] Hereinbelow, the present invention will be further made clear with reference to Reference Examples, Examples and Pharmacological Experimental Examples and Preparation Examples.

Reference Example 1

Synthesis of 1-benzo[b]thiophen-4-yl-piperazine hydrochloride

[0288] A mixture consisting of 14.4 g of 4-bromobenzo[b]thiophene, 29.8 g of piperazine anhydride, 9.3 g of sodium t-butoxide, 0.65 g of (R)-(+)-2,2'-bis(diphenylphosphino)-1,1'-binaphthyl (BINAP), 0.63 g of tris (dibenzylideneacetone) dipalladium (0) and 250 ml of toluene was refluxed with heating for one hour under a nitrogen atmosphere. Water was poured to the reaction solution, which was then extracted with ethyl acetate, washed with water and dried over magnesium sulfate. The solvent was evaporated under reduced pressure. The obtained residue was purified by silica gel column chromatography (dichloromethane: methanol: 25% ammonia water = 100:10:1), to obtain 9.5 g of 1-benzo[b]thiophen-4-yl-piperazine in the form of yellow oil.
[0289] Then, 3.7 ml of concentrated hydrochloric acid was added to a methanol solution of 9.5 g of 1-benzo[b]thiophen-4-yl-piperazine, and the solvent was evaporated under reduced pressure. Ethyl acetate was added to the obtained residue and precipitated crystals were obtained by filtration. Recrystallization was performed from methanol to obtain 1-benzo[b]thiophen-4-yl-piperazine hydrochloride as colorless needle-like crystals.
Melting point 276-280˚C

^{1}H-NMR (DMSO-d_6) δppm: 3.25-3.35 (8H, m), 6.94 (1H, d, J=7.6Hz), 7.30 (1H, dd, J=7.8Hz, J=7.8Hz), 7.51 (1H, d, J=5.5Hz), 7.68 (1H, d, J=8.1Hz), 7.73 (1H, d, J=5.5Hz), 9.35 (2H, brs).

Reference Example 2

Synthesis of tert-butyl 4-benzo[b]thiophen-4-yl-3-methylpiperazin-1-carboxylate

[0290] The titled compound was obtained using tert-butyl 3-methylpiperazin-1-carboxylate and 4-bromobenzo[b]thiophene in the same manner as in Reference Example 1.
^{1}H -NMR ($CDCl_3$) δppm: 1.85-1.95 (3H, m , 1.50 (9H, s, 2.8-2.9 (1H, m), 3.15-3.35 (2H, m), 3.4-3.5 (1H, m), 3.5-3.65 (1H, m), 3.65-3.7 (1H, m), 3.7-3.9 (1H, m), 6.98 (1H, d, J = 7.5Hz), 7.29 (1H, dd, J = 8Hz, J=9Hz), 7.38 (1H, d, J = 5.5Hz), 7.61 (1H, d, J = 9Hz).

Reference Example 3

Synthesis of 1-benzo[b]thiophen-4-yl-2-methylpiperazine dihydrochloride

[0291] Trifluoroacetic acid (6 ml) was added to a solution of 1.22 g (3.7 mmol) of tert-butyl 4-benzo[b]thiophen-4-y-3-methylpiperazin-1-carboxylate in a dichloromethane solution (12 ml) and the mixture was stirred at room temperature for one hour. The reaction mixture was concentrated under reduced pressure, and a 5% aqueous potassium carbonate solution was added to the residue and the resulting mixture was extracted with dichloromethane. The extraction solution with dichloromethane was dried over magnesium sulfate and thereafter concentrated under reduced pressure. To the residue obtained, concentrated hydrochloric acid (0.6 ml) and methanol (10 ml) were added and the resulting mixture was concentrated under reduced pressure. The obtained residue was subjected to recrystallization from acetonitrile to obtain 1-benzo[b]thiophen-4-yl-2-methylpiperazine dihydrochloride (0.98 g) as light brown powder.
^{1}H -NMR (DMSO-d_6) δppm: 0.92 (3H, d, J =6.5Hz), 2.8-3.6 (6H, m), 3.6-4.0 (1H, m), 5.3-6.8 (1H, m), 7.20 (1H, br), 7.38 (1H, dd, J = 8Hz, J=8Hz), 7.5-8.0 (3H, m), 9.4-10.1 (2H, m).

Reference Example 4

Synthesis of 1-benzo[b]thiophen-4-yl-3-methylpiperazine dihydrochloride

[0292] The titled compound was obtained using 2-methylpiperazine and 4-bromobenzo[b]thiophene in the same manner as in Reference Example 1.
^{1}H-NMR (DMSO-d_6) δppm: 1.34 (3H, d, J = 6.5Hz), 2.85-2.95 (1H, m), 3.05-3.15 (1H, m), 3.2-3.6 (6H, m), 6.97 (1H, d, J = 7.5Hz), 7.31 (1H, dd, J = 8Hz, J = 8Hz), 7.54 (1H, d, J = 5.5Hz), 7.69 (1H, d, J = 8Hz), 7.75 (1H, d, J = 5.5Hz), 9.2-9.3 (1H, m), 9.64 (1H, br).

Reference Example 5

Synthesis of ethyl 3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propionate

[0293] 5.05 g (19.8 mmol) of 1-benzo[b]thiophen-4-yl-piperazine hydrochloride was added to an aqueous solution of sodium hydroxide, and the mixture was extracted with dichloromethane. The extraction solution was dried over magnesium sulfate and concentrated under reduced pressure. The obtained residue was dissolved in 50 ml of ethanol and ethyl acrylate (2.44 ml, 21.8 mmol) was added thereto, and then the reaction mixture was refluxed with heating for 4 hours. The reaction solution was cooled to room temperature and concentrated under reduced pressure. Diisopropyl ether was added to the residue and insoluble matter precipitated was obtained by filtration, washed with diisopropyl ether, and dried to obtain ethyl 3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propionate (5.26 g) as white powder.
^{1}H -NMR ($CDCl_3$) δppm: 1.28 (3H, t, J=7.0Hz), 2.50-2.63 (2H, m), 2.67-2.87 (6H, m), 3.11-3.24 (4H, m), 4.17 (2H, q, J=7.0Hz), 6.89 (1H, d, J=7.8Hz), 7.27 (1H, t, J=7.8Hz), 7.37-7.42 (2H, m), 7.55 (1H, d, J=7.8Hz).

Reference Example 6

Synthesis of 3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propan-1-ol

[0294] Lithium aluminum hydride (1.18 g, 24.8 mmol) was added to a solution of 5.26 g (16.5 mmol) of ethyl 3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propionate in a tetrahydrofuran (THF) solution (55 ml) under ice cooling, and the

mixture was stirred at room temperature for 4 hours. To the reaction solution, water (1.2 ml), 15 % aqueous sodium hydroxide solution (1.2 ml), and water (3.6 ml) were added in this order and the mixture was stirred at room temperature. Insoluble matter was removed by filtration, and the filtrate was concentrated under reduced pressure. The obtained residue was purified by silica gel column chromatography (n-hexane : ethyl acetate = 3:2 → ethyl acetate) and concentrated to dryness under reduced pressure to obtain 3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propan-1-ol (0.23 g) as white powder.

^{1}H -NMR ($CDCl_3$) δppm: 1.75-1.85 (2H, m), 2.74 (2H, t, J=5.8 Hz), 2.75-2.85 (4H, m), 3.15-3.25 (4H, m), 3.85 (2H, t, J=5.3 Hz), 5.19 (1H, brs), 6.88 (1H, d, J=7.6 Hz), 7.27 (1H, dd, J=7.9 Hz, J=7.8 Hz), 7.39 (2H, s), 7.56 (1H, d, J=8.0 Hz).

Reference Example 7

Synthesis of 4-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)butyl acetate

[0295] 1.0 g (3.9 mmol) of 1-benzo[b]thiophen-4-yl-piperazine hydrochloride was suspended in 20 ml of dimethylformamide (DMF), and potassium carbonate (1.3 g, 9.4 mmol) and 4-bromobutyl acetate (0.7 ml, 4.8 mmol) were added thereto. The reaction mixture was stirred at 80˚C for 6 hours, cooled to room temperature, and water was added thereto, and extracted with ethyl acetate. The organic phase was washed with water, dried over sodium sulfate, and concentrated under reduced pressure. The obtained residue was purified by silica gel column chromatography (dichloromethane: methanol = 30:1), and concentrated to dryness under reduced pressure to obtain 4-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)butyl acetate (0.72 g) as light yellow oil.

^{1}H -NMR ($CDCl_3$) δppm: 1.60-1.73 (4H, m), 2.07 (3H, s), 2.47 (2H, t, J=7.2Hz), 2.60-2.72 (4H, m), 3.17-3.22 (4H, m), 4.11 (2H, t, J=6.3Hz), 6.90 (1H, d, J=7.6Hz), 7.27 (1H, dd, J=7.6Hz, J=8.0Hz), 7.37-7.42 (2H, m), 7.55 (1H, d, J=8.0Hz).

Reference Example 8

Synthesis of 4-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)butan-1-ol

[0296] Potassium carbonate (3.87 g, 28 mmol) was added to a solution of 7.76 g (23.3 mmol) of 4-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)butyl acetate in 90% methanol solution (150 ml). The solution mixture was stirred at room temperature for 2 hours. Water was added to the reaction solution, which was then extracted with dichloromethane. The extraction solution was dried over sodium sulfate and concentrated under reduced pressure. The residue was purified by basic silica gel column chromatography (n-hexane : ethyl acetate = 2:1 → 1:1), and concentrated under reduced pressure to obtain 4-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)butan-1-ol (6.65 g) as colorless oil.

^{1}H -NMR ($CDCl_3$) δppm: 1.60-1.74 (4H, m), 2.50-2.55 (2H, m), 2.70-2.80 (4H, m), 3:20-3.30 (4H, m), 3.60-3.63 (2H, m), 6.2 (1H, brs), 6.90 (1H, d, J=7.6Hz), 7.27 (1H, dd, J=7.6Hz, J=8.0Hz), 7.39 (1H, s), 7.56 (1H, d, J=8.0Hz).

Reference Example 9

Synthesis of 1-benzo[b]thiophen-4-yl-4-(3-chloropropyl)piperazine

[0297] 3.56 g (12.9 mmol) of 3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propan-1-ol was suspended in 30 ml of dichloromethane, and carbon tetrachloride (30 ml) and triphenyl phosphine (4.06 g, 15.5 mmol) were added thereto. The mixture was refluxed with heating for 3 hours. The reaction solution was cooled to room temperature, then methanol and dichloromethane were added thereto to homogenize the mixture. Silica gel (30 g) was added to the solution, and the solvent was evaporated under reduced pressure. The obtained residue was loaded on silica gel column (300 g) and extracted with a solvent mixture of n-hexane : ethyl acetate = 2:1. The extraction solution was concentrated under reduced pressure to obtain 1-benzo[b]thiophen-4-yl-4-(3-chloropropyl)piperazine (2.36 g) as colorless oil.

^{1}H -NMR ($CDCl_3$) δppm: 1.95-2.10 (2H, m), 2.60 (2H, t, J=7.2 Hz), 2.65-2.75 (4H, m), 3.15-3.25 (4H, m), 3.65 (2H, t, J=6.6 Hz), 6.89 (1H, dd, J=7.6 Hz, J=0.7 Hz), 7.27 (1H, dd, J=7.9 Hz, J=7.8 Hz), 7.38 (1H, d, J=5.6 Hz), 7.41 (1H, d, J=5.7 Hz), 7.55 (1H, d, J=8.0 Hz).

Reference Example 10

Synthesis of methyl 4-hydroxythiophene-2-carboxylate

[0298] Thionyl chloride (1.6 ml) was added dropwise to a methanol solution (20 ml) of 4-hydroxythiophene-2-carboxylic acid (1.1 g, 7.6 mmol) under ice cooling. The solution mixture was refluxed with heating for 5 hours. The reaction solution was cooled to room temperature, poured into ice water and extracted with ethyl acetate. The extraction solution with

ethyl acetate was dried over magnesium sulfate and concentrated under reduced pressure. The residue was purified by silica gel column chromatography (n-hexane : ethyl acetate = 4:1) and concentrated/dried under reduced pressure to obtain methyl 4-hydroxythiophene-2-carboxylate (0.7 g) as white powder. ^{1}H-NMR ($CDCl_3$) δppm: 3.90 (3H, s), 5.50-6.60 (1H, br), 6.64 (1H, d, J=1.9 Hz), 7.43 (1H, d, J=1.8 Hz).

Reference Example 11

Synthesis of ethyl 6-hydroxypyrimidine-4-carboxylate

[0299] The titled compound was obtained using 6-hydroxypyrimidine-4-carboxylic acid in the same manner as in Reference Example 10.
^{1}H-NMR ($CDCl_3$) δppm: 1.29 (3H, t, J=7.0Hz), 4.29 (2H, q, J=7.0Hz), 6.87 (1H, d, J=1.0Hz), 8.27 (1H, d, J=1.0Hz), 10.54 (1H, br).

Reference Example 12

Synthesis of methyl 5-hydroxy-1-methyl-1H-pyrazole-3-carboxylate

[0300] A diethyl ether solution (35 ml) of dimethyl acetylenedicarboxylate (5.0 g, 35 mmol) was cooled with a freezing medium (salt & ice). To this solution, a diethyl ether solution (15 ml) of methyl hydrazine (0.63 ml, 35 mmol) was added dropwise while maintaining the temperature at 0˚C or less. After completion of dropwise addition, the solution was stirred at 0˚C for one hour. The insoluble matter precipitated was obtained by filtration and washed with diethyl ether. The filter cake was heated to 130˚C for 30 minutes and cooled to room temperature. Methanol was added to the cake, which was concentrated under reduced pressure. Ethyl acetate was added to the obtained residue and the residue was concentrated under reduced pressure. Ethyl acetate was added to the residue and the insoluble matter precipitated was obtained by filtration, washed with ethyl acetate, and dried to obtain methyl 5-hydroxy-1-methyl-1H-pyrazole-3-carboxylate (3.26 g) as light yellow powder.
^{1}H-NMR (DMSO-d_6) δppm: 3.58 (3H, s), 3.73 (3H, s), 5.77 (1H, s), 11.41 (1H, br).

Reference Example 13 Synthesis of 6-chloro-N-(2,2,2-trifluoroethyl)nicotine amide

[0301] Triethylamine (1.03 ml, 7.4 mmol) and isobutyl chloroformate (0.76 ml, 5.5 mmol) were added to an acetonitrile solution (12 ml) of 6-chloronicotinic acid (0.58 g, 3.6 mmol) under ice cooling and the mixture was stirred at 0˚C for 30 minutes. To the solution mixture, 2,2,2-trifluoroethyl amine (0.88 ml, 11.2 mmol) was added and the mixture was stirred at room temperature for 10 minutes. Water was added to the reaction solution, which was then extracted with ethyl acetate. The extraction solution with ethyl acetate was dried over magnesium sulfate, and concentrated under reduced pressure. The residue was purified by basic silica gel column chromatography (n-hexane : ethyl acetate = 5:1 → 1:1). The purified product was concentrated under reduced pressure and diisopropyl ether and n-hexane were added. The insoluble matter precipitated was obtained by filtration and dried to obtain 6-chloro-N-(2,2,2-trifluoroethyl)nicotine amide (0.58 g) as light yellow powder.
^{1}H-NMR ($CDCl_3$) δppm: 4.15 (2H, dq, J=6.5Hz, 9.0Hz), 6.35 (1H, br), 7.46 (1H, dd, J=0.7Hz, J=8.5Hz), 8.11 (1H, dd, J=2.5Hz, J=8.5Hz), 8.77 (1H, dd, J=0.7Hz, J=2.5Hz).

Reference Example 14

Synthesis of N-(2,2,2-trifluoroethyl)-4-chloropyridine-2-carboxamide

[0302] 1-hydroxybenzotriazole (0.53 g, 3.5 mmol), 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride (WSC) (0.67 g, 3.5 mmol) and 2,2,2-trifluoroethyl amine (0.51 ml. 6.35 mmol) were added to a dichloromethane solution (5 ml) of 4-chloropyridine-2-carboxylic acid (0.5 g, 3.17 mmol) and the mixture was stirred at room temperature for one hour. Water was added to the reaction solution, which was then extracted with ethyl acetate. The extraction solution with ethyl acetate was dried over magnesium sulfate and concentrated under reduced pressure. The residue was purified by silica gel column chromatography (n-hexane : ethyl acetate = 11:1 → 5:1). The purified product was concentrated to dryness under reduced pressure to obtain N-(2,2,2-trifluoroethyl)-4-chloropyridine-2-carboxamide (435 mg) as white powder. ^{1}H-NMR ($CDCl_3$) δppm: 4.13 (2H, dq, J=6.8Hz, 9.0Hz), 7.49 (1H, dd, J=2.1Hz, J=5.3Hz), 8.22 (1H, dd, J=0.4Hz, J=2.1Hz), 8.30 (1H, br), 8.49 (1H, dd, J=0.4Hz, J=5.3Hz).

Reference Example 15

Synthesis of 2-chlorothiazole-4-carboxamide

[0303] 1-hydroxybenzotriazole (0.56 g, 3.7 mmol), 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride (WSC) (0.7 g, 3.7 mmol) and ammonia water (28%, 0.5 ml)) were added to a dichloromethane solution (10 ml) of 2-chlorothiazole-4-carboxylic acid (0.5 g, 3.06 mmol) and the mixture was stirred at room temperature for 46 hours. Water was added to the reaction solution, which was then extracted with ethyl acetate. The extraction solution with ethyl acetate was dried over magnesium sulfate and concentrated under reduced pressure. The residue was purified by silica gel column chromatography (n-hexane : ethyl acetate = 3:5 → ethyl acetate). The purified product was concentrated to dryness under reduced pressure to obtain 2-chlorothiazole-4-carboxamide (475 mg) as white powder.
^{1}H-NMR ($CDCl_3$ δppm: 5.70 (1H, br), 7.01 (1H, br), 8.06 (1H, s).

Reference Example 16

Synthesis of N-methyl-2-chlorothiazole-5-carboxamide

[0304] The titled compound was obtained using 2-chlorothiazole-5-carboxylic acid in the same manner as in Reference Example 13.
^{2}H-NMR ($CDCl_3$) δppm: 3.00 (3H, d, J=4.9Hz), 5.92 (1H, br), 7.84 (1H, br).

Reference Example 17

Synthesis of 6-methoxy-2,2-dimethyl-4H-benzo[1,4]oxazin-3-one

[0305] 5% palladium carbon (1.5 g) were added to an ethanol solution (250 ml) of ethyl 2-(4-methoxy-2-nitrophenoxy)-2-methylpropionate (14.6 g, 51.6 mmol) to perform catalytic reduction at room temperature. The catalyst was removed by filtration and the filtrate was concentrated under reduced pressure. Water was added to the obtained residue, which was then extracted with ethyl acetate. The extraction solution was dried over magnesium sulfate, and concentrated under reduced pressure. The obtained residue was purified by silica gel column chromatography (n-hexane : ethyl acetate = 9:1). The purified product was concentrated to dryness under reduced pressure to obtain 6-methoxy-2,2-dimethyl-4H-benzo[1,4]oxazin-3-one (7.0 g) as white powder.
^{1}H-NMR ($CDCl_3$) δppm: 1.53 (6H, s), 3.78 (3H, s), 6.40 (1H, d, J=2.8Hz), 6.52 (1H, dd, J=2.8Hz, J=8.8Hz), 6.88 (1H, d, J=8.7Hz), 8.66 (1H, brs).

Reference Example 18

Synthesis of 6-hydroxy-2,2-dimethyl-4H-benzo[1,4]oxazin-3-one

[0306] A dichloromethane solution (36 ml) of 2M boron tribromide was added dropwise to a dichloromethane solution of 6-methoxy-2,2-dimethyl-4H-benzo[1,4]oxazin-3-one (5.0 g, 26 mmol) under ice cooling and the mixture was stirred overnight. Water was added to the reaction solution to decompose the reagents excessively present. The reaction solution was washed with water, dried over magnesium sulfate and concentrated under reduced pressure. The obtained residue was purified by silica gel column chromatography (n-hexane : ethyl acetate = 2:1). The purified product was concentrated to dryness under reduced pressure to obtain 6-hydroxy-2,2-dimethyl-4H-benzo[1,4]oxazin-3-one (4.02 g) as white powder.
^{1}H-NMR (DMSO-d_6) δppm: 1.34 (6H, s), 6.25-6.40 (2H, m), 6.70 (1H, d, J=8.5 Hz), 9.09 (1H, s), 10.41 (1H, brs).

Reference Example 19

Synthesis of 6-hydroxy-2-methyl-4H-benzo[1,4]oxazin-3-one

[0307] The titled compound was obtained using 6-methoxy-2-methyl-4H-benzo[1,4]oxazin-3-one in the same manner as in Reference Example 18.
White powder
^{1}H-NMR (DMSO-d_6) δppm: 1.34 (3H, d, J=6.8 Hz), 9.46 (1H, q, J=6.8 Hz), 6.23-6.27 (1H, m), 6.33 (1H, d, J=2.7 Hz), 6.70 (1H, d, J=8.6 Hz), 9.11 (1H, s), 10.44 (1H, brs).

Reference Example 20

Synthesis of 4-(4-methoxyphenyl)-1-(toluene-4-sulfonyl)piperidine

[0308] p-Toluenesulfonyl chloride (4.39 g, 23 mmol) was added to a pyridine solution (30 ml) of 4-(4-methoxyphenyl) piperidine (4.0 g, 21 mmol) and the mixture was stirred at room temperature overnight. Water was added to the solution mixture, which was then extracted with ethyl acetate. The organic phase was washed with hydrochloric acid and water, dried over magnesium sulfate and concentrated under reduced pressure. The obtained residue was purified by silica gel column chromatography (n-hexane : ethyl acetate = 1:1). The purified product was concentrated to dryness under reduced pressure to obtain 4-(4-methoxyphenyl)-1-(toluene-4-sulfonyl)piperidine (4.8 g) as white powder. ^{1}H-NMR ($CDCl_3$) δppm: 1.60-1.90 (4H, m), 2.30-2.40 (3H, m), 2.46 (3H, s), 3.78 (3H, s), 3.90-3.95 (2H, m), 6.84 (2H, dd, J=1.9, J=6.8 Hz), 7.07 (2H, dd, J=1.9, J=6.8 Hz), 7.35 (2H, d, J=8.2 Hz), 7.68 (2H, d, J=8.2 Hz).

Reference Example 21

Synthesis of 4-(4-hydroxyphenyl)-1-(toluene-4-sulfonyl)piperidine

[0309] The titled compound was obtained using 4-(4-methoxyphenyl)-1-(toluene-4-sulfonyl)piperidine in the same manner as in Reference Example 18.
Brown powder
^{1}H-NMR ($CDCl_3$) δppm: 1.60-1.90 (4H, m), 2.30-2.50 (3H, m), 2.45 (3H, s), 3.90-3.95 (2H, m), 6.67 (1H, brs), 6.80 (2H, dd, J=1.9, J=6.8 Hz), 7.02 (2H, dd, J=1.8, J=6.9 Hz), 7.35 (2H, d, J=8.1 Hz), 7.68 (2H, d, J=8.1 Hz).

Reference Example 22

Synthesis of 4-bromo-2-hydroxymethyl-6-methoxyphenol

[0310] Sodium borohydride (0.28 g, 6.9 mmol) was added to a THF solution (30 ml) of 5-bromo-2-hydroxy-3-methoxybenzaldehyde (3.2 g 13.8 mmol) under ice cooling and the mixture was stirred at 0˚c for 2 hours. Acetic acid was added to the reaction solution to set pH at 3. 10% hydrochloric acid was added to the reaction mixture, which was then extracted with ethyl acetate. The extracted material was dried over magnesium sulfate and concentrated under reduced pressure. The obtained residue was purified by silica gel column chromatography (n-hexane : ethyl acetate = 5:1 → 1:1) and concentrated to dryness under reduced pressure to obtain 4-bromo-2-hydroxymethyl-6-methoxyphenol (3.23 g) as light yellow oil.
^{1}H-NMR ($CDCl_3$) δppm: 3.88 (3H, s), 4.71 (2H, s), 6.94 (1H, d, J=2.0Hz), 7.03 (1H, d, J=2.0Hz).

Reference Example 23

Synthesis of 5-bromo-3-methoxy-2-, methoxymethoxybenzaldehyde

[0311] Ethyldiisopropylamine (3.01 ml, 17.1 mmol) and methoxymethylchloride (1.5 ml, 15.7 mmol) were added to a dichloromethane solution (30 ml) of 5-bromo-2-hydroxy-3-methoxybenzaldehyde (3.3 g, 14.3 mmol) under ice cooling, and the mixture was stirred at room temperature for 2 hours. The reaction solution was washed with water, dried over magnesium sulfate, and concentrated under reduced pressure. The obtained residue was purified by silica gel column chromatography (n-hexane : ethyl acetate = 3:1 →11:9). The purified product was concentrated to dryness under reduced pressure to obtain 5-bromo-3-methoxy-2-methoxymethoxybenzaldehyde (4.2 g) as light yellow solid.
^{1}H-NMR ($CDCl_3$) δppm: 3.56 (3H, s), 3.89 (3H, s), 5.21 (2H, s), 7.23 (1H, d, J=2.5Hz), 7.56 (1H, d, J=2.5Hz), 10.39 (1H, s).

Reference Example 24

Synthesis of 3-methoxy-2-methoxymethoxy-5-(2-oxo-oxazolidin-3-yl)benzaldehyde

[0312] 2-oxazolidinone (0.38 g, 4.36 mmol), dipalladium tris(dibenzylideneacetone) (0.17 g, 0.18 mmol), 9,9-dimethyl-4,5-bis(diphenylphosphino)xanthene (XANTPHOS)(0.32 g, 0.55 mmol) and cesium carbonate (1.66 g, 5.1 mmol) were added to a dioxane solution (20 ml) of 5-bromo-3-methoxy-2-methoxymethoxybenzaldehyde (1.0 g, 3.6 mmol) and the mixture was stirred at 100 ˚C for 24 hours under an argon atmosphere. The reaction solution was cooled to room temperature and ethyl acetate was added thereto. The mixture was filtrated by cerite. The filtrate was washed with water, dried over magnesium sulfate and concentrated under reduced pressure. The obtained residue was purified by silica

gel column chromatography (n-hexane : ethyl acetate = 4:1 → 1:1). The purified product was concentrated under reduced pressure. Ethyl acetate and diisopropyl ether were added to the residue. The insoluble matter thus purified was obtained by filtration and dried to obtain 3-methoxy-2-methoxymethoxy-5-(2-oxo-oxazolidin-3-yl)benzaldehyde (0.5 g).as white powder.

^{1}H-NMR ($CDCl_3$) δppm: 3.57 (3H, s), 3.93 (3H, s), 4.06-4.12 (2H, m), 4.48-4.54 (2H, m), 5.21 (2H, s), 6.96 (1H, d, J=2.5Hz), 8.18 (1H, d, J=2.5Hz), 10.45 (1H, s).

Reference Example 25

Synthesis of 3-(3-methoxy-4-methoxymethoxy-5-methylphenyl)oxazolidin-2-one

[0313] 3-Methoxy-2-methoxymethoxy-5-(2-oxo-oxazolidin-3-yl)benzaldehyde (0.5 g, 1.79 mmol) was dissolved in a solvent mixture of acetic acid (5 ml) and ethanol (5 ml) and 10% palladium carbon (0.05 g) was added thereto to perform catalytic reduction at 1 atm at 50˚C for 4 hours. The reaction mixture was cooled to room temperature and filtrated by cerite. The filtrate was concentrated under reduced pressure. The residue was dissolved in acetic acid (10 ml) and 10% palladium carbon (0.05 g) was added thereto to perform catalytic reduction at 1 atm at 50˚C for 6 hours. The solvent was removed under reduced pressure to obtain 3-(3-methoxy-4-methoxymethoxy-5-methylphenyl)oxazolidin-2-one as a crude product, which was subjected to the next reaction as it was.

^{1}H-NMR (CE)Cl_3) δppm: 2.32 (3H, s), 3.56 (3H, s), 3.85 (3H, s), 3.98-4.06 (2H, m), 4.43-4.50 (2H, m), 5.05 (2H, s), 6.61 (1H, d, J=2.3Hz), 7.36 (1H, d, J=2.3Hz).

Reference Example 26

Synthesis of 3-(4-hydroxy-3-methoxy-5-methylphenyl)oxazolidin-2-one

[0314] 10% hydrochloric acid (5 ml) was added to a methanol solution (5 ml) of 3-(3-methoxy-4-methoxymethoxy-5-methylphenyl)oxazolidin-2-one (0.48 g, 1.79 mmol) and the mixture was stirred at 50˚C for 10 minutes. Water was added to the reaction solution, which was extracted with ethyl acetate. The extracted material was dried over magnesium sulfate, and thereafter concentrated to dryness under reduced pressure to obtain 3-(4-hydroxy-3-methoxy-5-methylphenyl)oxazolidin-2-one (434 mg) as a light yellow powder.

^{1}H-NMR ($CDCl_3$) δppm: 2.26 (3H, s), 3.90 (3H, s), 4.02 (2H, dd, J=7.0Hz, J=8.5Hz), 4.46 (2H, dd, J=7.0Hz, J=8.5Hz), 5.55 (1H, br), 6.56 (1H, d, J=2.5Hz), 7.31 (1H, d, J=2.5Hz).

Reference Example 27

Synthesis of 1-(8-methoxy-2,2-dimethyl-4H-benzo[1,3]dioxin-6-yl)pyrrolidin-2-one

[0315] The titled compound was obtained using 6-bromo-8-methoxy-2,2-dimethyl-4H-benzo[1,3]dioxin and 2-pyrrolidone in the same manner as in Reference Example 25.

^{1}H-NMR ($CDCl_3$) δppm: 1.59 (6H, s), 2.09-2.21 (2H, m), 2.60 (2H, t, J=8.3Hz), 3.82 (2H, t, J=7.0Hz), 3.88 (3H, s), 4.83 (2H, s), 6.67 (1H, d, J=2.5Hz), 7.24 (1H, d, J=2.5Hz).

Reference Example 28

Synthesis of 1-(4-hydroxy-3-hydroxymethyl-5-methoxyphenyl)pyrrolidin-2-one

[0316] 10% hydrochloric acid (4 ml) was added to a THF solution (7 ml) of 1-(8-methoxy-2,2-dimethyl-4H-benzo[1,3]dioxin-6-yl)pyrrolidin-2-one (0.36 g, 1.3 mmol) and the mixture was stirred at room temperature for 17 hours. Water was added to the reaction solution, which was then extracted with dichloromethane. The extracted material was dried over magnesium sulfate, concentrated under reduced pressure and purified by silica gel column chromatography (dichloromethane : methanol: = 300: 1 → 30:1). The purified product was concentrated to dryness under reduced pressure to obtain 1-(4-hydroxy-3-hydroxymethyl-5-methoxyphenyl)pyrrolidin-2-one (0.31 g) as light brown powder.

^{1}H-NMR ($CDCl_3$) δppm: 2.05-2.28 (3H, m), 2.26 (2H, t, J=7.5Hz), 3.84 (2H, t, J=7.0Hz), 3.91 (3H, s), 4.74 (2H, s), 5.90 (1H, br), 6.78 (1H, d, J=2.5Hz), 7.52 (1H, d, J=2.SHz).

Reference Example 29

Synthesis of 3-methoxy-2-methoxymethoxy-5-(2-oxopyrrolidin-1-yl)benzaldehyde

[0317] The titled compound was obtained using 5-bromo-3-methoxy-2-methoxymethoxybenzaldehyde and 2-pyrrolidone in the same manner as Reference Example 25. ^{1}H-NMR ($CDCl_3$) δppm: 2.11-2.24 (2H, m), 2.63 (2H, t, J=8.3Hz), 3.56 (3H, s), 3.89 (2H, t, J=7.0Hz), 3.92 (3H, s), 5.21 (2H, s), 7.08 (1H, d, J=2.5Hz), 8.28 (1H, d, J=2.5Hz), 10.46 (1H, s).

Reference Example 30

Synthesis of 1-(4-hydroxy-3-methoxy-5-methylphenyl)pyrrolidin-2-one

[0318] 3-methoxy-2-methoxymethoxy-5-(2-oxopyrrolidin-1-yl)benzaldehyde (0.72 g, 2.56 mmol) was dissolved in a solvent mixture of acetic acid (5 ml) and ethanol (7 ml) and 10% palladium carbon (70 mg) was added thereto to perform catalytic reduction at 50˚C for 10 hours. The reaction solution was cooled to room temperature and filtrated by cerite. The filtered cake was concentrated under reduced pressure. The residue thus obtained was dissolved in dichloromethane (15 ml) and trifluoroacetic acid (2.0 ml, 25.6 mmol) and triethylsilane (2.0 ml, 12.8 mmol) were added thereto under ice cooling. The mixture was stirred at room temperature for 16 hours. The mixture was concentrated under reduced pressure and the residue was purified by silica gel column chromatography (n-hexane : ethyl acetate = 5:1 → ethyl acetate). The purified product was concentrated under reduced pressure to obtain 1-(4-hydroxy-3-methoxy-5-methylphenyl)pyrrolidin-2-one (0.41 g) as light yellow oil.
^{1}H-NMR ($CDCl_3$) δppm: 2.17-2.25 (5H, m), 2.72 (2H, t, J=8.3Hz), 3.88 (2H, t, J=7.0Hz), 3.89 (3H, s), 6.66 (1H, d, J=2.5Hz), 7.15 (1H, d, J=2.5Hz).

Reference Example 31

Synthesis of 3,4-diacetoxy-5-methylbenzaldehyde

[0319] Acetic anhydride (1.2 ml, 12 mmol) was added to a pyridine solution (4 ml) of 3,4-dihydroxy-5-methylbenzaldehyde (0.72 g, 4.7 mmol) and the mixture was stirred at 0˚C for one hour. 10% hydrochloric acid was added to the reaction solution, which was extracted with ethyl acetate. The organic phase was washed with an aqueous sodium hydrogen carbonate solution, dried over magnesium sulfate and concentrated under reduced pressure. The obtained residue was purified by silica gel column chromatography (n-hexane : ethyl acetate = 5:1 → 3:1). The purified product was concentrated under reduced pressure to obtain 3,4-diacetoxy-5-methylbenzaldehyde (0.98 g) as light yellow oil.
^{1}H-NMR ($CDCl_3$) δppm: 2.29 (3H, s), 2.32 (3H, s), 2.35 (3H, s), 7.58 (1H, d, J=1.6Hz), 7.67 (1H, d, J=1.6Hz), 9.93 (1H, s).

Reference Example 32

Synthesis of 7-hydroxy-1,4-dihydrobenzo[d][1,3]oxazin-2-one

[0320] The titled compound was obtained using 7-methoxymethoxy-1,4-dihydrobenzo[d][1,3]oxazin-2-one in the same manner as in Reference Example 26.
White powder
^{1}H-NMR (DMSO-d_6) δppm: 5.14 (2H, s), 6.35 (1H, d, J=2.2 Hz), 6.39 (1H, dd, J= 8.1, J=2.2 Hz), 6.97 (1H, d, J=8.1 Hz), 9.98 (1H, br-s).

Reference Example 33

Synthesis of 7-methoxy-3,4-dihydro-1H-quinazolin-2-one

[0321] 2-aminomethyl-5-methoxyaniline (1.2 g, 7.9 mmol) and carbonyl diimidazole (1.53 g, 9.5 mmol) were added to THF (100 ml) and the mixture was stirred at room temperature overnight. The insoluble matter precipitated was obtained by filtration, washed with dichloromethane and water, dried to obtain 7-methoxy-3,4-dihydro-1H-quinazolin-2-one (1.11 g) as white powder.
^{1}H-NMR (DMSO-d_6) δppm: 3.68 (3H, s), 4.23 (2H, s), 6.35 (1H, d, J=2.5Hz), 6.42 (1H, dd, J=8.3Hz, J=2.5Hz), 6.96 (1H, d, J=8.3Hz), 8.90 (1H, brs).

Reference Example 34

Synthesis of 7-hydroxy-3,4-dihydro-1H-quinazolin-2-one

[0322] The titled compound was obtained using 7-methoxy-3,4-dihydro-1H-quinazolin-2-one in the same manner as in Reference Example 18.
Light brown powder
^{1}H-NMR (DMSO-d_6) δppm: 4.18 (2H, brs), 6.75-6.85 (1H, m), 7.01 (1H, dd, J = 2.0 Hz, J=9.0Hz), 8.07 (1H, d, J = 9.0Hz), 8.87 (1H, brs), 9.48 (1H, brs), 13.21 (1H, brs).

Reference Example 35

Synthesis of methyl 5-(3-chloropropoxy)-1-methyl-1H-pyrazole-3-carboxylate

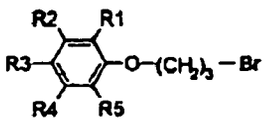
[0323] Cesium carbonate (2.08 g, 6.4 mmol) and 1-bromo-3-chloropropane (1.6 ml) were added to a DMF solution (5 ml) of methyl 5-hydroxy-1-methyl-1H-pyrazole-3-carboxylate (0.83 g, 5.3 mmol) and the mixture was stirred at room temperature for 21 hours. Water was added to the reaction solution, which was then extracted with ethyl acetate. The organic phase was washed with water and dried over magnesium sulfate. The reaction solution was concentrated under reduced pressure. The residue was purified by silica gel column chromatography (n-hexane : ethyl acetate = 100:1 → 4:1). The purified product was concentrated to dryness under reduced pressure to obtain methyl 5-(3-chloropropoxy)-1-methyl-1H-pyrazole-3-carboxylate (1.17 g) as white solid.
^{1}H-NMR ($CDCl_3$) δppm: 2.21-2.32(2H, m), 3.72(2H, t, J=6.3Hz), 3.72(2H, s), 3.91(3H, s), 4.24(2H, t, J=5.8Hz), 6.10(1H, s).

Reference Example 36

Synthesis of 7-(3-chloropropoxy)-2H-1,4-benzoxazin-3(4H)-one

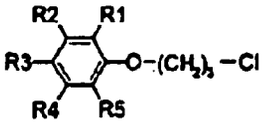
[0324] The titled compound was obtained using 7-hydroxy-2H-1,4-benzoxazin-3(4H)-one and 1-bromo-3-chloropropane in the same manner as in Reference Example 35.
Light brown needle-like crystal (ethanol-n-hexane)
Melting point: 119-120˚C
[0325] The compounds listed in the following Tables 1 to 12 were produced using appropriate starting substances in the same manners as in Reference Examples 1 to 36.

[Table 1]



Reference Exemple	R1	R2	R3	R4	R5	NMR
37	-H	-H	-$CONHC_2H_5$	-H	-H	^{1}H-NMR ($CDCl_3$) δppm: 1.25(3H, t, J=7.5Hz), 2.29-2.39 (2H, m), 3.43-3.54(2H, m), 3.61 (2H, t, J= 6.3Hz), 4.15 (2H, t, J = 5.8Hz), 5.99(1H, br), 6.89-6.95 (2H, m), 7.70-7.75 (2H, m)
38	-H	-H	-$CONHC_3H_7$	-H	-H	^{1}H-NMR ($CDCl_3$) δppm: 0.99(3H, t, J=7.5Hz), 1.57-1.68(2H, m), 2.23-2.36 (2H, m), 3.37-3.45(2H, m), 3.61 (2H, t, J = 6.3Hz), 3.75 (2H, t, J=6.3Hz), 4.12-4.18 (2H, m), 6.02(1H, br), 6.71-6.95 (2H, m), 7.71-7.75 (2H, m)

[Table 2]

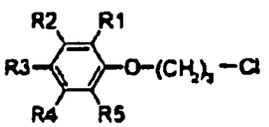


Reference Example	R1	R2	R3	R4	R5	NMR
39	-H	-H	$-NO_2$,	-H	-F	^{1}H-NMR ($CDCl_3$) δppm: 2.20-2.45 (2H, m), 3.70-3.80 (2H, m), 4.30-4.35 (2H, m), 7.07 (1H, dd. J=8.2, 8.9 Hz), 8.00 (1H, dd, J=2.7, 10.7 Hz), 8.07 (1H, dd, J=0.9, 9.0Hz).
40	-H	-H	$-NH_2$	-H	-H	^{1}H-NMR ($CDCl_3$) δppm: 2.14-2.24 (2H, m), 3.26(2H, br), 3.73(2H, t, J=8.3Hz), 4.04 (2H, t, J=5.8Hz,8.81-6.87 (2H, m), 6.72-6.78(2H, m)
41	-H	-H	$NHCO_2CH_3$	-H	-H	^{1}H-NMR ($CDCl_3$) δppm: 2.15-2.25 (2H, m 3.74 (2H, t, J = 6.3Hz), 3.76(3H, s), 4.09 (2H, t, J = 5.8Hz), 6.42(1H, br), 6.85 (2H, dd, J = 25, 8.8Hz), 7.21-7.33 (2H, m)
42	-H	-H	$CH_2CON(C_2H_5)_2$	-H	-H	^{1}H-NMR ($CDCl_3$) δppm: 1.07-1.14(6H, m), 2.17-2.30 (2H, m), 3.26-3.42(4H, m), 3.63 (2H, s), 3.74 (2H, t, J = 6.3Hz), 4.09(2H, t, J=5.8Hz), 6.83-6.88 (2H, m), 7.14-7.19 (2H, m)
43	-H	-H	-H	$-NHCO_2CH_3$	-H	^{1}H-NMR ($CDCl_3$) δppm: 2.28-2.37 (2H, m), 3.74(2H, t, J=8.5Hz), 3.77 (3H, s), 4.11 (2H, t, J = 6.0Hz), 6.50-6.67 (2H, m), 6.83(1H, dd, J=1.5Hz, 7.6Hz), 7.16-7.22 (2H, m)
44	-H	-H	$-NHSO_2C_2H_5$	-H	-H	^{1}H-NMR ($CDCl_3$) δppm: 1.37 (3H, t, J=7.4 Hz), 2.15-2.30 (2H, m), 3.07 (2H, q, J=7.4 Hz), 3.75 (2H, t, J=6.3 Hz), 4.10 (2H, t, J=5.8 Hz), 6.41 (1H, brs), 6.88 (2H, dt J=8.9, 3.4 Hz), 7.19 (2H, dt, J=6.9, 3.4 Hz),
45	-H	-H	$-NH_2$	-H	$-OCH_3$	^{1}H-NMR ($CDCl_3$,) δppm: 2.15-2.30 (2H, m), 3.20-3.70 (2H, br), 3.75.3.95 (2H, m), 3.83(3H, s), 4.07 (2H, t, J=3 Hz), 6.24 (1H, dd, J=26, 8.4 Hz), 6.33 (1H, d, J=2.7 Hz), 6.77 (1H, d, J=8.4Hz).

(continued)

Reference Example	R1	R2	R3	R4	R5	NMR
46	-H	-H	$-NHCO_7CH_3$	-H	$-OCH_3$	^{1}H-NMR ($CDCl_3$) δppm: 2.20-2.30 (2H, m), 3.77 (3H, s), 3.86 (3H, s), 4.13 (2H, t, J=6.0 Hz), 6.55 (1H, brs), 6.73 (1H, dd, J=2.4, 8.6 Hz), 6.84 (1H, d, J=8.6 Hz), 7.20 (1H, brs).
47	-H	-H	$-CONHC_2H_5$	-H	-H	^{1}H-NMR ($CDCl_3$) δppm: 1.23 (3H, t, J=7.3). Hz), 2.20-2.30 (2H, m), 3.40-3.50 (2H, m), 3.74 (2H, t, J=6.3 Hz), 4.14 (2H, t, J=5.8 Hz), 6.13 (1H, brs), 6.85-6.95 (2H, m), 7.70-7.75 (2H, m).
48	-H	-H	$-NHCON(CH_3)_2$	-H	-H	^{1}H-NMR ($CDCl_3$) δppm: 2.15-2.25 (2H, m), 3.02 (6H, s), 3.74 (2H, t, J=6.4 Hz), 4.08 (2H, t, J=5.9 Hz), 6.20 (1H, brs), 6.84 (2H, dd, J=2.0, 8.8 Hz), 7.26 (2H, dd, J=21, 6.8 Hz).
49	-H	-H	$-CO_2C_2H_5$	-H	-Cl	^{1}H-NMR ($CDCl_3$) δppm: 1.39 (3H, t J=7.0Hz), 2.27-2.37 (2H, m), 3.81(2H, t J=6.8Hz), 4.25(2H, t, J=6.3Hz), 4.36 (2H, q, J=7.0Hz), 6.86(1H, d, J=8.5Hz), 7.93(1H, dd, J=2.0Hz, 8.5Hz), 8.06(1H, d. J=2.0Hz)

[Table 3]



Reference Example	R1	R2	R3	R4	R5	NMR
50	-H -	H	$-CH_2CO_2C_2H_5$	-H	-Cl	^{1}H-NMR ($CDCl_3$) δppm: 1.26(3H, t, J=7.0Hz), 2.23-2.33 (2H, m), 3.52 (2H, s), 3.80(2H, t, J=6.3Hz), 4.15(2H, q, J=7.0Hz), 6.90(1H, d, J=8.3Hz), 7.13(1H, dd, J=2.0Hz, 8.3Hz), 7.30(1H, d, J=2.0Hz)

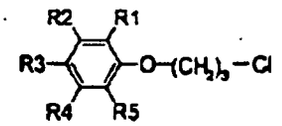
(continued)

Reference Example	R1	R2	R3	R4	R5	NMR
51	-H	-H	$-CH_2CONHCH_3$	-H	-H	^{1}H-NMR ($CDCl_3$) δppm: 2.19-2.29(2H, m), 2.76 (3H, d, J=4.8Hz), 3.52(2H, s), 3.76(2H, t, J=6.3Hz), 4.12(2H, t, J=5.8Hz), 5.35 (1H, br), 6.86-6.92(2H, m), 7.13-7.18(2H, m)
52	-H	-H	$-CH_2CH_2NHCH_3$	-H	-H	^{1}H-MMR ($CDCl_3$) δppm: 2.18-2.27 (2H, m), 2.43 (2H, s), 2.72-2.83(4H, m), 3.71(3H, s), 3.75(4H, t, J=6.3Hz), 4.09(2H, t, J=5.8Hz), 6.83-6.86(2H, m), 7.10-7.14(2H, m)
53	-H	-H	$-(CH_2)_2N(CH_3)CO_2C(CH_3)_3$	-H	-H	^{1}HNMR ($CDCl_3$) δppm: 1.42(9H,s), 2.17-2.27 (2H, m), 2.67-2.86(6H, m), 3.35-3.41 2H, m), 3.74(2H, t, J=6.3Hz), 4.09(2H, t, J=5.8Hz), 6.83(2H, d, J=8.5Hz), 7.00-7.16(2H, m)
54	-H	-H	$-NH_2$	-H	-F	^{1}H-NMR ($CDCl_3$) δppm: 2.15-2.26 (2H, m), 3.54 (2H, brs), 3.76 (2H, t, J=6.4 Hz), 4.05-4.15 (2H, m), 6.35-6.40 (1H, m), 8.48 (1H, dd, J=0.9, 12.6 Hz), 8.82 (1H, dd, J=8.5, 8.5Hz).
55	-H	-H	$NHCO_2CH_3$	-H	-F	^{1}H-NMR ($CDCl_3$) δppm: 2.20-2.30 (2H, m), 3.77 (2H, t, J=6.5 Hz), 3.77 (3H, s), 4.10-4.20 (2H, m), 6.57 (1H, brs), 6.85-7.00 (2H, m), 7.25-7.30 (1H, m).
56	-H		$-CH_2CO_2C_2H_5$	-H	-F	^{1}H-NMR ($CDCl_3$) δppm: 1.26(3H, t, J=7.0Hz), 2.21-2.30 (2H, m), 3.5382H, s), 3.77(2H, t, J=6.3Hz), 4.11-4.20(4H, m), 8.89-7.06(3H, m)
57	-H	-H	$-CO_2C_2H_5$	-H	-Br	^{1}H-NMR ($CDCl_3$) δppm: 1.39(3H, t, J=7.0Hz), 2.27-2.37 (2H, m), 3.82 (2H, t, J=6.3Hz), 4.24(2H, t, J=5.8Hz), 4.35(2H, q. J=7.0Hz), 6.92(1H, d, J=8.5Hz), 7.98(1H, dd, J=2.0H, 8.5Hz), 8.23(1H, d, J=2.0Hz)

(continued)

Reference Example	R1	R2	R3	R4	R5	NMR
58	-H	-H	-CHO	$-OCH_3$	-H	^{1}H-NMR($CDCl_3$) δppm: 2.23-2.34 (2H, m), 3.76 (2H, t J=6.3Hz), 3.91(3H, s), 4.20(2H, t, J=5.8Hz), 6.46(1H, d, J=2.0Hz), 6.56 (1H, dd, J=2.0Hz, 6.3Hz), 7.81(1H, d, J=8.3Hz), 10.29(1H, s)
59	-H	-H	$-CO_2C_2H_5$	-H	$-NO_2$	^{1}H-NMR ($CDCl_3$) δppm: 1.41(3H, t, J=7.0Hz), 2.26-2.40(2H, m). 3.81(2H, t J=6.3Hz), 4.32-4.44(4H, m), 7.15(1H, d, J=8.8Hz), 8.22(1H, dd. J=2.0Hz, 8.8Hz), 8.52(1H, d, J=2.0Hz)

[Table 4]

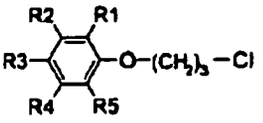


Reference Example	R1	R2	R3	R4	R5	NMR
60	-H	-H	$-CONHC_2H_5$	-H	$-NO_2$	^{1}H-NMR ($CCCl_3$) δppm1.26 (3H, t J=7.3 Hz), 2.25-2.35 (2H, m).3.45-3.55(2H, m), 3.80 (2H, t, J=1 H_2), 4.30-4.35 (2H, m), 6.34 (1H, brs), 7.15 (1H, d=8.8 Hz), 8.04 (1H. dd, J=2.3, 8.8 Hz). 8.25 (1H. d, J=2.3 Hz).
61	-H	-H	$-CONH_2$	$-OCH_3$	-H	^{1}H-NMR ($CDCl_3$) δppm : 2.21-2.35 (2H, m), 3.75(2H, t, J=6.3Hz), 3.95(3H, s), 4.18 (2H, t, J=8.8Hz 5.67(1H, br), 6.51(1H, d, J=25Hz), 6.61(1H. dd, J=2.5Hz 8.8Hz), 7.59 (1H, br), 8.18 (1H, d, J=8.8Hz)
62	-H	-H	$-CONHCH_3$	$-OCH_3$	-H	^{1}H-NMR (CDCH) δppm: 2-20-2.30 (2H, m). 2.99(3H, d, J=5.0Hz), 3.75(2H, t, J=6.3Hz). 3.94(3H, s), 4.17(2H, t, J=6.0Hz).), 6.49(1H, d J=2.5Hz). 6.60(1H. dd. J=2.5Hz, 8.8Hz). 7.70 (1H, br 8.19 (1H, d. J=8.8Hz)

(continued)

Reference Example	R1	R2	R3	R4	R5	NMR
63	-H	-H	$-CONHC_2H_5$	$-OCH_3$	-H	^{1}H-NMR ($CDCl_3$) δppm 1.23 (3H, t, J=7.3Hz), 2.20-2.30 (2H, m) 3.43-3.54(2H, m), 3.75(2H. t, J=6.3Hz). 3.94(3H, s), 4.17 (2H. t, J=6.3Hz), 6.49(1H, d, J=2.5Hz). 6.60(1H, dd, J=2.5Hz 8.8Hz). 7.70 (1H, br), 8.18 (1H, d, J=8.8Hz)
64	-H	-H	$-CONHCH_2CF_3$	$-OCH_3$	-H	^{1}H-NMR ($CDCl_3$) δppm: 2.21-2.31 (2H, m), 3.75(2H, t, J=6.3Hz), 3.98(3H, s). 4.07-4.21(4H, m), 6.51(1H, d, J=5Hz), 6.62(1H, dd, J=2.5Hz, 8.8Hz), 8.09 (1H, br), 8.18 (1H, d, J=8.8Hz)
65	-H	-H	$-CH=CHCO_2C_2H_5$	-H	-H	^{1}H-NMR ($CDCl_3$) δppm: 1.33 (3H, t, ' J=7.0Hz), 2.20-2.30(2H, m), 3.73(2H, t, J=6.3Hz), d.15 (2H, t, J=5.8Hz), 4.25(2H, q, J=7.0Hz), 8.31(1H. d, J= 18.0Hz), 8.88-8.93(2H. m), 7.44-7.50(2H, m), 7.64(1H, d, J=16.0Hz)
68	-F	-H	-H	$-CO_2C_2H_5$	-H	^{1}H-NMR ($CDCl_3$) δppm:1.40 (3H, t, J=7.0Hz), 2.25-2.34 (2H, m), 3.78(2H, t, J=6.3Hz), 4.25 (2H. J=5.8Hz), 4.37(2H, q, J=7.0Hz), 7.08-7.15(1H, m), 7.62-7.70(2H, m)
67	-H	-H	$-CO_2H$	$-CH_3$	-H	^{1}H-NMR ($CDCl_3$) δppm: 221-231 (2H, m), 2.64(3H, s), 3.75(2H, t, J=6.3Hz), 4.18(2H, t, J=5.8Hz), 6.77-8.81(2H, m), 8.06(1H, d, J=9.5H_2), 11.00(1 H, br)
68	-Cl	-H	-H	$-CO_2C_2H_5$	-H	^{1}H-NMR ($COCl_3$) δppm: 1.40 (3H, t, J=7.0Hz), 2.25-2.37 (2H. m), 3.82(2H, t, J=6.3Hz),1.25 (2H, t, J=5.8Hz), 4.38(2H. q, J=7.0Hz). 7.42(1H, d, J=8.5Hz). 7.56.7.62(2H. m) .
69	$-CH_3$	-H	-H	$-CO_2C_2H_6$	-H	^{1}H-NMR ($CDCl_3$,) δppm: 1.39 (3H, t, J=7.0Hz), 2.24-234 (2H, m), 2.26(3H. s), 3.78(2H. t, J=6.3Hz). 4.19(2H. t, J=5.8Hz), 4.37(2H, q, J=7.0Hz). 7.19(1H, d, J=7.8Hz), 7.49(1H. d, J=1.5Hz), 7.57(1H, dd. J=1.5Hz, 7.8Hz)

[Table 5]

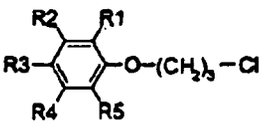


Reference Example	R1	R2	R3	R4	R5	NMR
70	-H	-H	$-CONH_2$	$-CH_3$	-H	^{1}H-NMR ($COCl_3$) δppm: 2.16-2.29 (2H, m}, 2.51(3H, s), 3.75(2H, t, J=6.3Hz), 4.14{ 2H, t, J=6.3Hz), 6.53(2H, br), 6.71(2H, m), 7.45 (1H. d. J=8.3Hz)
71	-H	-H	$-CONRCH_3$	$-CH_3$	-H	^{1}H-NMR ($COCl_3$) δppm: 2.18-2.28 (2H, m), 2.45(3H, s), 298(33H, d, J=4.8Hz), 3.74(2H, t, J=8.3Hz), 4.12(2H, t, J=5.8Hz), 5.72(1H. br), 8.88-8.75(ZH, m), 7.32 (1H, d. J=8.3H)
72	-H	-H	$-CONHC_2H_3$	$-CH_3$	-H	^{1}H-NMR (CDC%) 8ppv: 1.24l3H, t, J=7.3Hz), 2.19-2.28 (2H, m), 2.45(3H, s), 3.41-3.52(2H, m), 3.74(2H, t, J=6.3Hz), 4.12(2H, t, J=6.0Hz), 5.88(1H, br). 8.8843.75(2H, m), 7.32 (1H, d, J=8.3Hz)
73	$-CH_3$	-H	$-CO_2C_2H_3$		-H CH_3	^{1}H-NMR ($CDCl_3$) δppm: 1.38(3H. t, J=7.0H_2). 2.21-2-28 (2H, m), 2.31 (6H, s), 3.84(2H, t, J=6.3Hz), 3.93(2H. t, J=5.8Hz), 4.35(2H, t, J=7.0Hz), 7.72(2H, s)
74	-H	$-CO_2C_2H_5$	-H	-H	$-OCH_3$	^{1}H-NMR ($COCl_3$) δppm: 1.39 (3H, t, J=7.1Hz). 2.26-2.38 (2H, m), 3.78(2H, t, J=8.3Hz), 3.81 (3H, s), 4.22(2H, t, J=5.8Hz), 4.36 (2H, q, J=7.1Hx), 8.89(1H, d, J=8.3Hz), 7.58(1H, d, J=2.0Hz), 7.70 (1H, d, J=8.3Hz)
75	$-OCH_3$	-H	$-CO_2C_2H_5$	-H	$-OCH_3$	^{1}H-NMR ($COCl_3$) δppm 1.40(3H, t, J=7.0Hz), 2.13-2-23 (2H, m), 3.85(2H, t, J=8.3Hz), 3.90(6H, s), 4.17(2H, t, J=5.8Hz), 4.38(2H, q, J=7.0Hz). 7.30(2H, s)
76	$-CH_3$	-H	-CHO	-H	$-OCH_3$	^{1}H-NMR ($CDCl_3$ δppm: 2.17-2.28 (2H, m), 2.34(3H, s), 3.83(2H, t, J=6.3Hz). 3.91(3H, s), 4.18(2H, t, J=5.8Hz), 7.31(1H. s), 9.86(1H, s)
77	$-CH_3$	-H	$-CO_2H$	-H	$-OCH_3$	^{1}H-NMR ($CDCl_3$) δppm: 2.18-2.28 (2H, m), 2.32(6H, s), 3.83(2H, t, J=3Hz), 3.90(3H, s), 4.16(2H, t, J=5.8Hz), 7.50(1H, d, J=2.0Hz), 7.80(1H, d, J=20Hz)

(continued)

Reference Example	R1	R2	R3	R4	R5	NMR
78	$-CH_3$	-H	$-CONH_2$	-H	$-OCH_3$	^{1}H-NMR ($CDCl_3$) δppm: 217-2.27 (2H. m), 2.30(3H, s), 3.83(2H, t, J=3Hz), 3.89(3H, s), 4.12(2H, t, J=5.8Hz), 5.24-8.28(2H, br), 7.15(1H, d, J=20Hz), 7.32 (1H, d, J=2.0Hz)
79	$-CH_3$	-H	$-CONHCH_3$	-H	$-OCH_3$	^{1}H-NMR ($CDCl_3$) δppm 2.17-236 (2H, m), 2.29(3H, s). 3.00(3H, d, J=5.0Hz), 3.83(2H, t, J=8.3Hz), 3.88(3H, s), 4.10(2H, t, J=5.8Hz), 8.06(1H, br), 7.08(1H, d, J=1.9Mz), 7.28 (1H, d. J=1.8Hz)

[Table 6]

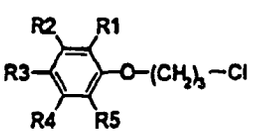


Reference Example	R1	R2	R3	R4	R5	NMR
80	$-CH_3$	-H	$-CONHC_2H_5$	-H	$-OCH_3$	^{1}H-NMR ($CDCl_3$) δppm 1.26 (3H,t, J=7.3Hz), 2-17-2.28 (2H, m), 2.30(3H, s), 3.43-3.54(2H, m). 3.83(2H, t J=6.3Hz). 3.89(3H. s), 4.10 (2H, t, J=5.8Hz), 6.02(1H, br), 7.07(1H, d, J=20Hz), 7.28 (1H, d, J=2.0Hz)
81	$-CH_3$	-H	$-NHCO_2C(CH_3)_3$	-H	$-OCH_3$	^{1}H-NMR ($CDCl_3$) δppm 1.51 (9H,s), 214-2.28 (2H, m), 2.23(3H, s), 3.82(2H, t, J=6.3Mz). 3.83(3H. s). 3.98 (2H, t, J=5.8Hz), 6.34(1H, br), 6.59(1H, d, J=2.5Hz), 7.01 (1H, d, J=2.5Hz)
82	$-CH_3$	-H	$-NHCO_2CH_3$	-H	$-OCH_3$	^{1}H-NMR ($CDCl_3$) δppm: 2.17-2.29 (2H, m), 2.30(3H, s), 3.83(2H, t, J=8.3Hz), 3.88 (6H, s), 4.13(2H,1,J=5.8Hz), 7.44(1H, d, J=2.0Hz), 7.51 (1H, d. J=20Hz)
83	$-CH_3$ -H		$-CO_2CH_3$	-H	$-OCH_3$	^{1}H-NMR ($CDCl_3$) δppm: 2.15-2.30 (2H, m), s). 3.89 (3H, s). 4.13 (2H, t, J=.9 Hz), 7.43 (1H, d, J=1.8 Hz), 7.50 (1H. d, J=1.4Hz).
84	-CH,	-H	$-NH_2$	41	$-OCH_3$	H-NMR ($CDCl_3$) δppm: 2.14-2.22 (2H, m), 2.19(3H, 9), 3.47(2H, br), 3.82(2H, t, 1=5.3Hz). 3.95(2H, t, J=4.8Hz), 6.09-6.13(2H,m)

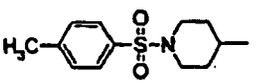
(continued)

Reference Example	R1	R2	R3	R4	R5	NMR
85	$-CH_3$	-H	$-HHCOCH_3$	-H	$-OCH_2$	^{1}H-MMR($CDCl_3$) δppm: 2.11-2.28(2H,m), 2.15(3H, s), 2.24(3H. s), 3.82(2H, t, J=6.3Hz), 3.83(3H, s), 4.01 (2H, t, J=5.8Hz 6.66(1H, d, J=2.1 Hz), 7.02(1H, br), 7.23 (1H, d, J=2.1 Hz)
86	$-CH_3$	-H	-CHO	-H	$-OCOCH_3$	^{1}H-NMR ($CDCl_3$) δppm: 2.17-2.27(2H,m), 2.37(6H, s), 3.79(2H, t, J=5.6Hz), 4.11(2H, t, J=5.8Hz), 7.46(1H. d, J=2.0Hz), 7.62(1H, d, J=20Hz), 9.88(1H, s)
87	CH_3	-H	$-CO_2H$	-H	$-OCOCH_3$	^{1}H-NMR($CDCl_3$) δppm: 2.16-2-26(2H.m), 2.35(3H, s). 2.38(3H. s), 3.79(2H, t, J=6.3Hz), 4.09(2H, t, J=5.8Hz), 7.67(1H, d, J=2.0Hz),7.84(1H,d, J=2.0Hz)
88	-OH	-H	$-CONHCH_3$	-H	$-CH_3$	^{1}H-NMR($CDCl_3$) δppm : 221-2.35(2H,m), 2.32(3H, s), 2.99(3H, d, J= 4.9Hz), 3.85 (2H, t, J=6.3Hz), 4.05(2H, t, J=5.8Hz), 5.90(1H. br), 6.02 (1H. br), 7.15(1H, d, J=1.8Hz), 7.20(1H, d, J=2.0Hz)
89	$-CH_3$	-H	$-CONHCH_3$	-H	$-OC_2H_5$	^{1}H-NMR ($CDCl_3$) δppm: 1.46 {3H, t, J=7.0Hz), 2.17-2.27 (2H, m), 2.28(3H, s), 2.99(3H, d, J=5.0Hz), 3.83(2H, t, J=6.3Hz). 4.08-4.15(4H, m 6.04(1H, br), 7.07(1H, d, J=1.8Hz), 7.25 (1H, d, J=1.8Hz)
90	-H	-H	$-CO_2H$	$-OCH_3$	-H	^{1}H-NMR ($CDCl_3$) δppm: 2.22-232 (2H, m), 3.75(2H. t, J=6.3Hz), 4.05(3H. s), 4.21 (2H, t, J=5.8Hz), 6.55(1H, d, J=2-5Hz). 8.86(1H, d, J=8.8Hz), 8.14(1H. d, J=8.8Hz), 10.43(1H, br)

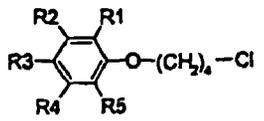
[Table 7]



(continued)

Reference Example	R1	R2	R3	R4	R5	NMR
91	-H	-H		-H	-H	^{1}H-NMR ($COCl_3$) δppm 22-2.3 (2H, m), 3.77 (2H, 1 J = 6.3Hz). 4.16 (2H, t, J = 5.8Hz), 7.00 (2H, dd, J = 22, 6.7Hz), 7.15-7.25 (2H, m 7.25-7.35 (2H, m), 7.78 (1H,s).
92	-H	-H		-H	-H	H-NMR ($CDCl_3$) δppm: 2-26 (2H, t, J=6.1 Hz), 3.75 (2H, t, J=8.3 Hz 4.15 (2H,t, J=5.7 Hz), 7.00 (1H, dd, J=2.1, 6.9 Hz), 7.56 (1H, dd, J=2.2, 7.1 Hz), 8.07 (1H, s), 8.45 (1H, s).
93	-H	-H		-H	-H	^{1}H-NMR($CDCl_3$) δppm: 1.70.1.90 (4H, m), 2.10-2.40 (3H, m), 2.45 (3H. s), 3.553.75 (2H, m), 3.90-3.95 (2H, m), 4.05-4.15 (2H, m), 6.84 (2H, dd, J=1.9, 6.8 Hz), 7.06 (2H, dd. J=1.8, 6.9 Hz), 7.34 (2H, d, J=8.0 Hz), 7.68 (2H, d, J=8.2 Hz).
94	-CH,	-H		-H	-OCH_3	^{1}H-NmR($CDCl_3$) δppm: 2.16-2.25 (2H,m), 2-28 (3H, s), 3.83(2H, t, J=8.3Hz), 3.8H(3H, s), 3.99-4.06(4H, m 4.46 (2H, dd, J= 6.3Hz, 8.8Hz), 6.81(1H, d, J=25Hz), 7.33 (1H, d, J=2.5Hz)
95	-OCH_3	-H		-H	-CH_2OH	^{1}H-NMR ($CDCl_3$) δppm: 2.08-228 (2H, m), 2.61 (2H, t, J=7.8Hz), 3.7+3.87(4H, m), 3.88 (3H, s), 4.13(2H, t, J=5.5Hz), 4.71(2H, d, t=5.8Hz), 6.85(1H, d, J=2.5Hz), 7.59 (1H, d, J=2.5Hz)
96	-CH_3	-H		-H	-OCH_3	^{1}H-NMR($CDCl_3$) δppm: 2.05-2-25 (4H, m), 2.27 (3H, s), 2.60(2H, t, J=8.3Hz), 3.79-3.89 (42H. m), 3.86(3H, s), 6.71(1H, d, J=2.5Hz), 7.37 (1H, d, J=2.5Hz)

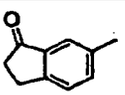
[Table 8]



Reference Example	R1	R2	R3	R4	R5	NMR
97	-H	-H	-H	$-NO_2$,	-H	^{1}H-NMR ($CDCl_3$) δppm 1.93-211 (4H, m 3.59-3.70(2H, m), 4.00-4.13(2H, m), 720-724(1H, m), 7.43(1H, t, J=8.0Hz). 7.72(1H, t, J-2.3Hz), 7.80-7.84(1H, m)
98	-H	-H	-H	-CN	-H	^{1}H-NMR ($CDCl_3$) δppm 1.96-200 (4H, m), 3.60-3.65 (2H, m), 3.99-4.14(2H, m), 7.10-7.14 (2H, m), 722-728 (1H, m), 7.34-7.40 (1H,m)

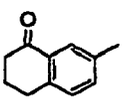
[Table 9]

R1-O-(CH2)3-Cl

Reference Example	R1	NMR
99		^{1}H-NMR ($CDCl_3$) δppm: 2.20-2.30 (2H, m), 270-275 (2H, m), 3.07 (2H, t, J=5.8 Hz), 3.74 (2H, t, J=6.4 Hz). 7.15.7.20 (2H. m), 7.37 (1H, d. J=8.2 Hz).

[Table 10]

R1-O-(CH2)3-Cl

Reference Example	R1	NMR
100		^{1}H-NMR ($CDCl_3$) δppm: 212 (2H, tt, J = 8.3, 6.3 Hz), 224 (2H, tt, J = 6.1, 6.1 Hz), 2.62(2H, t, J = 6.5 Hz), 2902(2H, t, J = 6.1 HZ), 3.74(2H, t, J = 6.3 Hz), 4.15 (2H, t J = 5.8 Hz), 7.05 (1H, dd, J =8.4, 2.8 Hz), 7.17 (1H, d, J = 8.4 Hz), 7.52 (1H, d, J = 28 Hz).

Example 1 (Reference)

Synthesis of methyl 5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1-methyl-1H-pyrazole-3-carboxylate

[0326] Methyl 5-(3-chloropropoxy)-1-methyl-1H-pyrazole-3-carboxylate (1.17g, 5.0 mmol), 1-benzo[b]thiophen-4-yl piperazine hydrochloride (1.35 g, 5.3 mmol), potassium carbonate (1.74, 12.6 mmol) and sodium iodide (0.75 g, 5.0 mmol) were added to DMF (12 ml), and the mixture was stirred at 80˚C for 3 hours. The reaction solution was cooled to room temperature and water was added thereto, and then, extracted with ethyl acetate. The organic phase was washed with water and dried over magnesium sulfate. The reaction solution was concentrated under reduced pressure and the residue was purified by silica gel column chromatography (n-hexane : ethyl acetate = 7:3 → dichloromethane : methanol =100:3). The purified product was concentrated under reduced pressure to obtain a light yellow oily substance (1.97 g). The oily substance was allowed to stand still at room temperature to obtain a solid substance, which was washed with diisopropyl ether and dried to obtain methyl 5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxyl-1-methyl-1H-pyrazole-3-carboxylate (1.49 g)
Melting point: 109.0-110.5˚C
MS 414 (M^+)

Example 2 (Reference)

Synthesis of 5-[3-(9-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1-methyl-1H-pyrazole-3-carboxylic acid

[0327] A 6N aqueous sodium hydroxide solution (2 ml) was added to an ethanol solution (10 ml) of methyl 5-[3-(4-

benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1-methyl-1H-pyrazole-3-carboxylate (1.62 g, 3.9 mmol) and the mixture was stirred at room temperature for 4 days. Then, 6N hydrochloric acid (2 ml) was added to the reaction solution under ice cooling and the solution mixture was stirred. Dichloromethane was added to the reaction solution and the precipitate was obtained by filtration. The filtrate was separated and the organic phase was concentrated under reduced pressure. The filter cake and the residue were combined, washed with water and dried to obtain 5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1-methyl-1H-pyrazole-3-carboxylic acid (1.53 g) as white powder.
Melting point: 119.5-118.0˚C

Example 3 (Reference)

Synthesis of N-methyl-5-[3-(9-benzo[b]thiophen-4-yl-piperazin-1-yl)]propoxy]-1-methyl-1H-pyrazole-3-carboxamide hydrochloride

[0328] A DMF solution of 5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1-methyl-1H-pyrazole-3-carboxylic acid (0.3 g, 0.75 mmol) was cooled on ice and triethylamine (0.73 ml, 5.2 mmol), methylamine hydrochloride (0.3 g, 4.5 mmol) and diethylphosphorocyanidate (DEPC)(0.25 ml, 1.4 mmol) were added thereto, and then, the mixture was stirred at room temperature for 24 hours. To the reaction solution, triethylamine (0.73 ml, 5.2 mmol), methylamine hydrochloride (0.3 g, 4.5 mmol) and DEPC (0.25 ml, 1.4 mmol) were added and the mixture was stirred at room temperature for 4 days. Water was added to the reaction solution, which was then extracted with ethyl acetate. The extracted material was washed with water and dried over magnesium sulfate. The solution was concentrated under reduced pressure and the residue was purified by basic silica gel column chromatography (n-hexane : ethyl acetate = 5:1 → methyl acetate). The purified product was concentrated under reduced pressure and the residue was dissolved in ethyl acetate and a solution of 4N-hydrochloric acid/ethyl acetate was added thereto. The insoluble matter precipitated was obtained by filtration and dried to obtain N-methyl-5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1-methyl-1H-pyrazole-3-carboxamide hydrochloride (0.24 g) as white powder.
Melting point: 228.0-232.5˚C (dec)

Example 4 (Reference)

Synthesis of 5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1-methyl-1H-pyrazole-3-carboxamide

[0329] The titled compound was obtained using 5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1-methyl-1H-pyrazole-3-carboxylic acid and ammonium chloride in the same manner as in Example 3.
White powder (ethyl acetate-diisopropyl ether)
Melting point: 186:5-188.5˚C

Example 5

Synthesis of 4-[3-4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5,N-dimethylbenzamide

[0330] The titled compound was obtained using 4-(3-chloropropoxy)-3-methoxy-5,N-dimethylbenzamide and 1-benzo[b]thiophen-4-yl-piperazine hydrochloride in the same manner as in Example 1.
White powder (ethyl acetate-methanol)
Melting point: 141.5-142.5˚C

Example 6 (Reference)

Synthesis of N-methyl-2-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]thiazole-4-carboxamide hydrochloride

[0331] Sodium hydride (55%, oily, 90 mg, 2.2 mmol) was added to a DMF solution (2 ml) of 3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propanol (0.2 g, 0.7 mmol) and N-methyl-2-chlorothiazole-4-carboxamide (0.26 g, 1.45 mmol) under ice cooling and the solution was stirred at 80˚C for 1.5 hours. After the reaction solution was cooled to room temperature and water was added thereto, it was extracted with ethyl acetate. The extraction solution with ethyl acetate was washed with water, dried over magnesium sulfate and concentrated under reduced pressure. The obtained residue was purified by silica gel column chromatography (dichloromethane: ethyl acetate = 5:1 → ethyl acetate). After the purified product was concentrated under reduced pressure, the residue was dissolved in ethyl acetate. A solution of 4N-hydrochloric acid/ethyl acetate was added to the solution and the insoluble matter precipitated was obtained by filtration and dried to obtain N-methyl-2-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]thiazole-4-carboxamide hydrochloride (0.24 g)

as light yellow powder.
Melting point: 199.5-202.5˚C

Example 7

Synthesis of {4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-methylphenyl}-carbamic acid tert-butyl ester

[0332] The titled compound was obtained using [4-(3-chloropropoxy)-3-methoxy-5-methylphenyl]-carbamic acid tert-butyl ester and 1-benzo[b]thiophen-4-yl-piperazine hydrochloride in the same manner as in Example 1.
Light brown oily substance
^{1}H-NMR (CDCl3) δppm : 1.51(9H, s), 1.95-2.10 (2H, m), 2.24(3H, s), 2.66-2.81(6H, m), 3.14-3.31(2H, m), 3.84(3H, s), 3.95(2H, t, J=6.3Hz), 6.36(1H, br), 6.60(1H, d, J=2.5Hz), 6.87-6.92(1H, m), 7.01 (1H, d, J=2.0Hz), 7.24-7.31(1H, m), 7.37-7.44(2H, m), 7.55(1H, d, J=8.0Hz)
MS 511(M+).

Example 8

Synthesis of 4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-methylaniline

[0333] 6N-hydrochloric acid (3 ml) was added to a methanol solution (10 ml) of {4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-methylphenyl}-carbamic acid tert-butyl ester (2.18 g, 4.3 mmol) and the mixture was stirred at room temperature overnight. After stirred at 60˚C for 15 minutes, the mixture was cooled to room temperature and a 6N aqueous sodium hydroxide solution was added thereto to neutralize it. Dichloromethane was added to the reaction mixture, and the substance extracted with dichloromethane was dried over magnesium sulfate and concentrated under reduced pressure. The obtained residue was purified by silica gel column chromatography (n-hexane : ethyl acetate = 3:2 → ethyl acetate). The purified product was concentrated to dryness under reduced pressure to obtain 4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-methylaniline (1.26 g) as light yellow solid
Melting point: 155.0-158.0˚C
MS 411 (M^+)

Example 9

Synthesis of N-{4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-methylphenyl}formamide hydrochloride

[0334] 4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-methylaniline (0.9 g, 2.2 mmol) was added to.ethyl formate (10 ml) and refluxed with heating for 33 hours. After the reaction solution was cooled to room temperature, it was concentrated under reduced pressure. The obtained residue was purified by basic silica gel column chromatography (n-hexane : ethyl acetate = 5:1 → ethyl acetate). The purified product was concentrated under reduced pressure and a solution of 4N-hydrochloric acid/ethyl acetate was added to an ethyl acetate solution of the residue. The insoluble matter precipitated was obtained by filtration to obtain N-{4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-methylphenyl}formamide hydrochloride (0.3 g) as white powder.
Melting point: 247.5-253.0˚C (dec)

Example 10

Synthesis of N-methyl-4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-methylaniline hydrochloride

[0335] A 6N aqueous sodium hydrochloride solution was added to N-{4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-methylphenyl formamide hydrochloride (0.23 g, 0.48 mmol) and the solution mixture was extracted with dichloromethane. The extraction solution with dichloromethane was dried over magnesium sulfate and concentrated under reduced pressure. The obtained residue was dissolved in a tetrahydrofuran (THF) solution (5 ml) and lithium aluminum hydride (30 mg, 0.71 mmol) was added thereto under ice cooling and refluxed with heating for 15 minutes. The reaction solution was cooled on ice, and water (0.03 ml), 15 % aqueous sodium hydroxide solution (0.03 ml), and water (0.09 ml) were added to the reaction mixture in this order and stirred. Insoluble matter was removed by filtration, and the filtrate was concentrated under reduced pressure. The obtained residue was purified by basic silica gel column chromatography (n-hexane : ethyl acetate = 5:1 → 3:1) and concentrated under reduced pressure. A solution of 4N-

hydrochloric acid/ethyl acetate was added to an ethyl acetate solution of the residue, and the insoluble matter precipitated was obtained by filtration to obtain N-methyl-4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxyl-3-methoxy-5-methylaniline hydrochloride (63 mg) as white powder.
Melting point: 239.5-294.0˚C (dec)

Example 11

Synthesis of 3-{4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-methylphenyl}oxazolidin-2-one hydrochloride

[0336] The titled compound was obtained using 3-[4-(3-chloropropoxy)-3-methoxy-5-methylphenyl]oxazolidin-2-one and 1-benzo[b]thiophen-4-yl-piperazine hydrochloride in the same manner as in Example 1.
White powder (ethanol)
Melting point: 2.47.5-251.0˚C (dec)

Example 12

Synthesis of N-{4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-methylphenyl}acetamide

[0337] The titled compound was obtained using N-[4-(3-chloropropoxy)-3-methoxy-5-methylphenyl]acetamide and 1-benzo[b]thiophen-4-yl-piperazine hydrochloride in the same manner as in Example 1.
White powder (ethyl acetate-diisopropyl ether)
Melting point: 121.5-122.0˚C

Example 13

Synthesis of N-{4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-methylphenyl}-N-methylacetamide hydrochloride

[0338] Sodium hydride (55%, oily, 0.06 g, 1.3 mmol) was added to a DMF solution (5 ml) of N-{4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-methylphenyl}acetamide (0.45 g, 0.99 mmol) under ice cooling and the mixture was stirred at 0˚C for 15 minutes. Methyl iodide (0.07 ml, 1.1 mmol) was added to the reaction solution and the solution was stirred at 0˚C for one hour. Further, sodium hydride (55% oily, 0.06 g, 1.3 mmol) and methyl iodide (0.07 ml, 1.1 mmol) were added to the reaction solution and the solution mixture was stirred at 0˚C for 2 hours. Water was added to the reaction solution and extraction was performed with ethyl acetate. The extracted material was washed with water, and dried over magnesium sulfate. The reaction solution was concentrated under reduced pressure and the residue was purified by basic silica gel column chromatography (n-hexane : ethyl acetate = 5:1 → ethyl acetate). After the purified product was concentrated under reduced pressure, a solution of 4N-hydrochloric acid/ethyl acetate was added to an ethyl acetate solution of the residue. The insoluble matter precipitated was obtained by filtration to obtain N-{4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-methylphenyl}-N-methylacetamide hydrochloride (325 mg).
Melting point: 230.0-234.0˚C (dec)

Example 14

Synthesis of 4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-N,N-dimethyl-3-methoxy-5-methylaniline hydrochloride

[0339] Formalin (37%, 0.29 ml, 3.9 mmol) and sodium cyanoborohydride (0.21 g, 3.1 mmol) were added to a methanol solution (6 ml) of 4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-methylaniline (0.32 g, 0.78 mmol) under ice cooling and the mixture was stirred at 0˚C for 15 minutes. To the reaction solution, acetic acid (0.18 ml, 3.1 mmol) was added and the mixture was stirred at room temperature for one hour. An aqueous potassium carbonate solution was added to the reaction solution under ice cooling, and extraction was performed with ethyl acetate. The extracted material was dried over magnesium sulfate. The reaction solution was concentrated under reduced pressure, and the residue was purified by basic silica gel column chromatography (n-hexane :ethyl acetate = 11:1 → 3:1). The purified product was concentrated under reduced pressure. A solution of 4N-hydrochloric acid and ethyl acetate was added to an ethyl acetate solution of the residue and the insoluble matter precipitated was obtained by filtration to obtain 4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-N,N-dimethyl-3-methoxy-5-methylaniline hydrochloride (137 mg)

as white powder.
Melting point: 234.5-240.5˚C (dec)

Example 15

Synthesis of methyl {4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-methylphenyl}carbamate hydrochloride

[0340] The titled compound was obtained using methyl 4-(3-chloropropoxy)-3-methoxy-5-methylphenyl}carbamate and 1-benzo[b]thiophen-4-yl-piperazine hydrochloride in the same manner as in Example 1.
White powder (ethyl acetate)
Melting point: 230.0-235.5˚C

Example 16

Synthesis of methyl N-methyl-{4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-methylphenyl}carbamate hydrochloride

[0341] The titled compound was obtained using methyl {4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-methylphenyl}carbamate hydrochloride and methyl iodide in the same manner as in Example 14.
White powder (ethyl acetate)
Melting point: 228.0-233.5˚C

Example 17 (Reference)

Synthesis of 6-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3,4-dihydro-2H-benzo[1,4]oxazine hydrochloride

[0342] Lithium aluminum hydride (86 mg, 2.3 mmol) was suspended in THF (20 ml). To this solution, a THF solution (10 ml) of 6-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3,4-dihydro-2H-benzo[1,4]oxazin-3-one (0.8 g, 1.9 mmol) was added dropwise under an argon atmosphere. After completion of dropwise addition, the solution mixture was refluxed with heating for one hour. Water (0.1 ml), 15 % aqueous sodium hydroxide solution (0.1 ml), and water (0.3 ml) were added to the reaction mixture under ice cooling and stirred. Insoluble matter was removed by cerite filtration, and the filtrate was concentrated under reduced pressure. The obtained residue was purified by silica gel column chromatography (dichloromethane : methanol = 1:0 → 20:1) and concentrated under reduced pressure. The residue was dissolved in ethyl acetate (10 ml) and a solution (0.34 ml) of 1N-hydrochloric acid/ethanol was added thereto and the mixture was stirred at room temperature for 15 minutes. The insoluble matter precipitated was obtained by filtration, washed with ethyl acetate, and dried to obtain 6-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3,4-dihydro-2H-benzo[1,4]oxazine hydrochloride (0.11 g) as white solid.
Melting point 207.9-208.8˚C

Example 18

Synthesis of 7-[3-(4-benzo[b]·thiophen-4-yl-piperazin-1-yl)propoxy]-4-methyl-3,4-dihydro-2H-benzo[1,4]oxazine hydrochloride (Reference)

[0343] Formalin (37%, 0.22 ml, 2.7 mmol) and MP-cyanoborohydride (2.41 mmol/g, 1.12 g, 2.7 mmol) were added to a methanol solution (15 ml) of 7-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3,4-dihydro-2H-benzo[1,4]oxazine (0.30 g, 0.67 mmol) and the mixture was stirred at room temperature overnight. The insoluble matter was removed by filtration and the filtrate was concentrated under reduced pressure. The obtained residue was purified by silica gel column chromatography (dichloromethane methanol = 1:0→ 50:1). The purified product was concentrated under reduced pressure and the residue was dissolved in ethyl acetate (15 ml) and a solution (0.64 ml) of 1N-hydrochloric acid/ethanol was added thereto. The mixture was stirred at room temperature for 15 minutes. The insoluble matter precipitated was obtained by filtration, washed with ethyl acetate, and dried to obtain 7-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-4-methyl-3,4-dihydro-2H-benzo[1,4]oxazine hydrochloride (0.23 g) as light brown solid.
Melting point; 248.1-249.6˚C

Example 19 (Reference)

Synthesis of 6-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methyl-1,2,3,4-tetrahydroquinazolin-4-ol hydrochloride and 6-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methyl-1,2,3,4-tetrahydroquinazoline hydrochloride

[0344] A THF solution (20 ml) of 6-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methylquinazoline (0.25 g, 0.58 mmol) was cooled on ice. To this solution, a THF solution (5 ml) of lithium aluminum hydride (26 mg, 0.69 mmol) was added dropwise under an argon atmosphere. After completion of dropwise addition, the solution was stirred at room temperature for 20 minutes and refluxed with heating for one hour. Water (0.03 ml), 15 % aqueous sodium hydroxide solution (0.03 ml), and water (0.1 ml) were added to the reaction solution under ice cooling and stirred. Insoluble matter was removed by cerite filtration, and the filtrate was concentrated under reduced pressure. The obtained residue was purified by silica gel column chromatography (dichloromethane : methanol = 1:0 → 25:1). The purified product was concentrated under reduced pressure and the residue was dissolved in ethyl acetate (5 ml). To this, a solution (0.189 ml) of 1N-hydrochloric acid/ethanol was added and the mixture was stirred at room temperature for 15 minutes. The insoluble matter precipitated was obtained by filtration, washed with ethyl acetate, and dried to obtain 6-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methyl-1,2,3,4-tetrahydroquinazolin-4-ol hydrochloride (87 mg) as white solid.
MS: 438 (M^+).

[0345] An eluting solution of dichloromethane/methanol (10:1) was passed through the column of the silica gel column chromatography. The obtained eluate was concentrated under reduced pressure and then the residue was dissolved in ethyl acetate (5 ml). To this, a solution (0.226 ml) of 1N-hydrochloric acid/ethanol was added and the mixture was stirred at room temperature for 15 minutes. The insoluble matter precipitated was obtained by filtration, washed with ethyl acetate, and dried to obtain 6-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methyl-1,2,3,4-tetrahydroquinazoline hydrochloride (49 mg) as white solid.
Melting point: 203.1-204.4˚C

Example 20 Reference

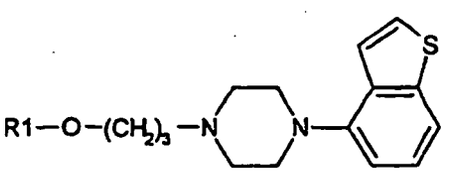
Synthesis of 5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-2,3-dihydro-1H-indole hydrochloride

[0346] Triethylsilane (1.14 ml, 7.14 mmol) was added to a trifluoroacetic acid solution (5 ml) of 5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1H-indole (228 mg, 0.71 mmol) and the mixture was stirred at 50˚C for 2 hours. The mixture was concentrated under reduced pressure. The residue was dissolved in dichloromethane, neutralized by a saturated aqueous solution of sodium hydrogen carbonate and separated. The organic phase was washed with a saturated aqueous solution of sodium hydrogen carbonate, water and a saturated saline solution in this order and concentrated under reduced pressure. The obtained residue was purified by basic silica gel column chromatography (n-hexane : ethyl acetate = 5: 1 → 1:1). The purified product was concentrated under reduced pressure and the residue was added to ethyl acetate (5 ml) and a solution of 1N-hydrochloric acid/ethanol (0.10 ml) was added thereto and the mixture was stirred at room temperature for 15 minutes. The insoluble matter precipitated was obtained by filtration, washed with ethyl acetate, and dried to obtain 5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-2,3-dihydro-1H-indole hydrochloride (32 mg) as white solid.
Melting point: 222.4-223.9˚C

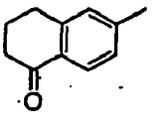
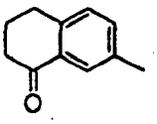
[0347] Compounds listed in the following Tables 12 to 131 were produced using appropriate starting substances in the same manners as in Reference Examples 1 to 36 or Examples 1 to 20 and 1051 to 1067.

[0348] In the following Tables, compounds with the physical properties, such as crystalline form, m.p. (melting point), salt, ^{1}H-NMR and MS (mass spectrum), were prepared actually.

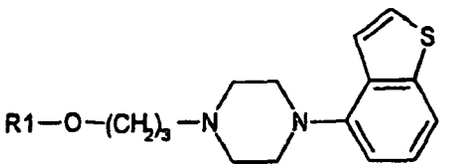
[Table 12]

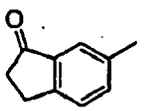


(continued)

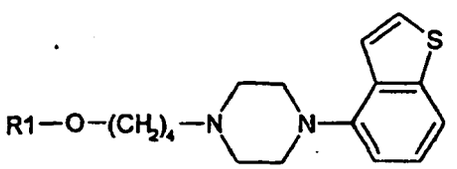
Example	R1	Crystal form (Recrystalization solvent)	Melting point (˚C)	Salt
21		White solid (Ethanol/ ethyl acetate)	251:1-253.6	Hydrochloride
22		White solid (Ethyl acetate)	249.8-2523	Hydrochloride

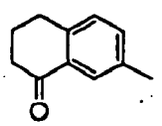
[Table 13]



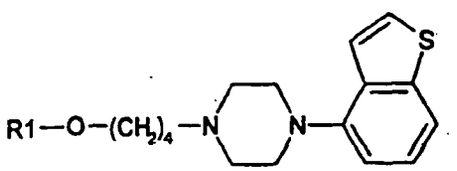
Example	R1	NMR	Salt
23		^{1}H-NMR (DMSO-d_6) δ ppm 220-2.30 (2H, m), 2.64 (2H. t, J=5.8 Hz), 3.01 (2H, t, J=5.5 Hz), 320-3.40 (6H, m), 3.53 (2H, d, J=123 Hz), 3.64 (2H, d J=11.2 Hz), 4.15 (2H, t, J=6.0 Hz), 6.95 (1H, d, J=7.7 Hz), 7.13 (1H, d, J=2.4 Hz), 7.25-7.35 (2H, m), 7.45-7.55 (2H, m), 7.69 (1H, d, J=8.0 Hz), 7.75 (1H, d, J=5.8 Hz), 11.12 (1H, brs).	Hydrochloride

[Table 14]

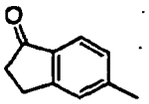
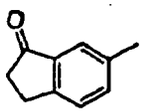


Example	R1	Crystal form (Recrystallization solvent)	Melting point (˚C)	Salt
24		White solid (Ethanol/ethyl acetate)	2420-244.9	Hydrochloride

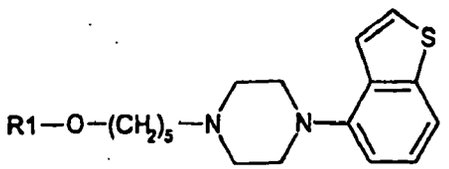
[Table 15]

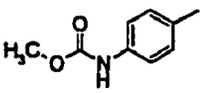
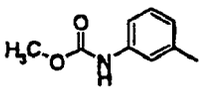


(continued)

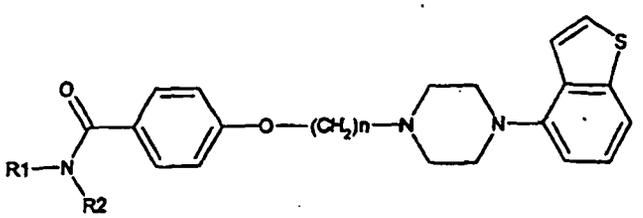
Example	R1	Crystal form (Recrystallization solvent)	Melting point (˚C)	Salt
25		White powder (Ethyl acetate/ether)	198-201	Hydrochloride
26		White powder (Ethyl acetate/ether)	206-209	Hydrochloride

[Table 16]



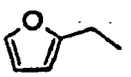
Example	R1	Crystal form (Recrystallization solvent)	Melting point (˚C)	Salt
27		Light yellow powder (Ethyl acetate/ isopropyl ether)	112.5-114.5	-
28		White powder (Ethyl acetate)	208.0-211.5	Hydrochloride

[Table 17]

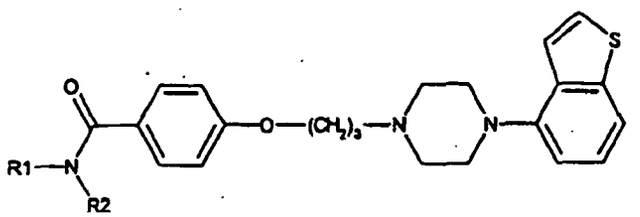


Example	R1	R2	n	Crystal form (Recrystallization solvent)	Melting point (˚C)	Salt
29	-H	$-C_2H_5$	3	White powder (Ethyl acetate)	218.5-222.0 (dec)	Hydrochloride
30	-H	$-C_3H_7$	3	Light yellow powder (Ethyl acetate/isopropyl ether)	127.0-128.5	-
31	-H	$-CH_3$	3	Light yellow powder (Ethyl acetate/isopropyl ether)	151.0-154.5	-
32	$-CH_3$	$-CH_3$	3	White powder (Ethyl acetate).	206.5-211.5	Hydrochloride

(continued)

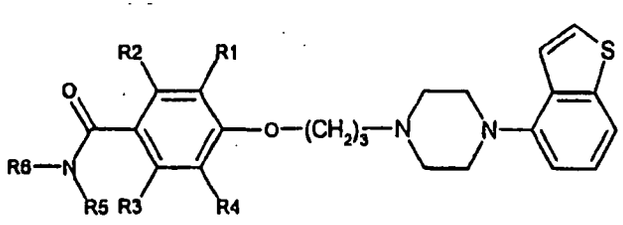
Example	R1	R2	n	Crystal form (Recrystallization solvent)	Melting point (°C)	Salt
33	$-C_2H_5$	$-C_2H_5$	3	White powder (Ethyl acetate)	205.5-209.0	Hydrochloride
34	-H	$-CH_2CF_3$	3	White powder (Ethyl acetate)	217.0 (dec)	Hydrochloride
35	-H	$-CH_2CH_2N(C_2H_5)_2$	3	White powder (Ethyl acetate)	229.5-232.5	Dihydrochloride
36	-H	$-CH_2CH_2OCH_3$	3	White powder (Ethyl acetate)	218.5-221.0	Hydrochloride
37	-H	-cyclo- C_3H_5	3	White powder (Ethyl acetate/ isopropyl ether)	185.5-167.0	-
38	-H	-OH (CH_3),	3	White powder (Ethyl acetate/ isopropyl ether)	131.5-1325	-
39	-H	-H	3	White powder (Dichloromethane)	186.0-191.0	-
40	-H	$-(CH_2)_5OH$	3	White solid (Ethanol)	202-203	Hydrochloride
41	-H		3	Light brown solid (Ethanol)	215-216	Hydrochloride
42	-H	$-C_2H_5$	4	White powder (Ethyl acetate)	198.0-199.5	Hydrochloride
43	-H	$-CH_2CF_3$	4	White powder (Ethyl acetate)	194.5-196.0	Hydrochloride
44	-H	-H	4	White powder (2-propanol)	150.0-151.5	-
45	-H	$-CH_3$	4	White powder (Ethyl acetate)	154.0-156.0	-
46	$-CH_3$	$-CH_3$	4	White powder (Ethyl acetate)	226.0 (dec)	Hydrochloride

[Table 18]



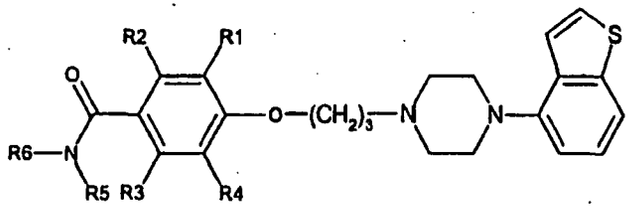
Example	R1	R2	NMR	Salt
47	-H	$-CH_2CH_2OH$	^{1}H-NMR (DMSO-d_6 ppm 2.1-22 (2H, m), 3.1-3.8 (14H. m), 4.17 (2H, t, J=5.7 Hz), 4.6-4.8 (1H, br), 6.9-7.1 (3H, m), 7.33 (1H, dd, J=7.9, 8.1 Hz), 7.51 (1H, d, J=5.5 Hz), 7.72 (1H, d, J=8.1 Hz), 7.78 (1H, d, J=5.5 Hz), 7.86 (2H, d, J=8.8 Hz), 8.2-8.3 (1H, br), 102-10.4 (1H, br).	Hydrochloride

[Table 19]



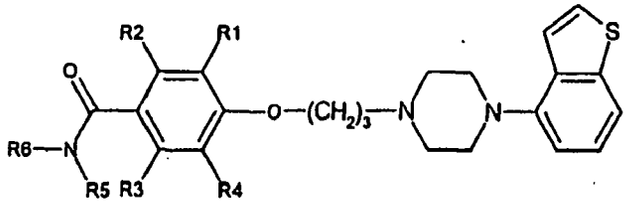
Example	R1	R2	R3	R4	R5	R6	Crystal form (Recrystallization solvent)	Melting point (˚C)	Salt
48	-H	-H	-H	$-OCH_3$	$-CH_3$	-CH,	White powder (Ethyl acetate)	199.0-204.0	Hydrochloride
49	$-OCH_3$	-H	-H	-H	$-C_2H_5$	-H	White powder (Ethyl acetate/isopropyl ether)	162.0-163.0	-
50	-Cl	-H	-H	-H	-H	-H	White powder (Ethyl acetate/isopropyl ether)	154.0-155.5	-
51	-Cl	-H	-H	-H	-CH,	-H	White powder (Ethyl acetate/isopropyl ether)	145.0-148.0	-
52	-H	-H	-H	-Cl	$-CH_3$	$-CH_3$	White powder (Ethyl acetate)	213.0 (dec)	Hydrochloride
53	-H	-H	-H	-Cl	$-C_2H_5$	-H	White powder (Ethyl acetate)	211.0 (dec)	Hydrochloride
54	-Cl	-H	-H	-H	$-CH_2CF_3$	-H	White powder (Ethyl acetate/isopropyl ether)	128.5-131.0	-
55	-F	-H	-H	-H	-H	-H	White powder (Ethyl acetate/isopropyl ether)	153.5-156.0	-

[Table 20]



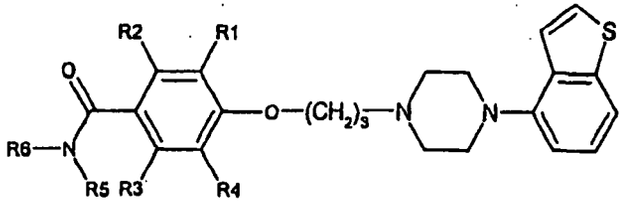
Example	R1	R2	R3	R4	R5	R6	Crystal form (Recrystallization solvent)	Melting point (˚C)	Salt
56	-H	-H	-H	-F	$-CH_3$	-H	White powder (Ethyl acetate)	232.0 (dec)	Hydrochloride
57	-H	-H	-H	-F	$-CH_3$	$-CH_3$	White powder (Ethyl acetate)	198.0-202.0	Hydrochloride
58	-H	-H	-H	-F	$-C_2H_5$	-H	White powder (Ethyl acetate)	210.5-213.0	Hydrochloride
59	-F	-H	-H	-H	$-CH_2CF_5$	-H	Light yellow powder (Ethyl acetate/isopropyl ether)	178.5-179.5	-
60	$-CH_3$	-H	-H	-H	-H	-H	White powder (2-propanol)	178.5-180.0	-
61	$-CH_3$	-H	-H	-H	$-CH_3$	-H	White powder (2-propanol)	156.5-158.0	-
62	-H	-H	-H	$-CH_3$	$-CH_3$	$-CH_3$	White powder (Ethyl acetate)	220.0-222.0 (dec)	Hydrochloride
63	$-CH_3$	-H	-H	-H	$-C_2H_6$	-H	White powder (2-propanol)	140.5-143.0	-
64	$-CH_3$	-H	-H	-H	$-CH_2CF_3$	-H	White powder (2-propanol)	154.5-157.0	-
65	$-OCH_3$	-H	-H	-H	-H	-H	White powder (2-propanol)	162.0-163.5	-

[Table 21]



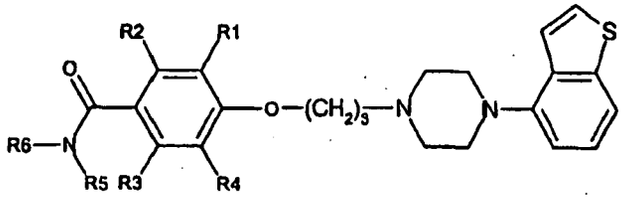
Example	R1	R2	R3	R4	R5	R6	Crystal form (Recrystallization solvent)	Melting point (˚C)	Salt
66	$-OCH_3$	-H	-H	-H	$-CH_3$	-H	White powder (2-propanol)	180.5-182.0	-
67	$-OCH_3$	-H	-H	-H	$-CH_2CF_3$	-H	Light yellow powder (2-propenal)	144.5-148.0	-
68	-Cl	-H	-H	-H	$-CH_2CH_2OCH_3$	-H	White powder	120-122	-
69	-H	-H	-H	-F	$-CH_2CH_2OCH_3$	-H	White powder (Ethanol/ethyl acetate)	215.0-217.0	Hydrochloride
70	$-CH_3$	-H	-H	-H	$-CH_2CH_2OCH_3$	-H	White powder (Ethanol/hexane)	120.0-121.0	-
71	-H	-H	-H	$-OCH_3$	$-CH_2CH_2OCH_3$	-H	White powder (Ethanol/ethyl acetate)	194-188	Hydrochloride
72	-Br	-H	-H	-H	-H	-H	White powder (Ethyl acetate/isopropyl ether)	152.5-154.0	-
73	-Br	-H	-H	-H	$-CH_3$	-H	White powder (Ethyl acetate/isopropyl ether)	148.0-150.0	-
74	-H	-H	-H	-Br	$-CH_3$	$-CH_3$	White powder (Ethyl acetate)	225.0 (dec)	Hydrochloride
75	-H	-H	-H	-Br	$-C_2H_5$	-H	Light yellow powder (Ethyl acetate)	214.5-220.5 (deo)	Hydrochloride

[Table 22]



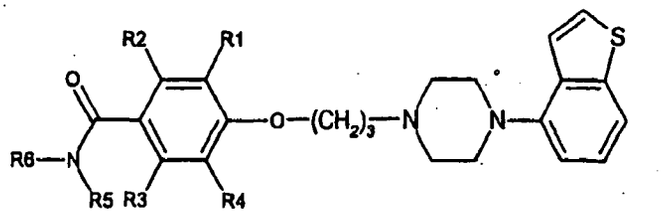
Example	R1	R2	R3	R4	R5	R6	Crystal form (Recrystallization solvent)	Melting point (˚C)	Salt
76	-H	-H	-H	-Br	CH_2CF_3,	-H	White powder (Ethyl acatate/isopropyl ether)	230.0-234.5	Hydrochloride
77	-CN	-H	-H	-H	-H	-H	White powder (Ethyl acetate)	182.0-185.0	-
78	-CN	-H	-H	-H	$-CH_3$	-H	White powder (2-propenol)	177.5-181.5	-
79	-H	-H	-H	-CN	$-CH_3$	$-CH_3$	White powder (Ethyl acetate)	213.5-214.0	Hydrochloride
80	-CN	-H	-H	-H	$-C_2H_5$	-H	White powder (2-propanol)	182.5-188.0	-
81	-H	-H	-H	-CN	CH_2CF_3	-H	White powder (Ethyl acetate)	217.0-222.0	Hydrochloride
82	-H	-Cl	-H	-H	-H	-H	White powder (95% 2-propanol)	133.5-135.5	-
83	-H	-Cl	-H	-H	$-CH_3$	-H	White powder (95% 2-propanol)	137.0-138.0	-
84	-H	-H	-Cl	-H	$-CH_3$	$-CH_3$	White powder (Ethyl acetate)	236.0 (dec)	Hydrochloride
85	-H	-H	-Cl	-H	$-C_2H_5$	-H	White powder (Ethyl acetate)	223.0-224.0	Hydrochloride

[Table 23]



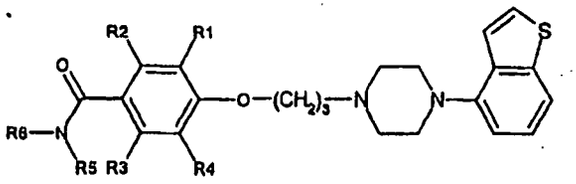
Example	R1	R2	R3	R4	R5	R6	Crystal form (Recrystallization solvent)	Melting point (°C)	Salt
86	-H	-H	-Cl	-H	$-CH_2CF_3$	-H	White powder (Ethyl acetate)	210.5-218.0	Hydrochloride
87	-H	-H	$-CF_3$	-H	$-C_2H_5$	-H	White powder (Ethyl acetate)	212.0-219.5	Hydrochloride
88	-H	$-CF_3$	-H	-H	-H	-H	White powder (Dichloromethene/isopropyl ether)	138.5-141.0	Hydrochloride
89	-H	-H	$-CF_3$	-H	$-CH_3$	-H	White powder (Ethyl acetate)	214.0-218.5	Hydrochloride
90	-H	-H	$-CF_3$	-H	$-CH_3$	$-CH_3$	White powder (Ethyl acetate)	252.5 (dec)	Hydrochloride
91	-H	-H	$-CF_3$	-H	$-CH_2CF_3$	-H	White powder (Ethyl acetate)	218.0-218.5	Hydrochloride
92	-H	$-OCH_3$	-H	-H	-H	-H	White powder (2-propanol)	173.5-178.5	-

[Table 24]



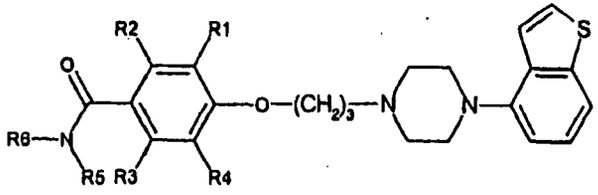
Example	R1	R2	R3	R4	R5	R6	NMR	Salt
93	-N $(CH_3)_2$	-H	-H	-H	$-C_2H_8$	-H	^{1}H-NMR ($CDCl_3$) δppm: 1.20-1.30 (3H, m), 2.10-2.20 (2H, m), 2.69 (2H, t, J=7.3 Hz), 2.70-2.75 (4H, m), 285 (6H, s). 3.20-3.25 (4H, m). 3.45-3.55 (2H, m), 4.10-4.20 (2H, m), 6.00 (1H, brs), 6.85-6.95 (2H, m). 7.25-7.30 (3H, m), 7.35-7.45 (2H, m). 7.56 (1H, d, J=8.1 Hz).	-
94	-$NHCOCH_3$	-H	-H	-H	$-C_2H_5$	-H	^{1}H-NMR ($CDCl_3$ δppm: 1.20-1.30 (3H, m), 2.05-2.15 (2H, m), 2.25 (3H, s), 2.65 (2H, t, J=7.1 Hz), 2.70-2.80 (4H, m), 3.20-3.25 (4H, m), 3.40-3.55 (2H, m), 4.21 (2H, t J=6.4 Hz), 6.22 (1H, brs), 6.81 (1H, d, J=7.7 Hz), 6.98 (1H, d, J=8.6 Hz), 7.25-7.30 (1H, m), 7.35-7.45 (2H, m), 7.56 (1H, d, J=8.0 Hz). 7.71 (1H, d, J=8.5 Hz), 7.82 (1H, brs), 8.70 (1H, s).	-

[Table 25]



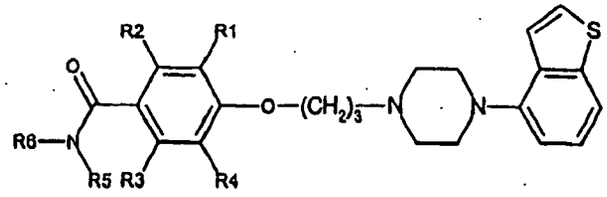
Example	R1	R2	R3	R4	R5	R6	Crystal form (Recrystallization solvent)	Melting point (°C)	Salt
95	-H	-H	$-OCH_3$	-H	$-CH_3$	-H	White powder (2-propanol)	221.5-223.0	Hydrochloride
96	-H	-H	$-OCH_3$	-H	$-CH_3$	$-CH_3$	White powder (Ethyl acetate)	207.5-215.0	Hydrochloride
97	-H	-H	$-OCH_3$	-H	$-C_2H_6$	-H	White powder (Ethyl acetate)	187.0-202.0	Hydrochloride
98	-H	-H	$-OCH_3$	-H	$-CH_2CF_3$	-H	White powder (Ethyl acetate)	219.0-227.0	Hydrochloride
99	$-NO_2$	-H	-H	-H	-H	-H	Light yellow powder (Ethyl acetate/isopropyl ether)	157.5-181.0	-
100	$-NO_2$	-H	-H	-H	$-CH_3$	-H	Light yellow powder (Ethyl acetate/isopropyl ether)	157.5-161.5	-
101	-H	-H	-H	$-NO_2$	$-CH_2CF_3$	-H	Light yellow powder (Ethyl acetate)	217.5-219.5 (dec)	Hydrochloride
102	$-CF_3$	-H	-H	-H	-H	-H	White powder (95% 2-propanol)	163.5-185.5	-
103	$-NH_2$	-H	-H	-H	-H	-H	White powder (Ethyl acetate/isopropyl ether)	172.5-173.0	-
104	$-CF_3$	-H	-H	-H	$-CH_3$	-H	White powder (95% 2-propanol)	158.5-162.0	-
105	$-CF_3$	-H	-H	-H	$-C_2H_5$	-H	White powder (95% 2-propanol)	146.5-148.5	-

[Table 26]



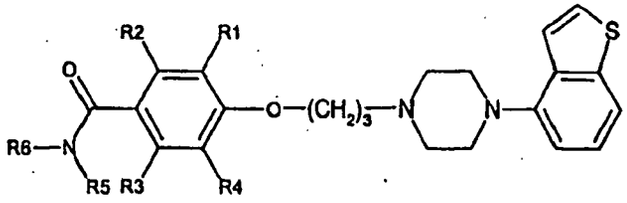
Example	R1	R2	R3	R4	R5	R6	Crystal form (Recrystallization solvent)	Melting point (°C)	Salt
106	$-CF_3$	-H	-H	-H	$-CH_2CF_3$	-H	White powder (95% 2-propanol)	144.5-150.0	-
107	$-NH_2$	-H	-H	-H	$-CH_3$	-H	White powder (Ethyl ecetate/isopropyl ether)	124.0-125.5	-
108	$-N(CH_2)_2$	-H	-H	-H	-H	-H	White powder (Ethyl acetate/isopropyl ether)	143.0-145.0	-
109	-H	-H	-H	$-N(CH_3)_2$	$-CH_3$	-H	White powder (Ethyl acetate)	219.0-223.0	Hydrochloride
110	$-NH_2$	-H	-H	-H	$-CH_2CF_3$	-H	White powder (Ethyl acetate/isopropyl ether)	125.0-128.0	-
111	$-N(CH_3)_2$	-H	-H	-H	$-CH_2CF_3$	-H	White powder (Ethyl acetate/Isopropyl ether)	147.5-148.5	-
112	-H	$-CH_3$	-H	-H	-H	-H	White powder (95% 2-propanol)	150.5-152.5	-
113	-H	$-CH_3$	-H	-H	$-CH_3$	-H	White powder (95% 2-propanol)	138.0-139.0	-
114	-H	$-CH_3$	-H	-H	$-C_2H_8$	-H	White powder (95% 2-propanol)	137.5-139.0	-
115	$-CH_3$	-H	-H	$-CH_3$	-H	-H	White powder (95% 2-propenol)	187.0-188.0	-

[Table 27]



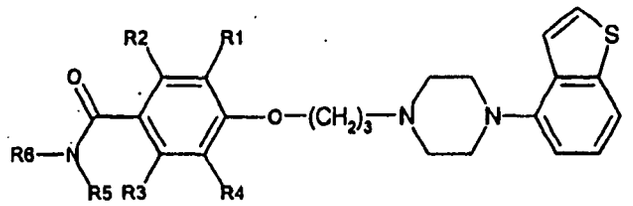
Example	R1	R2	R3	R4	R5	R6	Crystal form (Recrystallization solvent)	Melting point (°C)	Salt
116	$-CH_3$	-H	-H	$-CH_3$	$-CH_3$	-H	White powder (95% 2-propenol)	1525-154.5	-
117	$-CH_3$	-H	-H	$-CH_3$	$-C_2H_3$	-H	White powder (95% 2-propanol)	184.0-185.5	-
118	$-OCH_3$	-H	-H	$-OCH_3$	-H	-H	White powder (Ethyl acetate/isopropyl ether)	147.5-148.0	-
119	$-OCH_3$	-H	-H	$-OCH_3$	$-CH_3$	-H	White powder (Ethyl acetate)	233.0-237.5 (dec)	Hydrochloride
120	$-OCH_3$	-H	-H	$-OCH_3$	$-C_2H_3$	-H	White powder (Ethyl acetate/isopropyl ether)	145.5-147.5	-
121	$-OC_2H_3$	-H	-H	$-CH_3$	$-CH_2$	-H	White powder (Ethanol/ethyl acetate)	186,5-188.0	Hydrochloride
122	$-CH_2CH=CH_2$	-H	-H	$-OCH_3$	-H	-H	(Ethyl acetate/isopropyl ether)	128.0-130.0	-
123	$-C_3H_7$	-H	-H	$-OCH_3$	-H	-H	(Ethyl acetate/isopropyl ether)	137.5-140,0	-
124	$-OCH_3$	-H	-H	$-CH_2CH=CH_2$	$-CH_3$	-H	White powder (Ethyl acetate)	180.5-188.0	Hydrochloride
125	$-OCH_3$	-H	-H	$-C_2H_7$	$-CH_3$	-H	White powder (Ethyl acetate)	188.5-192.0	Hydrochloride

[Table 28]



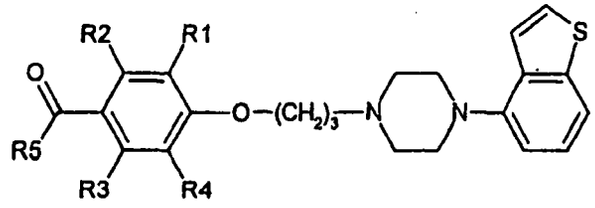
Example	R1	R2	R3	R4	R5	R6	Crystal form (Recrystallization solvent)	Melting point (°C)	Salt
126	$-CH_3$	-H	-H	$-OCH_3$	-H	-H	White powder (Ethyl acetate/isopropyl ether)	158.0-157.0	-
127	$-CH_3$	-H	-H	$-OCH_3$	$-CH_3$	-H	White powder (Ethyl acetate/methanol)	141.5-142.5	-
128	$-OCH_3$	-H	-H	$-CH_3$	$-C_2H_5$	-H	White powder (Ethyl acetate)	220.5-224.5	Hydrochloride
129	$-OCH_3$	-H	-H	$-CH_3$	$-CH_3$	$-OCH_3$	White powder (Ethyl acetate)	223.0-227.5	Hydrochloride

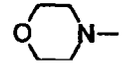
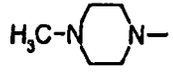
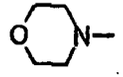
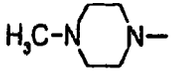
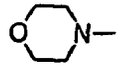
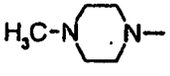
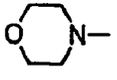
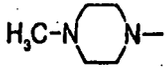
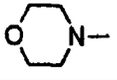
[Table 29]



Example	R1	R2	R3	R4	R5	R6	NMR	Salt
130	-H	-H	-H	$-NO_2$	$-C_2H_5$	-H	1H-NMR (CDCl3) δppm: 1.28 (3H, t, J=7.3 Hz), 2.05-2.15 (2H, m), 2.68 (2H, t, J=7.0 Hz), 2.73 (4H, brs), 3.19 (4H, brs). 3.45-3.55 (2H, m). 4.29 (2H, t, J=6.2 Hz), 6.14 (1H, brs), 6.90 (1H, d, J=7.8 Hz), 7.18 (1H, d, J=8.8 Hz), 7.25-7.30 (1H, m), 7.35-7.45 (2H, m), 7.55 (1H, d, J=8.1 Hz), 8.04 (1H, dd, J=2.3, 8.8 Hz), 8.23 (1H, d. J=2.2 Hz).	-

[Table 30]

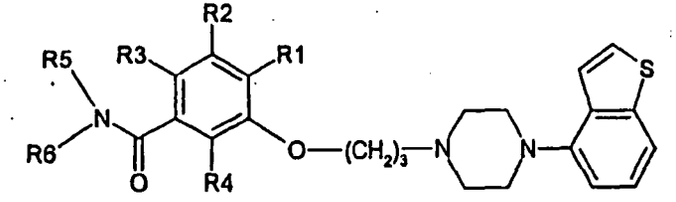


Example	R1	R2	R3	R4	R5	Crystal form (Recrystallization solvent)	Melting point (°C)	Salt
131	-H	-H	-H	-H		White powder (Ethyl acetate)	234.5-238.0	Hydrochloride
132	-H	-H	-H	-H		White powder (Ethyl acetate)	244.0 (dec)	Dihydrochloride
133	-H	-H	-H	Cl		White powder (Ethyl acetate)	218.5-222.0	Hydrochloride
134	-H	-H	-H	-Cl		White powder (Ethyl acetate)	255.0 (deo)	Dihydrochloride
135	-H	-H	-H	-F		White powder (Ethyl acetate)	224.5-227.5 (dec)	Hydrochloride
136	-H	-H	-H	-F		White powder (Ethyl acetate)	255.0 (dec)	Dihydrochloride
137	-H	-H	-H	$-CH_3$		White powder (Ethyl acetate)	236.0 (dec)	Hydrochloride
138	-H	-H	-H	$-CH_3$		White powder (Ethyl acetate)	255.5 (dec)	Dihydrochloride
139	-H	-H	-H	$-OCH_3$		White powder (Ethyl acetate)	228.0-228.0 (dec)	Hydrochloride

(continued)

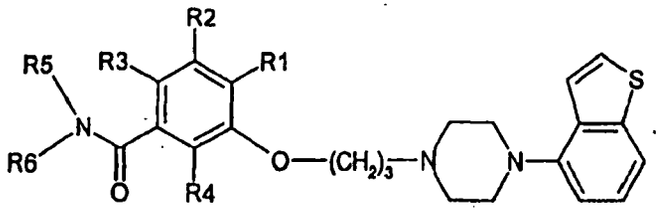
Example	R1	R2	R3	R4	R5	Crystal form (Recrystallization solvent)	Melting point (°C)	Salt
140	-H	-H	-H	$-OCH_3$		White powder (Ethyl acetate)	232.0 (dec)	Dihydrochloride

[Table 31]



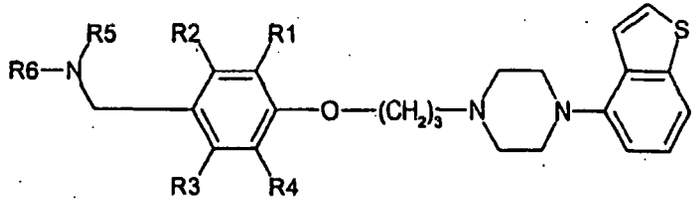
Example	R1	R2	R3	R4	R5	R6	Crystal form (Recrystallization solvent)	Melting point (°C)	Salt
141	-H	-H	-H	-H	-H	-H	Light yellow powder (Ethyl acetate/isopropyl ether)	158.0-160.0	-
142	-H	-H	-H	-H	-H	$-CH_3$	Light yellow powder (Ethyl acetate)	183.0-188.0	Hydrochloride
143	-H	-H	-H	-H	$-CH_3$	$-CH_3$	Light yellow powder (Ethyl acetate)	158.0-181.5	Hydrochloride
144	-H	-H	-H	-H	-H	$-C_2H_5$	Light yellow powder (Ethyl acetate)	168.5-173.0	Hydrochloride
145	-H	-H	-H	-H	-H	$-CH_2CF_3$	Light yellow powder (Ethyl acetate/isopropyl ether)	187.5-189.0	Hydrochloride
146	-F	-H	-H	-H	-H	-H	White powder (Ethyl acetate/isopropyl ether)	156.5-159.0	-
147	-F	-H	-H	-H	-H	$-CH_3$	White powder (Ethyl acetate/isopropyl ether)	214.5-218.0	Hydrochloride
148	-F	-H	-H	-H	-H	$-C_2H_5$	White powder (Ethyl acetate)	211.0-218.0	Hydrochloride
149	-Cl	-H	-H	-H	-H	-H	White powder (Ethyl ecetate/isopropyl ether)	139.0-140.5	-
150	-Cl	-H	-H	-H	-H	$-CH_3$	White powder (Ethyl acetate)	218.6-222.5	Hydrochloride
151	**-Cl**	-H	-H	-H	-H	$-C_2H_5$	White powder (Ethyl acetate)	247.0 (dec)	Hydrochloride
152	$-CH_3$	-H	-H	-H	-H	-H	White powder (Ethyl acetate/isopropyl ether)	128.5-130.0	-
153	$-CH_3$	-H	-H	-H	-H	$-CH_3$	White powder (Ethyl acetate/isopropyl other)	148.5-151.0	-
154	$-CH_3$	-N	-H	-H	-H	$-C_2H_5$	White powder (Ethyl acetate/isopropy) ether)	133.0-134.5	-
155	$-OCH_3$	-H	-H	-H	-H	-H	White powder (Ethyl acetate)	155.5-160.0	-
156	$-OCH_3$	-H	-H	-H	-H	$-CH_3$	White powder (Ethyl acetate)	163.5-165.0	Hydrochloride

[Table 32]



Example	R1	R2	R3	R4	R5	R6	Crystal form (Recrystallization solvent)	Melting point (˚C)	Salt
157	$-OCH_3$	-H	-H	-H	-H	$-C_2H_3$	White powder (Ethyl acetate)	187.0-188.5	Hydrochloride
158	$-OCH_3$	$-OCH_3$	-H	-H	-H	-H	White powder (Ethyl acetate/isopropyl ether)	132.0-134.0	-
159	$-OCH_3$	$-OCH_3$	-H	-H	-H	$-CH_3$	White powder (Ethyl acetate)	201.0-208.0	Hydrochloride
160	$-OCH_3$	$-OCH_3$	-H	-H	-H	$-C_2H_5$	White powder (Ethyl acetate/isopropyl ether)	158.0-158.5	-

[Table 33]

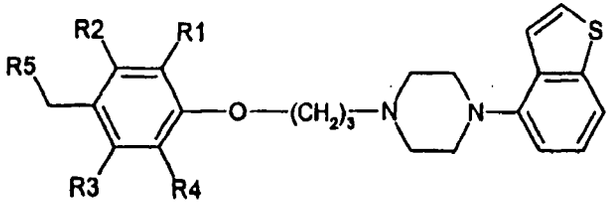


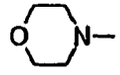
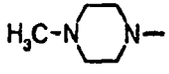
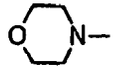
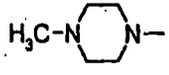
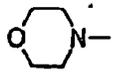
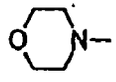
Example	R1	R2	R3	R4	R5	R6	Crystal form (Recrystallization solvent)	Melting (°C)	Salt
161	-H	-H	-H	-H	$-C_2H_5$	-H	Light yellow powder (Ethyl acetate)	point 228.0-241.0 (dec)	Dihydrochloride
162	-H	-H	-H	-H	$-C_3H_7$	-H	White powder (Ethyl acetate)	232.0-236.0 (dec)	Dihydrochloride
163	-H	-H	-H	-H	$-C_3H_7$	$-CH_3$	White powder (Ethyl acetate)	210.0-222.0 (dec)	Dihydrochloride
164	-H	-H	-H	-H	$-CH_3$	-H	White powder (Ethyl acetate)	235.5 (dec)	Dihydrochloride
165	-H	-H	-H	-H	$-CH_3$	$-CH_3$	White powder (Ethyl acetate)	257.5 (dec)	Dihydrochloride
166	-H	-H	-H	-H	$-C_2H_5$	$-C_2H_5$	White powder (Ethyl acetate)	232.0 (dec)	Dihydrochloride
167	-H	-H	-H	-H	$-CH_2CF_3$	-H	White powder (Ethyl acetate)	238.5-240.5 (dec)	Dihydrochloride
168	-H	-H	-H	-H	$-CH_2CH_2N(C_2H_5)_2$	-H	White powder (Ethyl acetate)	209.5 (dec)	Triydrochloride
169	-H	-H	-H	-H	-H	-H	Light yellow powder (Ethyl acetate)	245.5 (dec)	Dihydrochloride
170	-H	-H	-H	-H	-CHO	-H	White powder (Ethyl acetate)	207.6-213.0	Hydrochloride
171	-H	-H	-H	-H	$-COCH_3$	$-CH_3$	White powder (Ethyl acetate)	188.5-201.0	Hydrochloride
172	-H	-H	-H	-H	$-COC_2H_5$	$-CH_3$	White powder (Ethyl acetate)	194.5-198.0	Hydrochloride
173	-H	-H	-H	-H	$-COC_6H_5$	$-CH_3$	White powder (Ethyl acetate)	192.5-195.5	Hydrochloride
174	-H	-H	-H	-H	$-CH_2C_6H_5$	$-CH_3$	White powder (Ethyl acetate)	236.5 (dec)	Dihydrochloride
175	-H	-H	-H	-H	$-C_2H_5$	-H	White powder (Ethyl acetate)	191.0-193.5	Dihydrochloride
176	$-OCH_3$	-H	-H	-H	$-CH_3$	$-CH_3$	White powder (Ethyl acatate/ isopropyl ether)	101.0-103.0	-
177	-H	-H	-H	-H	$-C_6H_5$	$-CH_3$	White powder (Ethyl acetate)	207.5-214.5	Triydrochloride
178	-H	-H	-H	-Cl	$-CH_3$	$-CH_3$	White powder (Ethyl acetate)	259.0 (dec)	Dihydrochloride
179	-H	-H	-H	-F	$-CH_3$	$-CH_3$	White powder (Ethyl acetate)	247.0 (dec)	Dihydrochloride
180	-H	-H	-H	-F	$-CH_3$	-H	White powder (Ethyl acetate)	237.0 (dec)	Dihydrochloride
181	-H	-H	-H	-F	$-CH_3$	$-CONCH_3$	White powder (Ethyl acetate)	198.0-199.0	Hydrochloride

[Table 34]

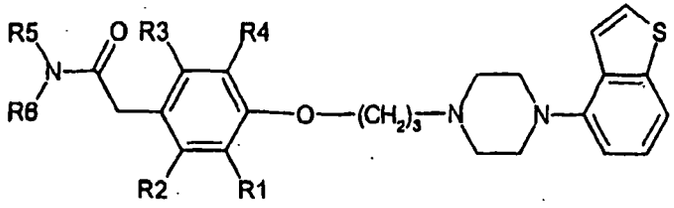
Example	R1	R2	R3	R4	R5	R8	Crystal form (Recrystallization solvent)	Melting point (°C)	Salt
182	-H	-H	-H	$-CH_3$	$-CH_3$	$-C_2H_5$	White powder (Ethyl acetate)	258.5 (dec)	Dihydrochloride
183	-H	-H	-H	$-CH_3$	$-CH_3$	-H	White powder (Ethyl acetate)	254.5 (dec)	Dihydrochloride
184	-H	-H	-H	$-CH_3$	$-CH_3$	$-CH_3$	White powder (Ethyl acetate)	277.5 (dec)	Dihydrochloride
185	-H	-H	-H	$-CH_3$	$-COCH_3$	$-CH_3$	White powder (Ethyl acetate)	230.0-232.0 (dec)	Hydrochloride
186	$-OCH_3$	-H	-H	-H	$-CH_3$	-H	White powder (Ethyl acetate)	239.5 (dec)	Dihydrochloride
187	-H	-H	-H	$-OCH_3$	$-CH_3$	$-COCH_3$	White powder (Ethyl acetate)	208.0-211.5	Hydrochloride

[Table 36]



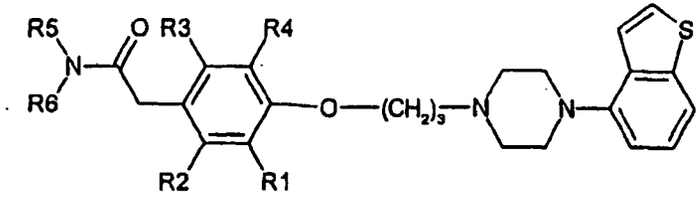
Example	R1	R2	R3	R4	R5	Crystal form (Re crystallization solvent)	Melting point (˚C)	Salt
188	-H	-H	-H	-H		White powder (Ethyl acetate)	243.5 (dec)	Dihydrochloride
189	-H	-H	-H	-H		White powder (Ethyl aoetate)	261.5 (dec)	Dihydrochloride
190	-H	-H	-H	-Cl		White powder (Ethyl acetate)	249.0 (dec)	Dihydrochloride
191	-H	-H	-H	-Cl		White powder (Ethyl acetate)	253.5 (dec)	Triydrochloride
192	-H	-H	-H	-F		White powder (Ethyl acetate)	252.0 (dec)	Dihydrochloride
193	-H	-H	-H	$-CH_3$		White powder (Ethyl acetate)	242.0 (dec)	Dihydrochloride

[Table 37]



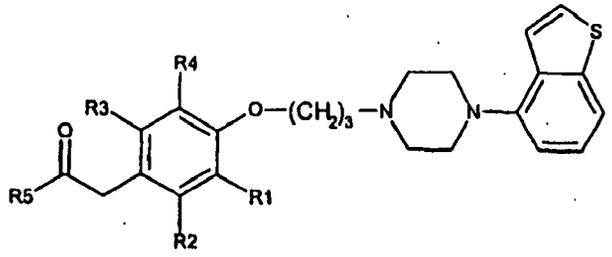
Example	R1	R2	R3	R4	R5	R6	Crystal form (Recrystallization solvent)	Melting point (˚C)	Salt
194	-H	-H	-H	-H	$-C_2H_3$	$-C_2H_8$	Light yellow powder (Ethyl acetate)	179.0-183.5	Hydrochloride
195	-H	-H	-H	-H	-H	-H	White powder (Ethyl acetate/water)	150.0-154.5	-
196	-H	-H	-H	-H	-H	$-CH_3$	White powder (Ethyl acetate)	198.0-207.0	Hydrochloride
197	-H	-H	-H	-H	$-CH_3$	$-CH_3$	White powder (Ethyl acetate/isopropyl ether)	128.0-129.5	-
198	-H	-H	-H	-H	-H	$-C_2H_3$	White powder (Ethyl acetate/isopropyl ether)	1125-113.5	-
199	-H	-H	-H	-H		$-CH_2CF_3$	White powder (Ethyl acetate/isopropyl ether)	126.0-127.0	-
200	-Cl	-H	-H	-H	-H	-H	White powder (2-propanol)	161.5-166.0	-
201	-H	-H	-H	-Cl	-H	$-CH_3$	White powder (Ethyl acetate)	194.5-197.0	Hydrochloride
202	-H	-H	-H	-Cl	$-CH_3$	$-CH_3$	White powder (Ethyl acetate)	197,5-201.0	Hydrochloride
203	-H	-H	-H	-Cl	-H	$-C_2H_5$	White powder (Ethyl acetate)	227.5 (dec)	Hydrochloride
204	-H	-H	-H	-Cl	-H	$-CH_2CF_3$	(Ethyl acetate)	204.0-208.0	Hydrochloride
205	$-OCH_3$	-H	-H	-H	-H	-H	White powder (Ethyl acetate/isopropyl ether)	129.0-130.0	-
206	-H	-H	-H	$-OCH_3$	-H	$-CH_3$	White powder (Ethyl acetate)	176.0-178.5	Hydrochloride
207	-H	-H	-H	$-OCH_3$	$-CH_3$	$-CH_3$	White powder (Ethyl acetate)	188.5-192.0	Hydrochloride
208	-H	-H	-H	$-OCH_3$	-H	$-C_3H_5$	White powder (Ethyl acetate)	178.0-184.0	Hydrochloride
209	-H	-H	-H	$-OCH_3$	-H	$-CH_2CF_3$	Light yellow powder (Ethyl acetate)	187.5-192.0	Hydrochloride

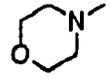
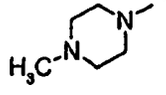
[Table 38]



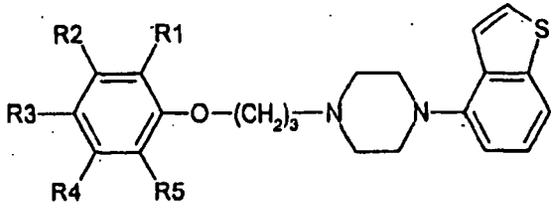
Example	R1	R2	R3	R4	R5	R6	Crystal form (Recrystallization solvent)	Melting point (˚C)	Salt
210	-F	-H	-H	-H	-H	-H	White powder (2-propanol)	148.5-150.0	-
211	-H	-H	-H	-F	-H	-CH,	White powder (Ethyl acetate)	191.0-193.0	Hydrochloride
212	-H	-H	-H	-F	$-CH_3$	$-CH_3$	White powder (Ethyl acetate)	192.5-197,0	Hydrochloride
213	-H	-H	-H	-F	-H	$-C_2H_3$	White powder (Ethyl acetate)	218:0-220.5	Hydrochloride
214	-H	-H	-H	-F	-H	$-CH_2CF_3$	Light yellow powder (Ethyl acetate)	197.0-202.0	Hydrochloride
215	-H	-H	-H	-H	-H	-H	White powder (Ethyl acetate/isopropyl ether)	149.5-150.5	-

[Table 39]



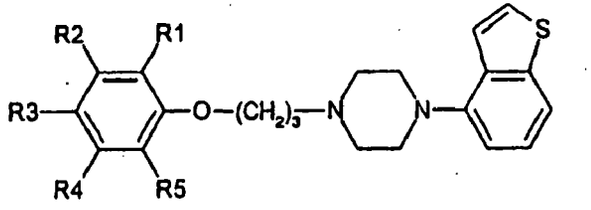
Example	R1	R2	R3	R4	R5	Crystal form (Recrystallization solvent)	Melting point (˚C)	Salt
216	-H	-H	-H	-H		White powder (Ethyl acetete/isopropyl ether)	130.5-131.5	-
217	-H	-H	-H	-H		White powder (Ethyl acetate)	227.5 (dec)	Dihydrochloride

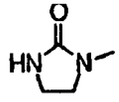
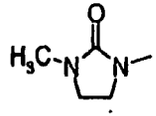
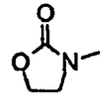
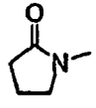
[Table 40]



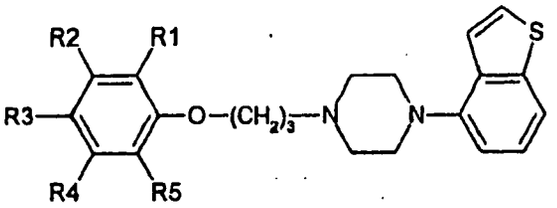
Example	R1	R2	R3	R4	R5	Crystal form (Recrystallization solvent)	Melting point (˚C)	Salt
218	-H	-H	$-NHCOCH_3$	-H	-H	White powder (Ethanol)	283.0-285.0	Hydrochloride
219	-H	-H	$-NHCO_2CH_3$	-H	-H	Light yellow powder (Ethyl acetate/isopropyl ether)	149.5-150.5.	-
220	-H	-H	$-NHSO_2C_2H_8$	-H	-H	Light yellow powder (Ethanol/ethyl acetate)	174-176	Dihydrochloride
221	-H	-H	$-NHC_2H_5$	-H	-H	White powder (Ethyl acetate)	225 (dec)	Hydrochloride
222	-H	-H	$-N(CH_3)CO_2CH_9$	-H	-H	White powder (Ethyl acetate)	196.0-2020	Hydrochloride
223	-H	-H	$-N(CH_3)COCH_3$	-H	-H	White powder (Ethanol)	246-247	Hydrochloride
224	-H	-H	$-NH_2$	-H	-H	White powder (Ethanol containing water)	266-271(dec)	Hydrochloride
225	-H	-H	$-NHCH_2$	-H	-H	White powder (Ethenol)	264-266	Dihydrochloride
226	-H	-H	$-N\ (CH_9)_2$	-H	-H	White powder (Ethanol)	269-270	Dihydrochloride
227	$-CH_3$	-H	$-NH_2$	-H	$-OCH_3$	Light yellow solid (Ethyl acetate)	155.0-158.0	-
228	$-OCH_3$	-H	$-NHCON\ (CH_3)_2$	-H	$-CH_3$	White powder (Ethyl acetate)	208.0-210.0	Hydrochloride
229	$-OCH_3$	-H	-NHCHO	-H	$-CH_3$	White powder (Ethyl acetate)	247.5-253.0 (dec)	Hydrochloride
230	$-OCH_3$	-H	$-NHCO_2CH_3$	-H	$-CH_3$	White powder (Ethyl acetate)	230.0-235.5	Hydrochloride

[Table 41]



Example	R1	R2	R3	R4	R5	Crystal form (Recrystallization solvent)	Melting point(°C)	Salt
231	-H	-H		-H	-H	White powder (Ethyl aoetete/2-propenol)	154.5-158.5	-
232	-H	-H		-H	-H	White powder (2-propanol)	141.0-144.5	-
233	$-OCH_3$	-H		-H	$-CH_3$	White powder (Ethanol)	247.5-251.0 (dec)	Hydrochloride
234	$-CH_2OH$	-H		-H	$-OCH_3$	White powder (Ethanol)	144.0-145.0	Hydrochloride

[Table 42]

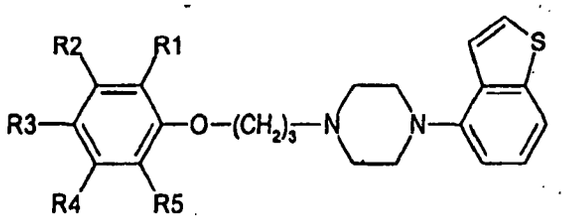


Example	R1	R2	R3	R4	R5	NMR	Salt
235	-H	R2 -H	-NHCH $(CH_3)_2$	-H	-H	^{1}H-NMR (DMSO-d_6) δ ppm: 1.24 (6H, d, J = 6.5Hz), 2.2-2.4 (2H, m), 3.15-3.8 (12H, m), 4.15 (2H, t, J = 6Hz), 6.99 (1H, d J = 7.5Hz). 7.11 (2H, d, J = 9Hz), 7.33 (1H, dd, J = 8, 8Hz). 7.4-7.55 (3H, m), 7.71 (1H, d, J = 8Hz). 7.78 (1H, d, J = 5.5Hz), 10.87 (3H, br).	Trihydrochloride
236	-OCH,	-H	-$NHCO_2CH_3$	-H	-H	^{1}H-NMR ($CDCl_3$,) δ ppm: 2.00-2.15 (2H, m), 2.60-2.70 (2H, m). 2.73 (4H, brs), 3.20 (4H, brs), 3.77 (3H, s), 3.88 (3H, s), 4.10 (2H, t, J=6.6 Hz), 6.52 (1H, brs), 8.74 (1H, dd, J=2.5, 8.6 Hz), 6.87 (1H, d, J=8.6 Hz), 8.90 (1H, d, J=7.7 Hz), 7.19 (1H, brs). 7.28 (1H, dd. J=7.8, 7.8 Hz). 7.35-7.45 (2H, m), 7.55 (1H, d, J=7.8 Hz).	-

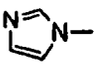
(continued)

Example	R1	R2	R3	R4	R5	NMR	Salt
237	-H	-H	-NHCON $(CH_3)_2$	-H	-H	^{1}H-NMR (DMSO-d_8) δ ppm: 2.20-2.30 (2H, m), 2.91 (6H, s), 3.20-3.40 (6H, m), 3.55 (2H, d, J=12.4 Hz), 3.65 (2H, d. J=11.4 Hz), 4.05 (2H, t, J=6.0 Hz), 6.86 (2H, d. J=9:0 Hz). 6.98 (1H, d, J=7.6 Hz), 7.30-7.40 (3H, m), 7.50 (1H, d, J=5.5 Hz), 7.71 (1H, d, J=8.1 Hz), 7.78 (1H, d J=5.5 Hz), 8.18 (1H, brs), 11.05 (1H, brs).	Dihydrochloride
238	-F	-H	-NHCO$_2$CH$_3$	-H	-H	^{1}H-NMR (DMSO-d_8) δ ppm: 2.24 (2H, brs), 3.10-3.25 (2H, m), 3.30-3.50 (4H, m), 3.50-3.60 (2H, m), 3.66 (3H, s), 3.85-3.70 (2H, m), 4.13 (2H, t, J=5.9 Hz), 6.98 (1H, d. J=7.6 Hz). 7.10-7.20 (2H, m), 7.32 (1H, dd, J=7.9, 7.8 Hz), 7.40 (1H, d, J=13.3 Hz), 7.50 (1H, d, J=5.5 Hz), 7.71 (1H. d J=8.1 Hz), 7.77 (1H, d J=5.5 Hz), 9.69 (1H, brs), 10.58 (1H, brs).	Hydrochloride

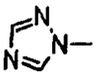
[Table 43]



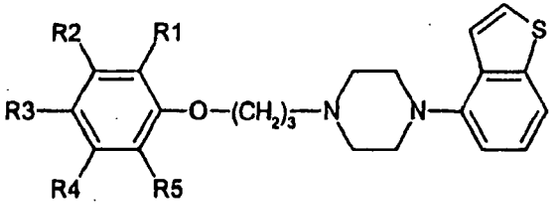
(continued)

Example	R1	R2	R3	R4	R5	NMR	Salt
239	-H	-H	-NHCONH$_2$	-H	-H	^{1}H-NMR ($CDCl_3$) δ ppm: 1.95-2.10 (2H, m), 2.64 (2H. t. J=7.3 Hz), 2.70-2.75 (4H, m), 3.15-3.20 (4H, m), 4.03 (2H, t, J=6.3 Hz), 4.83 (2H, brs), 6.83 (1H, brs), 8.85-6.95 (3H, m), 7.20 (2H, d, J=8.6 Hz), 7.25-7.30 (1H, m), 7.35-7.45 (2H, m), 7.55 (1H, d. J=8.1 Hz).	-
240	-H	-H	-NHCON (C_2H_3)$_2$	-H	-H	^{1}H-NMR (DMSO-d_8) δ ppm: 1.06 (6H, t, J=7.0 Hz), 2.15-2.30 (2H, m), 3.20-3.45 (10H, m), 3.54 (2H, d, J=12 Hz), 3.64 (2H, d, J=12 Hz), 4.03 (2H, t, J=5.9 Hz). 6.84 (2H, d, J=8.9 Hz), 6.97 (1H, d J=7.7 Hz), 7.25-7.40 (3H, m), 7.49 (1H, d, J=5.6 Hz), 7.70 (1H, d, J=8.1 Hz), 7.78 (1H, d. J=5.6 Hz). 8.01 (1H, s), 10.95 (1H, s).	Dihydrochloride
241	-H	-H		-H	-H	^{1}H-NMR (DMSO-d_8) δ ppm: 2.05-2.10 (2H, m), 2.67 (2H, t, J=7.3 Hz), 278 (4H, brs), 3.22 (4H, brs), 4.11 (2H, t, J=6.3 Hz), 6.91 (1H, d, J=7.8 Hz), 7.01 (2H, d. J=8.9 Hz), 7.20 (2H, d, J=9.0 Hz), 7.25-7.35 (3H, m), 7.35-7.45 (2H, m), 7.58 (1H, d, J=8.0 Hz), 7.77 (1H, s),	-

(continued)

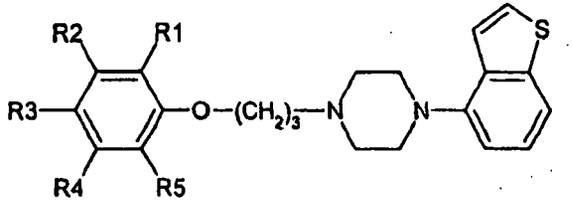
Example	R1	R2	R3	R4	R5	NMR	Salt
242	-H	-H		-H	-H	^{1}H-NMR ($CDCl_3$) δ ppm: 2.05-2.15 (2H, m), 2.67 (2H, t, J=7.2 Hz), 2.75 (4H, brs), 3.21 (4H, brs). 4.12 (2H, t; J=6.3 Hz), 6.91 (1H, d. J=7.6 Hz), 7.00-7.05 (2H, m), 7.25-7.30 (1H, m), 7.35-7.45 (2H, m), 7.50-7.60 (3H, m), 8.08 (1H, s). 8.45 (1H, s).	-

[Table 44]



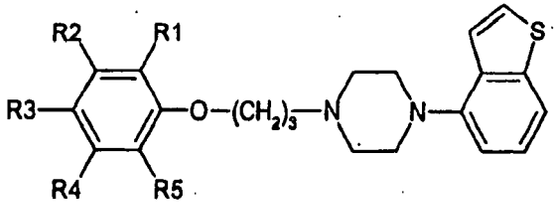
Example	R1	R2	R3	R4	R5	Crystal form (Recrystallization solvent)	Melting point(°C)	Salt
243	-H	-H	$-CH_2CH_2N(C_2H_5)_2$	-H	-H	White powder (Ethyl acetate)	224.0-232.0 (dec)	Dihydrochloride
244	-H	-H	-H	$-NHCO_2CH_3$	-H	White powder (Ethyl acetate)	178.0-181.0 (dec)	Hydrochloride
245	-H	-H	-CN	-H	-H	Light yellow powder (Ethyl acetate/isopropyl ether)	105.5-107.0	-
246	-H	-H	$-CO_2H$	-H	-H	White powder (Hydrochloric acid/acetio acid)	263.0 (dec)	Hydrochloride
247	-H	-H	$-CO_2CH_3$	-H	$-OCH_3$	White powder (Ethyl acetate)	242.0 (dec)	Hydrochloride
248	-H	-H	-Br	-H	-H	White powder (Ethyl acetate/isopropyl ether)	118.0-120.0	-
249	$-OCH_3$	-H	$-CO_2H$	-H	-H	White powder (Water)	121.0-124.5	-
250	-Cl	-H	$-CO_2C_2H_5$	-H	-H	Light yellow powder (Ethanol/isopropyl ether)	122.0-123.5	-
251	-H	-H	$-CH_2CO_2CH_3$	-H	-H	White powder (Ethyl acetate)	213.5-221.5 (dec)	Hydrochloride
252	-H	-H	$-CO_2C_2H_5$	-H	-F	White powder (Ethyl acetate)	231.5-233.5	Hydrochloride .

[Table 45]



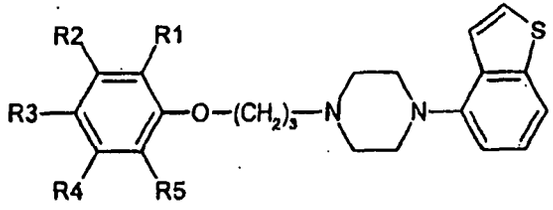
Example	R1	R2	R3	R4	R5	Crystal form (Recrystallization solvent)	Melting point(˚C)	Salt
253	-H	-H	$-CO_2H$	-H	-Cl	White powder (Hydrochloric acid/acetic acid)	273.0 (dec)	Hydrochloride
254	-H	-H	$-CH_2CO_2H$	-H	-H	White powder (Hydrochlorio acid/acetio acid)	217.0-222.0	Hydrochloride
255	-H	-H	$-CO_2H$	-H	-F	White powder (Hydrochlorio acid/acetio acid)	287.0 (dec)	Hydrochloride
256	-H	-H	$-CH_2CH_2NHCH_3$	-H	-H	White powder (Ethyl acetate)	258.0 (dec)	Dihydrochloride
257	-H	-H	$-CH_2CH_2N(CH_3)_2$	-H	-H	White powder (Ethyl acetate)	236.5 (dec)	Dihydrochloride
258	-H	-H	$-CH_2CH_2N(CH_3)COCH_3$	-H	-H	White powder (Ethyl acetate)	215.0-217.0	Hydrochloride
259	-H	-H	$-CH_2CH_2N(CH_3)COC_2H_5$	-H	-H	White powder (Ethyl acetate)	211.0-217.0	Hydrochloride
260	-H	-H	$-CH_2CH_2N(CH_3)COC_5H_5$	-H	-H	White powder (Ethyl acetate)	210.5-212.0	Hydrochloride
261	-H	-H	$-CH_2CH_2N(CH_3)CH_2C_6H_6$	-H	-H	White powder (Ethyl acetate)	196.0-202.0 (dec)	Dihydrochloride
262	-H	-H	$-CH_2CH_2NHC_2H_5$	-H	-H	White powder (Ethyl acetate/isopropyl ether)	230.0 (dec)	Dihydrochloride

[Table 46]



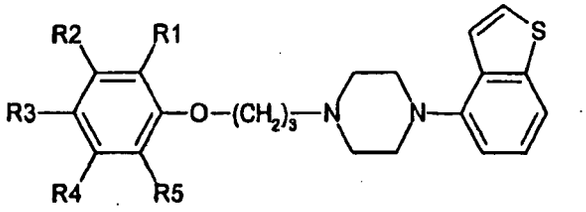
Example	R1	R2	R3	R4	R5	Crystal form (Recrystallization solvent)	Melting point(°C)	Salt
263	-H	-H -	$-CH_2CH_2NHCH_2CF_3$	-H	-H	White powder (Ethyl acetate)	223.0 (dec)	Dihydrochloride
264	-H	-H	$-CH_2CO_2C_2H_5$	-H	-Cl	White powder (Ethyl acetate)	225.0-228.5	Hydrochloride
265	-H	-H	$-CH_2CO_2H$ -	-H	-Cl	White powder (Hydrochloric acid/acetic acid)	208.0-209.5	Hydrochloride
266	-H	-H	$-CH_2CO_2C_2H_5$	-H	$-OCH_3$	White powder (Ethyl acetate)	205.5-213.5	Hydrochloride
267	$-CH_3$	-H	-CN	-H	-H	Light yellow powder (Ethyl acetate/isopropyl ether)	105.5-106.0	-
268	-H	-H	$-CH_2CO_2H$	-H	$-OCH_3$	White powder (Hydrochloric acid/acetic acid)	198.5-201.0	Hydrochloride
269	-H	-H	$-SO_2NH_2$	-H	-H	White powder (Ethanol)	199.0-203.0	-
270	-H	-H	$-CO_2H$	-H	$-CH_3$	White powder (Hydrochloric acid/acetic acid)	280.0 (dec)	Hydrochloride
271	-H	-H	$-CH_2CO_2C_2H_5$	-H	-F	White powder (Ethyl acetate)	220.5-224.0	Hydrochloride
272	-H	-H	$-CH_2CO_2H$	-H	-F	White powder (Hydrochlorid acid/acetic acid)	181.5-184.5	Hydrochloride

[Table 47]



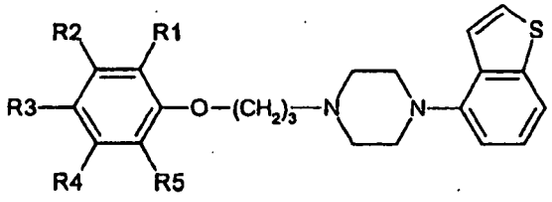
Example	R1	R2	R3	R4	R5	Crystal form (Recrystallization solvent)	Melting point(°C)	Salt
273	-H	-H	-CN	$-OCH_3$	-H	White powder (Ethyl acetate)	238.0 (dec)	Hydrochloride
274	-H	-H	$-CO_2C_2H_5$,	-H	-Br	White powder (Ethyl acetate)	237.5-242.5 (dec)	Hydrochloride
275	-H	-CN	-H	-H	-H	White powder (Ethyl acetate)	217.5-221.0 (dec)	Hydrochloride
276	-H	-H	$-CO_2H$	-H	-Br	White powder (Hydrochloric acid/acetic acid)	271.0 (dec)	Hydrochloride
277	-H	-H	-H	$-CO_2H$	-H	White powder (Hydrochlorio acid/acetic acid)	242.5-244.5	Hydrochloride
278	-H	-H	-H	-H	-CN	White powder (Ethyl acetate)	221.5-226.0	Hydrochloride
279	-CN	-H	$-CO_2C,_2H_5$	-H	-H	White powder (Ethyl acetate/isopropyl ether)	128.5-130.0	-
280	-H	-H	$-CO_2H$	-H	-CN	White powder (Dichloromethane/water)	271.0 (dec)	Hydrochloride
281	$-CONHC_2H_6$	-H	-H	-H	-H	White powder (Ethyl acetate)	220.0-227.5	Hydrochloride
282	-H	-H	$-CO_2C_2H_5$	$-CF_3$	-H	White powder (Ethyl acetate)	224.5-232.0	Hydrochloride

[Table 48]



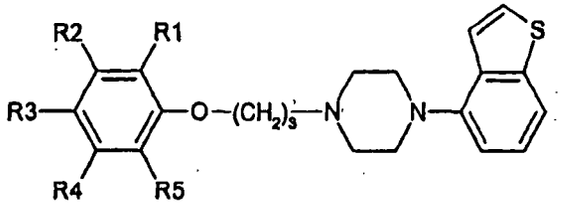
Example	R1	R2	R3	R4	R5	Crystal form (Recrystallization solvent)	Melting point(°C)	Salt
283	-H	-H	$-CO_2C_2H_5$	-Cl	-H	White powder (Ethyl acetate)	218.5-218.0	Hydrochloride
284	-H	-H	$-CO_2H$	-Cl	-H	White powder (Ethyl acetate)	259.0 (dec)	Hydrochloride
285	-H	$-OCH_3$	-CHO	-H	-H	White powder (Ethyl acetate 2-propanol)	118.0-119.5	-
286	-H	-H	$-CO_2H$	$-CF_3$	-H	White powder (Water)	240.0 (dec)	Hydrochloride
287	-H	-H	-CN	$-CH_3$	-H	White powder (Ethyl acetate)	230.0-237.0	Hydrochloride
288	$-NO_2$	-H	$-CO_2C_2H_3$	-H	-H	Light yellow powder (Ethyl acetate/isopropyl ether)	113.0-114.0	-
289	-H	-H	-CHO	-H	**-H**	White powder (Ethyl acetate)	102.5-105.5	-
290	-H	-H	$-CO_2H$	-H	$-NO_2$	White powder (Hydrochloric acid/acetic acid)	259.0 (dec)	Dihydrochloride
291	-H	-H	$-CH=CHCO_2H$	-H	-H	White powder (Hydrochloric acid/water)	265.0 (dec)	Hydrochloride
292	-H	-H	$-CO_2C_2H_6$	-H	$-CF_3$	White powder (Ethyl acetate)	211.5-221.0	Hydrochloride

[Table 49]



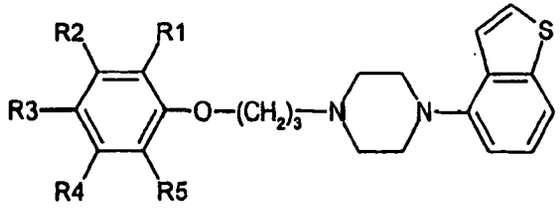
Example	R1	R2	R3	R4	R5	Crystal form (Recrystallization solvent)	Melting point(°C)	Salt
293	-H	-H	$-CO_2H$	-H	$-CF_3$	White powder (Ethyl acetate)	269.0 (dec)	Hydrochloride
294	-H	$-CH_2CO_2C_2H_6$	-H	-H	-H	White powder (Ethyl acetate)	206.0-208.0	Hydrochloride
295	-H	-H	$-CH=CHCONH_2$	-H	-H	White powder (Ethyl acetate)	210.5-215.0	-
296	-H	$-CH_2CO_2H$	-H	-H	-H	Light brown powder Ethyl acetate)	255.0 (dec)	Hydrochloride
297	-H	-H	$-CH=CHCONHCH_3$	-H	-H	White powder (95%-2-propanol)	165.5-169.0	-
298	-H	-H	$-CH=CHCON(CH_3)_2$	-H	-H	White powder (95%-2-propanol)	130.5-131.5	-
299	-H	-H	$-CH=CHCONHC_2H_6$	-H	-H	White powder (95%-2-propanol)	158.0-159.0	-
300	-H	-H	$-CH=CHCONHCH_2CF_3$	-H	-H	White powder (95%-2-propanol)	177.5-180.0	-
301	-H	-H	$-(CH_2)_2CO=C_2C_2H_5$	-H	-H	White powder (Ethyl acetate)	235.0-237.5	Hydrochloride
302	-F	-H	-H	$-CO_2C_2H_5$	-H	White powder (Ethyl acetate)	218.5-224.0	Hydrochloride

[Table 50]



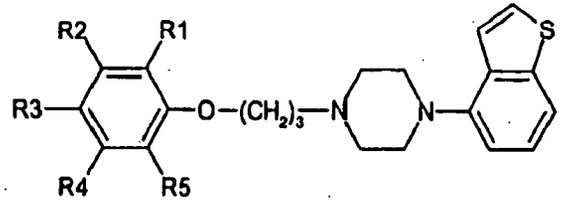
Example	R1	R2	R3	R4	R5	Crystal form (Recrystallization solvent)	Melting point(°C)	Salt
303	-H	-H	$-CH_2CH_2CO_2H$	-H	-H	White powder (Hydrochloric acid/acetic acid)	240.0 (dec)	Hydrochloride
304	-F	-H	-H	$-CO_2H$	-H	White powder (Hydrochloric acid/acetic acid)	260.0 (dec)	Hydrochloride
305	-Cl	-H	-H	$-CO_2C_2H_5$	-H	White powder (Ethyl acetate)	241.0-245.0	Hydrochloride
306	-Cl	-H	-H	$-CO_2H$	-H	White powder (Hydrochloric acid/acetic acid)	268.0 (dec)	Hydrochloride
307	$-CH_3$	-H	-H	$-CO_2C_2H_5$	-H	White powder (Ethyl acetate)	238.0-242.0 (dec)	Hydrochloride
308	$-CH_3$	-H	$-CO_2C_2H_5$	-H	$-CH_3$	White powder (isopropyl ether)	106.0-108.0	-
309	$-CH_3$	-H	-H	$-CO_2H$	-H	white powder (Hydrochloric acid/acetic acid)	256.5 (dec)	Hydrochloride
310	$-CH_3$	-H	$-CO_2H$	-H	$-CH_3$	White powder (Water)	252.5 (dec)	Hydrochloride
311	$-OCH_3$	$-OCH_3$	-H	$-CO_2C_2H_5$	-H	White powder (Ethyl acetate)	225.0-234.0	Hydrochloride
312	-H	-H	$-C(CH_3)_2CO_2CH_3$	-H	-H	White powder (Ethyl acetate)	222.0-226.5	Hydrochloride

[Table 51]



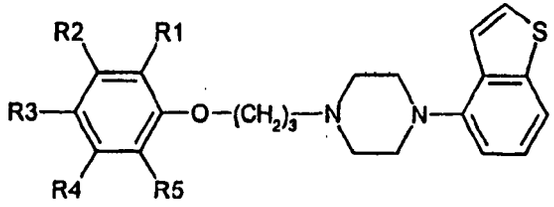
Example	R1	R2	R3	R4	R5	Crystal form (Recrystallization solvent)	Melting point(°C)	Salt
313	$-OCH_3$	-H	-H	$-CO_2C_2H_5$	-H	White powder (Ethyl acetate)	208.0-213.5	Hydrochloride
314	-H	-H	$-C(CH_3)_2CO_2H$	-H	-H	White powder (Hydrochloric acid/ acetio acid)	257.5 (dec)	Hydrochloride
315	-H	-H	$-CH_2CH_2CONH_2$	-H	-H	Light yellow powder (95%-2-propanol)	167.5-170.0	-
316	-H	-H	$-CH_2CH_2CONHCH_3$	-H	-H	White powder (95%-2-propanol)	128.0-132.0	-
317	$-OCH_3$	-H	-H	$-CO_{2H}$	-H	White powder (Hydrochloric acid/ water)	250.0 (dec) -	Hydrochloride
318	-H	-H	$-CH_2CH_2CONHC_2H_5$	-H	-H	White powder (95%-2-propanol)	130.5-132.0	Hydrochloride
319	-H	$-CH_2CONH_2$	-H	-H	-H	White powder (Ethyl acetate/isopropyl ether)	132.5-134.0	Hydrochloride
320	-H	-H	-H	$-CH_2CONHCH_3$	-H	White powder (Ethyl acetate)	173.5-175.0	Hydrochloride
321	$-OCH_3$	$-OCH_3$	-H	$-CO_2H$	-H	White powder (Water)	154.0-155.5	Hydrochloride
322	$-OCH_3$	-H	$-CO_2C_2H_5$	-H	$-OCH_3$	White powder (Ethyl acetate)	239.0-242.0 (dec)	Hydrochloride

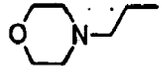
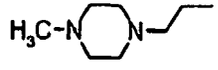
[Table 52]



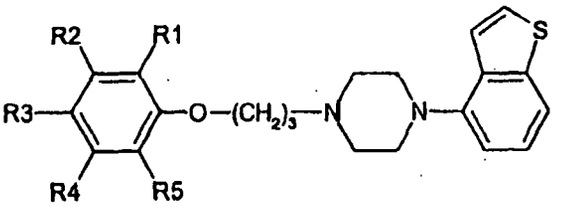
Example	R1	R2	R3	R4	R5	Crystal form (Recrystallization solvent)	Melting point(°C)	Salt
323	$-OCH_3$	-H	$-CO_2H$	-H	$-OCH_3$	White powder (Water)	191.0-196.0	-
324	-H	-H	$-CSNHC_2H_5$	-H	-H	Light yellow powder (Ethyl acetate/THF)	193.0-196.5	Dihydrochloride
325	$-OCH_3$	-H	$-COCH_3$	-H	$-CH_3$	White powder (Ethyl acetate)	243.0 (dec)	Hydrochloride
326	$-CH_2CH=CH_2$	-H	$-CO_2H$	-H	$-OCH_3$	White powder (Water)	97.0-102.0	-
327	-C, H,	-H	$-CO_2H$	-H	$-OCH_3$	White powder (Water)	145.5-150.5	-

[Table 53]

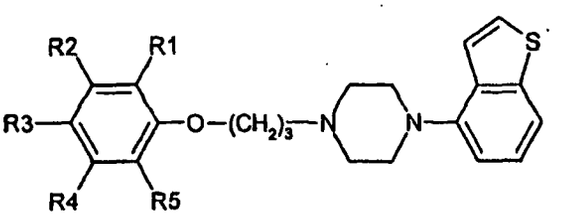


Example	R1	R2	R3	R4	R5	Crystal form (Recrystallization solvent)	Melting point(°C)	Salt
328	-H	-H		-H	-H	White powder (Ethyl acetate/isopropyl ether)	112.5-113.5	-
329	-H	-H		-H	-H	White powder (Ethyl acetate/isopropyl ether)	112.0-113.0	-

[Table 54]

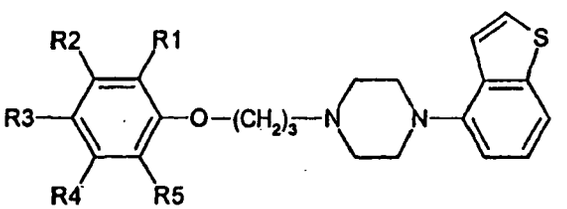


Example	R1	R2	R3	R4	R5	NMR	Salt
330	-H	-H	-F	-H	-H	^{1}H-NMR (DMSO-d_6) δ ppm: 2.15-2.30 (2H, m), 3.10-3.25 (2H, m), 3.25-3.60 (4H, m), 3.55-3.75 (4H, m), 4.10 (2H, t, J=6.0 Hz), 8.90-7.10 (4H, m), 7.25-7.40 (3H, m), 7.51 (1H, d, J=5.6 Hz), 7.72 (1H, d, J=8.3 Hz), 7.78 (1H, d, J=5.5 Hz), 10.12 (1H, brs).	Hydrochloride
331	-H	-H	-H	-H	-H		Hydrochloride

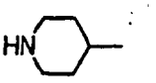
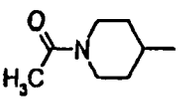


Example	R1	R2	R3	R4	R5	Crystal form (Recrystalization solvent)	Melting point (˚C)	Salt
332	-H	-H	-H	-H	-$NHCOCH_3$	Colorless needle-form crystal (Ethanol)	243.7 - 244.8	-

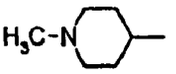
[Table 55]



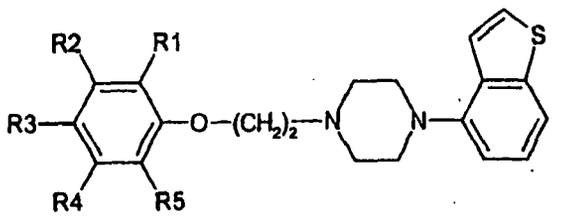
(continued)

Example	R1	R2	R3	R4	R5	NMR	Salt
333	-H	-H	$-COCH_3$	-H	$-OCH_3$	^{1}H-NMR (DMSO-d_8) δ ppm : 220-2.40 (2H, m), 2.53 (3H, s), 3.20-3.70 (10H, m), 3.83 (3H, s). 4.19 (2H, t, J=5.8 Hz). 6.96 (1H, d, J=7.5 Hz), 7.10 (1H, d, J=8.5 Hz), 7.31 (1H, t, J=7.8 Hz), 7.45-7.50 (2H, m), 7.62 (1H, dd, J=2.0, 8.4 Hz), 7.69 (1H, d, J=8.0 Hz), 7.76 (1H, d, J=5.5 Hz). 11.14 (1H, brs).	Hydrochloride
334	$-OCH_3$	-H	-H	-H	$-OCH_3$		Hydrochloride
335	-H	-H		-H	-H	^{1}H-NMR ($CDCl_3$) δ ppm: 1.95-2.10 (6H, m), 2.60-2.75 (7H, m), 2.96 (2H, t, J=11.3 Hz). 3.21 (4H, brs), 3.55 (2H, d, J=12.4 Hz). 4.08 (2H, t, J=8.2 Hz), 6.80-6.95 (3H, m), 7.17 (2H, d, J=8.5 Hz), 7.25-7.35 (1H, m), 7.40 (1H, d, J=5.5 Hz), 7.43 (1H, d, J=5.6 Hz), 7.57 (1H, d, J=8.1 Hz).	-
336	-H	-H		-H	-H	^{1}H-NMR ($CDCl_3$) δ ppm: 1.55-1.65 (2H, m), 1.80-1.95 (2H, m), 2.00-2.10 (2H, m), 2.13 (3H, s). 2.55-2.75 (7H. m), 3.10-3.20 (6H. m), 3.83 (1H, d, J=13.7 Hz), 4.05 (2H, t, J=8.4 Hz), 4.78 (1H, d, J=13.3 Hz), 6.85-6.95 (3H, m), 7.11 (2H, d, J=8.8 Hz), 7.25-7.30 (1H, m), 7.39 (1H, d, J=5.6 Hz), 7.42 (1H, d, J=5.5 Hz). 7.55 (1H, d, J=8.1 Hz).	-

(continued)

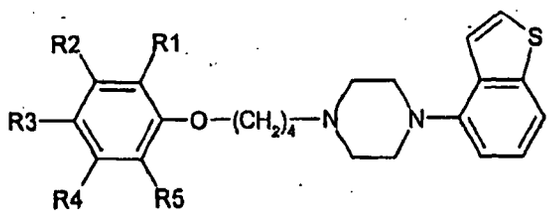
Example	R1	R2	R3	R4	R5	NMR	Salt
337	-H	-H		-H	-H	^{1}H-NMR ($CDCl_3$) δ ppm: 1.75-1.85 (4H, m), 2.00-2.10 (4H, m), 2.32 (3H. s). 2.35-2.45 (1H, m), 2.63 (2H, t, J=7.4 Hz). 2.73 (4H, brs), 2.96 (2H, d, J=11.5 Hz), 3.20 (4H, brs), 4.04 (2H, t, J=6.3 Hz), 6.85-6.95 (3H, m), 7.14 (2H, d, J=8.6 Hz), 7.25-7.30 (1H, m), 7.35-7.45 (2H, m), 7.55 (1H, d, J=8.1 Hz).	-

[Table 56]



Example	R1	R2	R3	R4	R5	NMR	Salt
338	-H	-H	-F	-H	-H	^{1}H-NMR (DMSO-d_6) δ ppm: 3.10-3.25 (2H, m), 3.40-3.75 (8H, m), 4.40-4.45 (2H, m), 6.98 (1H, d, J=7.7 Hz), 7.00-7.25 (4H, m). 7.33 (1H, dd, J=7.9, 7.8 Hz), 7.50 (1H, d, J=5.6 Hz), 7.71 (1H, d J=8.0 Hz), 7.78 (1H, d, J=5.5 Hz), 10.37 (1H, brs).	Hydrochloride
339	-H	-H	-H	-H	-H	^{1}H-NMR (DMSO-d_6) δ ppm: 3.10-3.35 (2H, m), 3.40-3.80 (8H, m). 4.48 (2H. t. J=4.8 Hz), 8.85-7.10 (4H, m), 7.25-7.40 (3H, m). 7.51 (1H, d, J=5.5 Hz), 7.71 (1H, d, J=8.1 Hz), 7.77 (1H, d, J=5.5 Hz), 10.80-11.20 (1H, br).	Hydrochloride

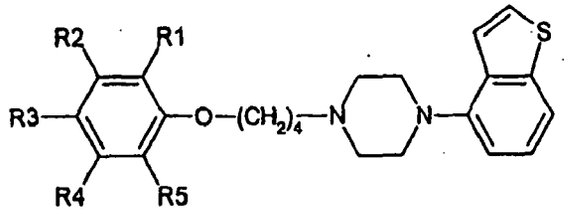
[Table 57]



(continued)

Example	R1	R2	R3	R4	R5	NMR	Salt
340	R1 -H	-H	-H	-H	-H	^{1}H-NMR (DMSO-d_6) δ ppm: 1.70-2.00 (4H, m), 3.10-3.40 (6H, m), 3.50-3.80 (4H, m), 4.03 (2H. t. J=5.9.Nz), 6.90-7.00 (5H, m), 7.25-7.40 (3H, m), 7.50 (1H. d, J=5.6 Hz), 7.71 (1H, d .1=8.0 Hz), 7.77 (1H, d, J=5.5 Hz), 10.59 (1H. brs)	Hydrochloride
341	-H	-H	-F	-H	-H	^{1}H-NMR (DMSO-d_6) δ ppm: 1.75-1.95 (4H, m), 3.10-3.50 (8H. m), 3.50-3.65 (4H, m), 4.00 (2H. t, J=5.9 Hz), 8.90-7.00 (3H, m), 7.00-7.20 (2H, m), 7.32 (1H, dd, J=7.9, 7.8 Hz), 7.50 (1H, d, J=5.5 Hz). 7.71 (1H, d, J=8.0 Hz), 7.77 (1H, d, J=5.5 Hz), 10.40-10.80 (1H, br).	Hydrochloride
342	-H	-H	-$COCH_3$	-H	-OCH_3	^{1}H-NMR (DMSO-d_6) δ ppm: 1.80-1.95 (4H, m). 2.52 (3H, s). 3.20-3.35 (6H, m). 3.50-3.85 (4H, m). 3.83 (3H, s), 4.00-4.15 (2H, m), 6.95 (1H, d, J=7.5 Hz), 7.08 (1H, d, J=8.5 Hz). 7.30 (1H, dd, J=7.8, 7.8 Hz), 7.40-7.50 (2H. m), 7.81 (1H. dd, J=1.9, 8.4 Hz). 7.69 (1H, d, J=8.1 Hz), 7.75 (1H, d, J=5.6 Hz), 11.0 (1H, brs).	Hydrochloride

[Table 58-1]

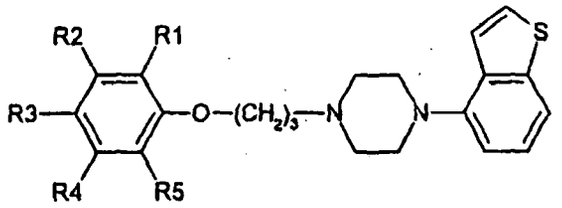


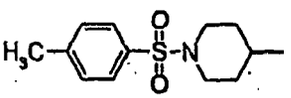
Example	R1	R2	R3	R4	R5	Crystal form (Recrystallization solvent)	Melting point(˚C)	Salt
343	-H	-H	$NHCO_2CH_3$	-H	-H	White powder (Ethyl acetate)	241.0 (dec)	Hydrochloride
344	-H	-H	-H	$-NHCO_2CH_3$	-H	White powder (Ethyl acetate)	203.0-209.5	Hydrochloride
345	-H	-H	-CN	-H	-H	White powder (Ethyl acetate)	220.0-223.0 (dec)	Hydrochloride
346	-H	-H	$-CO_2H$	-H	-H	White powder (Hydrochloric acid/acetic acid)	247.5-250.0 (dec)	Hydrochloride
347	-H	-CN	-H	-H	-H	White powder (Ethyl acetate)	196.0-198.5	Hydrochloride
348	-H	-H	-H	$-CO_2H$	-H	White powder (Ethyl acetate)	255.5-258.5	Hydrochloride
349	-CN	-H	-H	-H	-H	White powder (Ethyl acetate)	187.5-188.5	Hydrochloride
350	-H	-H	-H	$-CONHCH_2CF_3$	-H	White powder (Ethyl acetate/2-propanol)	137.0 (dec)	Hydrochloride
351	-H	-H	-H	$-CONHC_2H_5$	-H	Light yellow powder (Ethyiecetate/2-propenol)	130.0-135.0	Hydrochloride
352	-H	-H	-H	-H	$-CO_2H$	White powder (Dichloromethane/water)	192.0-197.0	Hydrochloride
353	-H	$-CONH_2$	-H	-H	-H	Light yellow powder (2-propanol)	148.0-151.0	-

[Table 58-2]

Example	R1	R2	R3	R4	R5	Crystal form (Recrystallizatfon solvent)	Melting point(°C)	Salt
354	-H	-H	-H	$-CONHCH_3$	-H	Light yellow powder (Ethyl acetate)	234.0-239.0	Hydrochloride
355	-H	-H	-H	$-CON(CH_3)_2$	-H	Light yellow powder (Ethyl acetate)	135.0-141.5	Hydrochloride
356	-H	-H	-H	-H	$-CONHC_2H_5$	White powder (Ethyl acetate)	209.5-213.0	Hydrochloride

[Table 59]

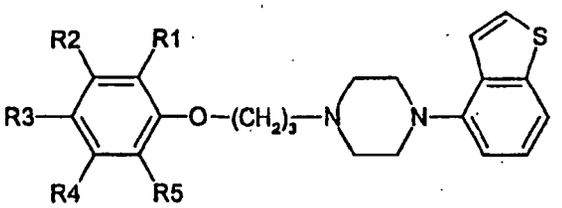


Example	R1	R2	R3	R4	R5	NMR	Salt
357	-H	-H	$-(CH_2)_2N(CH_3)CO_2C(CH_3)_3$	-H	-H	^{1}H-NMR ($CDCl_3$) δ ppm: 1.43(9H, s), 1.97-2.07 (2H, m), 284(2H, t J=7.5Hz), 2.69-2.87(6H, m), 2.81(3H, s), 3.15-3.27(4H, m), 3.38 (2H, t, J=7.5Hz), 4.04 (2H, t, J = 8.3Hz), 8.83-8.92 (3H, m), 7.02-7.15(2H, m), 7.28(1H, t, J=7.8Hz), 7.37-7.43 (2H, m), 7.55(1H, d, J=8.80Hz)	-
358	-H	-H		-H	-H	^{1}H-NMR ($CDCl_3$) δ ppm: 1.60-2.10 (6H, m), 2.30-2.40 (2H, m), 2.47 (3H, s), 2.60-2.70 (1H, m), 2.74 (4H, br), 2.85-3,00 (2H, m), 3.20 (4H, br), 3.90-4.10 (4H, m), 6.85-6.95 (2H, m), 7.07 (1H, d, J=8.8 Hz), 7.25-7.45 (3H, m), 7.56 (1H, d, J=8.0 Hz), 7.69 (2H, d, J=8.2 Hz).	-
359	-H	-H	-H	-H	$-CO_2H$	^{1}H-NMR (DMSO-d_6) δ ppm : 2.20-2.43 (2H, m), 3.17-3.77 (10H, m), 4.30 (2H, t, J=8.0 Hz), 6.90-7.20 (2H, m), 7.30-7.40 (2H, m), 7.50-7.03 (1H, m), 7.70-7.79 (4H, m), 11.00 (1H, br), 12.71(1H, br).	-

(continued)

Example	R1	R2	R3	R4	R5	NMR	Salt
360	$-OCH_3$	-H	$-CO_2CH_3$	-H	$-CH_3$	^{1}H-NMR ($CDCl_3$) δ ppm: 1.95-2.10 (2H, m), 2.31 (3H, s), 2.60-2.80 (6H, m), 3.10-3.30 (4H, m), 3.89 (6H, s), 4.10 (2H, t, J = 8.4Hz), 6.90 (1H, dd, J = 0.5, 7.6Hz), 7.27 (1H, dd, J = 7.8, 7.8Hz), 7.35-7.45 (3H, m), 7.50-7.60 (2H, m).	-
361	$-OCH_3$	-H	$-CO_2H$	-H	$-CH_3$	^{1}H-NMR (DMSO-d_6) δ ppm : 1.90-2.05 (2H, m), 2.28 (3H, s), 2.55-3.30 (10H, m), 3.85 (3H, s), 4.03 (2H, t, J = 6.1Hz), 6.93 (1H, d, J = 7.6Hz), 7.29 (1H, dd, J = 7.8, 7.8Hz), 7.35-7.50 (3H, m), 7.65 (1H, d. J = 8.0Hz), 7.72 (1H, d, J = 5.5Hz), 11.50-13.50 (1H, br).	-

[Table 60]

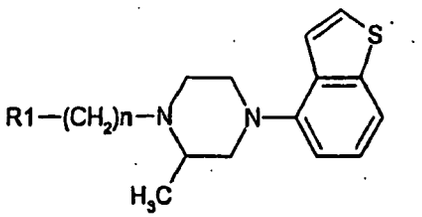


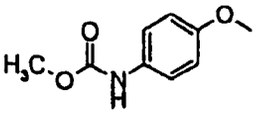
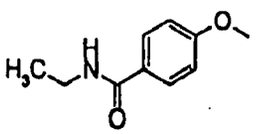
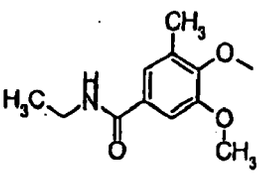
Example	R1	R2	R3	R4	R5	NMR	Salt
362	$-CH_2CH=CH_2$	-H	$-CO_2CH_3$	-H	$-OCH_3$	^{1}H-NMR ($CDCl_3$) δ ppm: 1.98-2.09(2H, m), 2.70-2.83 (6H, m), 3.13-3.30(4H, m), 3.45(2H, d, J=6.5Hz), 3.89(3H a), 4.10(2H, t, J=8.4Hz), 5.04-5.11(2H, m), 5.91-0.09 (1H, m), 6.90(1H, d, J=7.5Hz), 7.24-7.31(1H. m), 7.38-7.44 (2H, m), 7.47-7.57(3H, m).	-

(continued)

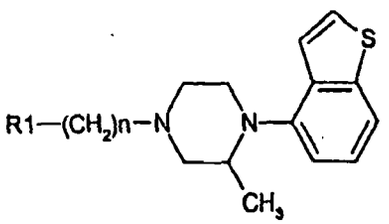
Example	R1	R2	R3	R4	R5	NMR	Salt
363	$-C_3H_7$	-H	$-CO_2CH_3$	-H	$-OCH_3$	^{1}H-NMR ($CDCl_3$) δ ppm: 0.97 (3H. t, J=7.3Hz), 1.52-1.74 (2H, m), 1.93-2.13(2H, m), 2.57-2.85(6H, m), 3.07-3.30 (4H, m), 3.89(6H, s), 4.09(2H, t, J=6.3Hz), 6.90(1H, d, J=7.5Hz), 7.24-7.31(1H, m), 7.38-7.45(3H, m), 7.52-7.57 (2H, m).	-

[Table 61]

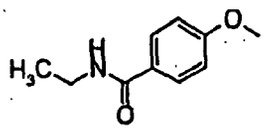


Example	R1	n	Crystal form (Recrystallization solvent)	Melting point(°C)	Salt
364		3	White powder (Ethyl acetate)	1 28.0-1 38.5	Hydrochloride
365		3	White powder (Ethyl acetate)	130.0-136.0	Hydrochloride
366		3	White powder		Fumarate

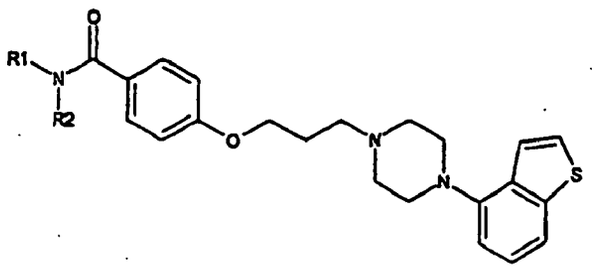
[Table 32]



(continued)

Example	R1	n	Crystal form (Recrystallization solvent)	Melting point(˚C)	Salt
367		3	White powder (Ethyl acetate)	151.5-158.5	Hydrochloride

[Table 63]

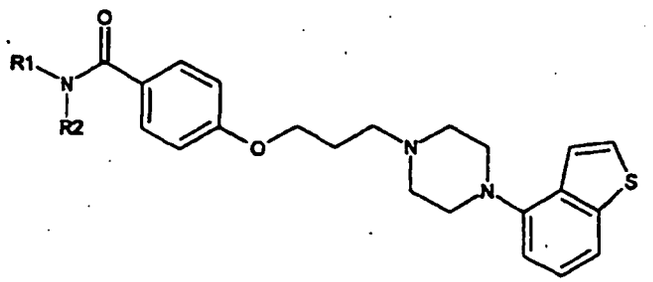


Example	R1	R2	MS(M+1)
368	-H	-cyclo- C_8H_{11}	478
369	$-CH_2CH(CH_3)_2$	$-CH_2CH(CH_3)_2$	508
370	$-CH_2CH_2OH$	$-CH_2CH_2OH$	484
371	$-CH_3$	$-CH_2CH_2N(CH_3)_2$	481
372	$-CH_2CH_2OCH_3$	$-CH_2CH_2OCH_3$	512
373	$-C_3H_7$	$-CH_2$-cyclo- C_3H_5	492
374	$-CH_2CH=CH_2$	-cyclo- C_5H_9	504
375	$-C_2H_3$	$-C_2H_5$	452
376	-H	$-C_4H_9$	452
377	-H	$-C(CH_3)_3$	452
378	-H	-cyclo- C_7H_{23}	492
379	$-C_2H_5$	-cyclo- C_6H_{11}	506
380	$-C_2H_5$	$-CH(CH_3)_2$	466
381	-H	$-CH_2CH(CH_3)_2$	452
382	-H	$-CH_2CH_2OCH_3$	454
383	-H	$-CH_2CH_2OC_2H_5$	488
384	-H	$-(CH_2)_3OC_2H_5$	482
385	-H	-1-CH_3-CYCLOHEXYL	492
386	-H	$-CH_2$-cyclo- C_3H_5	450
387	-H	$-CH_2$-cyclo- C_6H_{11}	492
388	-H	$-CH_2CO_2CH_3$	468
389	-H	$-CH_2CONH_2$	453
390	$-CH_3$	$-CH_2CO_2CH_3$	482
391	-H	$-CH_2CCH$	434
392	$-CH_3$	$-CH(CH_3)_2$	452
393	-H	$-(CH_2)_2CH(CH_3)_2$	466
394	-H	$-CH(CH_3)C(CH_3)_3$	480
395	-H	$-CH_2CH_2N(CH_3)_2$	467
396	$-CH_3$	$-CH_2$-cyclo- C_3H_5	464

(continued)

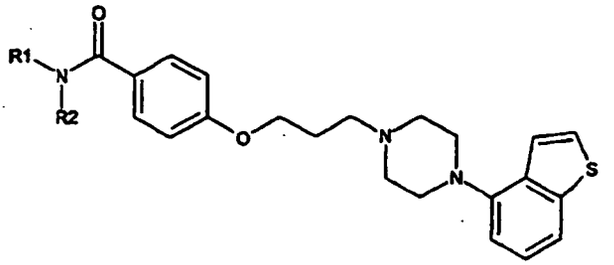
Example	R1	R2	MS(M+1)
397	-H	$-CH_2CF_3$	478
398	$-CH_3$	-cyclo- C_6H_{11}	492
399	$-C_2H_5$	$-CH_2CH_2OH$	468
400	$-CH_2CH_2OH$	-cyclo- C_6H_{11}	522
401	-H	-cyclo- C_5H_9	464
402	-H	-3-PYRIDYL	473
403	-H	-4-PYRIDYL	473
404	$-CH_2CH_2OH$	$-C_6H_5$	516

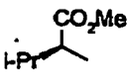
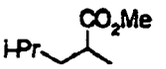
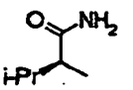
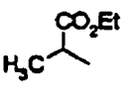
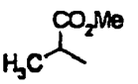
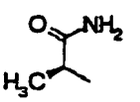
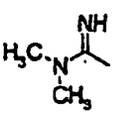
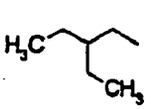
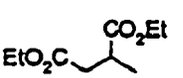
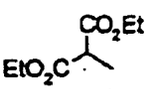
[Table 64]



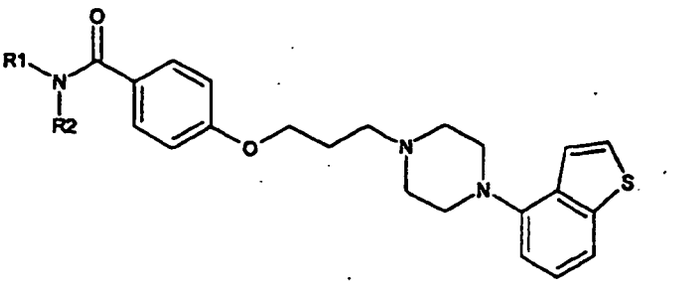
Example	R1	R2	MS (M+1)
405	-H	$-C_6H_5$	435
406	-H	$-CH_2CH_2C(CH_3)_3$	468
407	-H	$-CH\ (C_2H_5)_2$	449
408	-H	$-CH_2CN$	566
409	-H	$-(CH_{2)3}OCH_3$	523
410	-H	$-CH_2CH_2CN$	523
411	$-(CH_2)_3N(CH_3)_2$	$-(CH_2)_3N(CH_3)_2$	481
412	$-CH_3$	$-(CH_2)_3N(C_2H_5)_2$	482
413	$-C_2H_6$	$-(CH_2)_2N(C_2H_5)_2$	523
414	-H	$-(CH_2)_2NHCOCH_3$	481
415	-H	$-(CH_2)_5OH$	495
416	-H	$-(CH_2)_2N(I\text{-}Pr)_2$	524
417	-H	$-(CH_2)_2N(CH_3)_2$	524
418	-H	$-(CH_2)_2N(C_2H_5)_2$	563
419	$-CH_3$	$-(CH_2)_2CO_2C_2H_5$	509
420	-H	$-(CH_2)_4CO_2C_2H_5$	493
421	-cyclo- C_5H_9	$-(CH_2)_2N(C_2H_{5)2}$	528
422	$-CH_3$	$-(CH_2)_2N(C_2H_5)_2$	484
423	-H	$NHCH_2CF_3$	496
424	-H	$-CH_2CF_2CF_3$	482
425	-H	$-CH_2CH(OCH_3)_2$	442
426	-H	$-(CH_2)_3OCH(CH_3)_2$	467
427	-H	$-(CH_2)_2OCH(CH_3)_2$	470
428	-H	$-CH_2CH_2F$	435
429	-H	$-CH_2CONHCH_3$	468
430	-H	$-CH_2CH_2SCH_3$	449

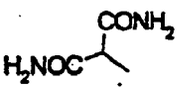
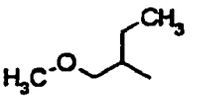
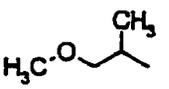
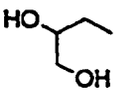
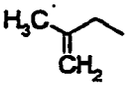
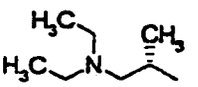
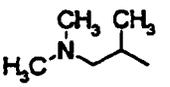
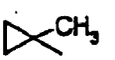
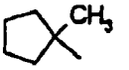
[Table 65]



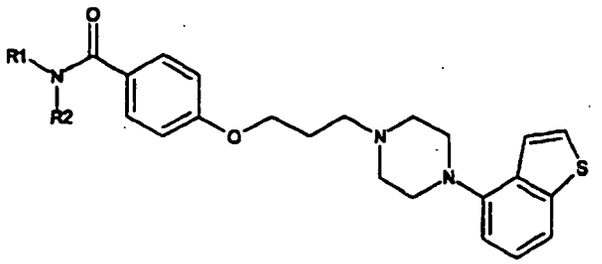
Example	R1	R2	MS (M+1)
431	-H		510
432	-H		524
434	-H		495
435	-H		496
436	-H		482
437	-H		467
438	-H		466
439	-H		480
440	-H		568
441	-H		554

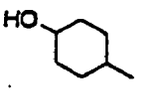
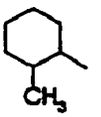
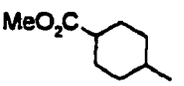
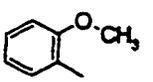
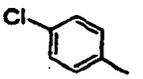
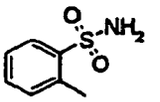
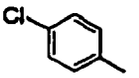
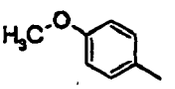
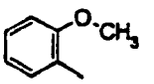
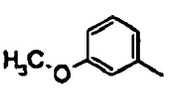
[Table 66]



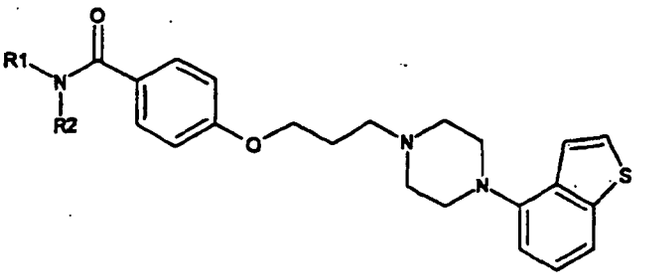
Example	R1	R2	MS (M+1)
442	-H		496
443	-H		482
444	-H		468
445	-H		470
446	-H		450
447	-H		509
448	-H		481
449	-H		450
450	-H		478

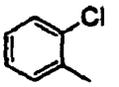
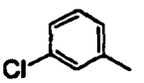
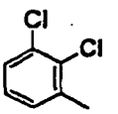
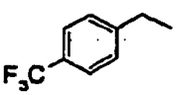
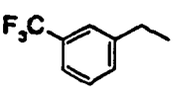
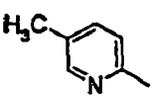
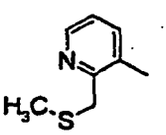
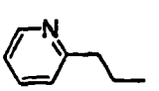
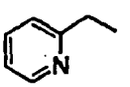
[Table 67]



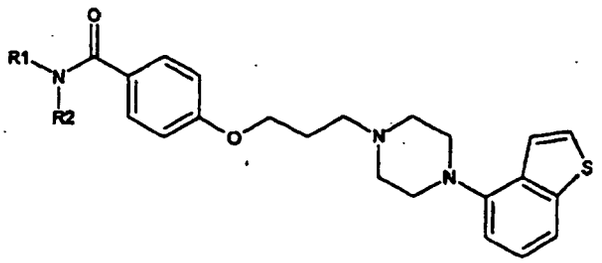
Example	R1	R2	MS (M+1)
451	-H		494
452	-H		492
453	-H		536
454	-CH_3		516
455	-CH_3		520
456	-H		551
457	-H		506
458	-H		502
459	-H		502
460	-H		502

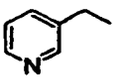
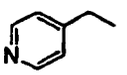
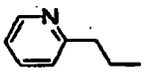
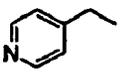
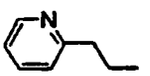
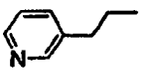
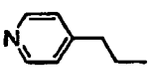
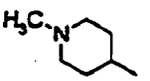
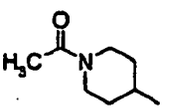
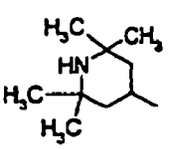
[Table 68]



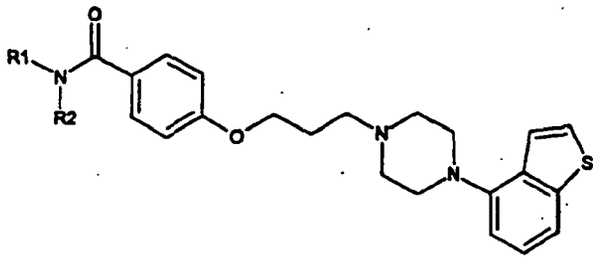
Example	R1	R2	MS (M+1)
461	-H		508
462	-H		506
463	-H		540
464	-H		554
465	-H		554
466	-H		487
467	-H		533
468	-CH_3		515
469	-H		487

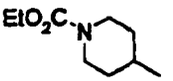
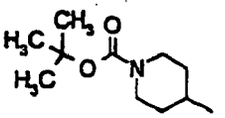
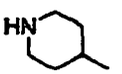
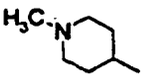
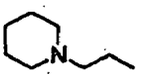
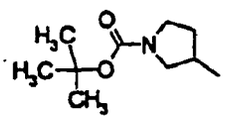
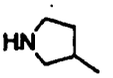
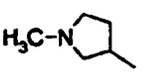
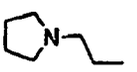
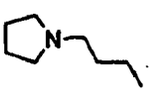
[Table 69]



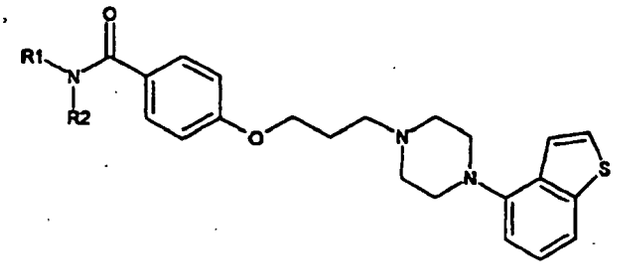
Example	R1	R2	MS (M+1)
470	-H		487
471	-H		487
472	-C_2H_5		529
473	-C_2H_5		515
474	-H		501
475	-H		501
476	-H		501
477	-CH_3		507
478	-CH_3		535
479	-H		535

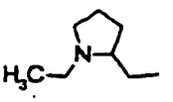
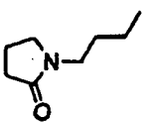
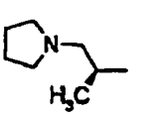
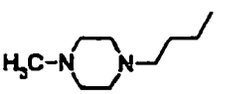
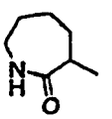
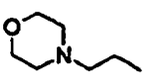
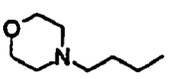
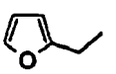
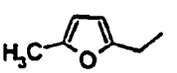
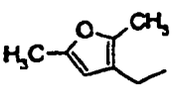
[Table 70]



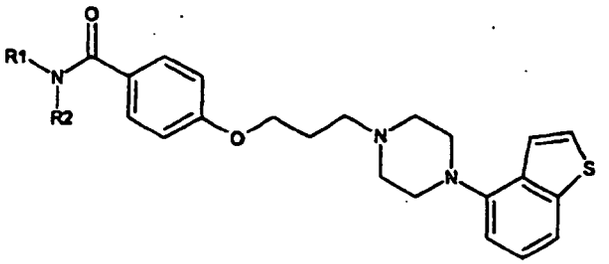
Example	R1	R2	MS (M+1)
480	-H		551
481	-H		579
482	-H		479
483	-H		493
484	-H		507
485	-H		565
486	-H		465
487	-H		479
488	-H		493
489	-H		507

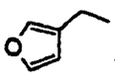
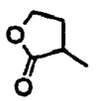
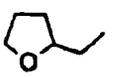
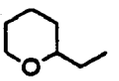
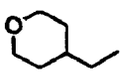
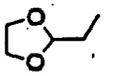
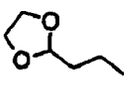
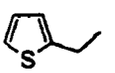
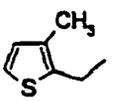
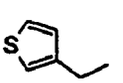
[Table 71]



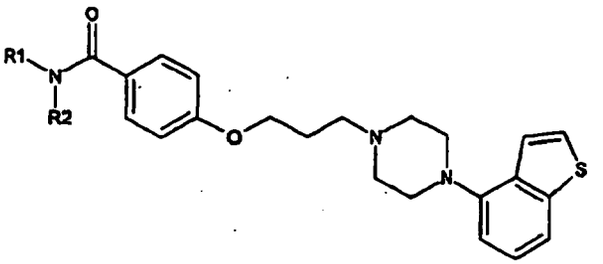
Example	R1	R2	MS (M+1)
490	-H		507
491	-H		521
492	-H		507
493	-H		536
494	-H		507
495	-H		509
496	-H		523
497	-H		476
498	-H		490
499	-H		504

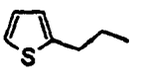
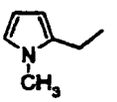
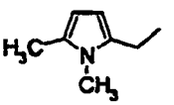
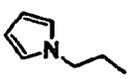
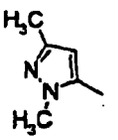
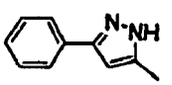
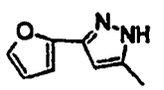
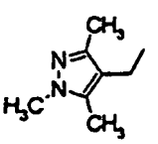
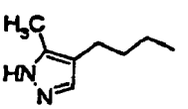
[Table 72]



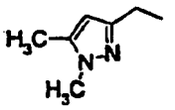
Example	R1	R2	MS (M+1)
500	-H		476
501	-H		480
502	-H		480
503	-C_2H_5		522
504	-H		494
505	-H		482
506	-H		496
507	-H		492
508	-H		506
509	-H		492

[Table 73]

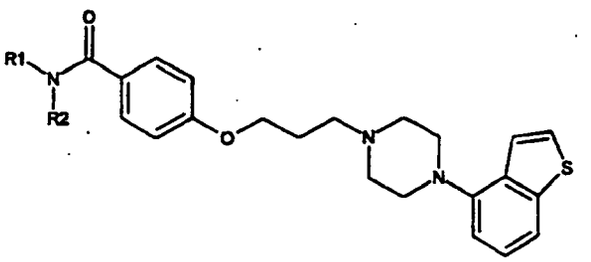


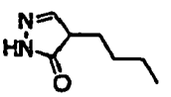
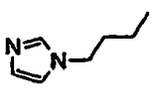
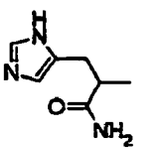
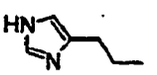
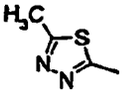
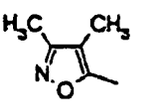
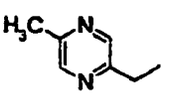
Example	R1	R2	MS (M+1)
510	-H		508
511	-H		489
512	-H		503
513	-H		489
514	-H		490
515	-H		538
516	-H		528
517	-H		518
518	-H		518

(continued)

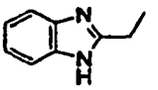
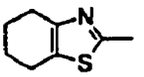
Example	R1	R2	MS (M+1)
519	-H		504

[Table 74]

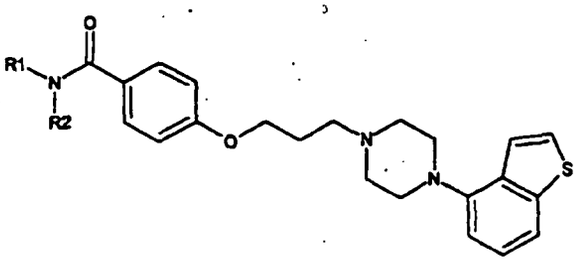


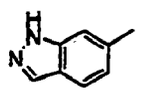
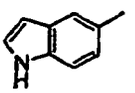
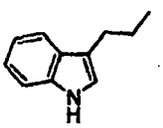
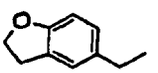
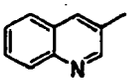
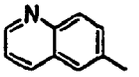
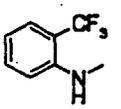
Example	R1	R2	MS (M+1)
520	-H		520
521	-H		504
522	-H		533
523	-H		490
524	-H		479
525	-H		494
526	-H		491
527	-H		502

(continued)

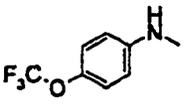
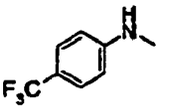
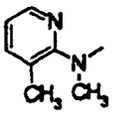
Example	R1	R2	MS (M+1)
528	-H		528
529	-H		533

[Table 75]

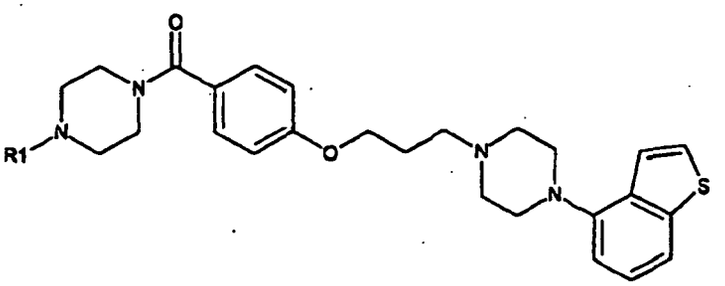


Example	R1	R2	MS (M+1)
530	R1		512
531	-H		511
532	-H		539
533	-H		528
534	-H		523
535	-H		523
536	-H		555

(continued)

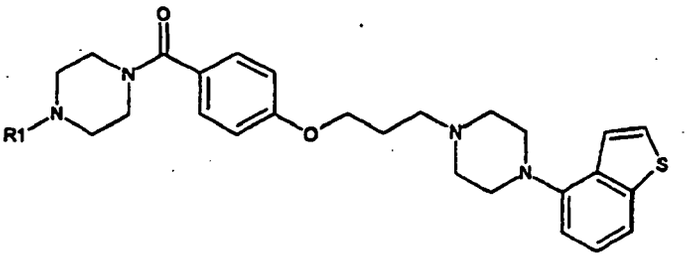
Example	R1	R2	MS (M+1)
537	-H		571
538	-H		555
539	-H		570

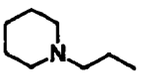
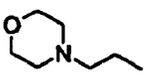
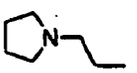
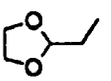
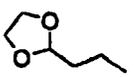
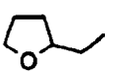
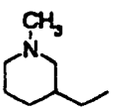
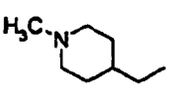
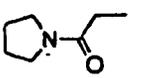
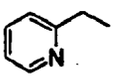
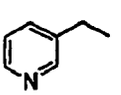
[Table 76]



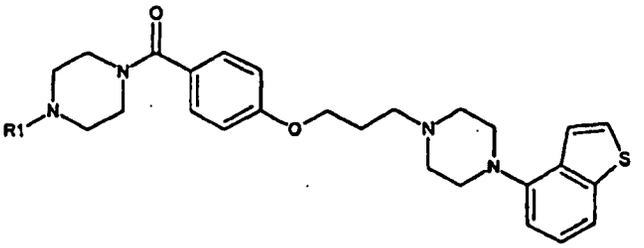
Example	R1	MS (M+1)
540	-H	465
541	$-C_4H_8$	521
542	$-CH(C_2H_5)_2$	535
543	$-CH(CH_3)_2$	507
544	$-C(CH_3)_2$	535
545	$-C_3H_7$	507
546	$-C_2H_5$	493
547	$-C_6H_{13}$	549
548	-cyclo- C_5H_9	533
549	-cyclo- C_7H_{13}	561
550	$-CH_2CH_2OH$	509
551	$-CH_2CH_2OC_3$	523
552	$-(CH_2)_3OCH_3$	537
553	$-(CH_2)_4OCH_3$	551
554	$-CO_2C_2H_5$	537
555	$-CO_2C(CH_3)_3$	565
556	$-COCH_3$	507
557	$-(CH_2)_3N(CH_3)_2$	550
558	$-CH_2CH_2N(CH_3)_2$	536

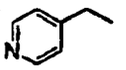
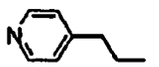
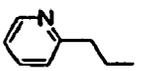
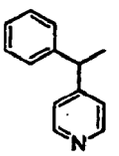
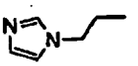
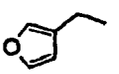
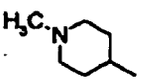
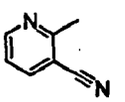
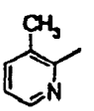
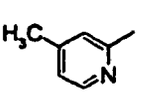
[Table 77]



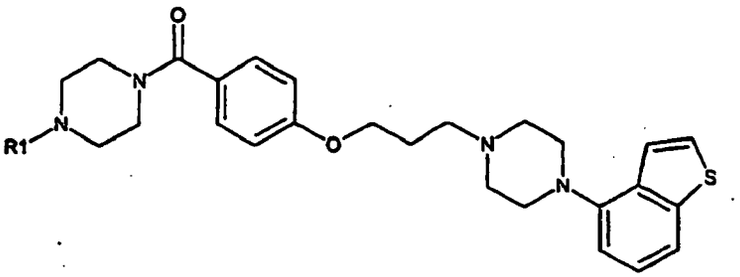
Example	R1	MS (M+1)
559		576
560		578
561		562
562		551
563		565
564		549
565		576
566		576
567		576
568		556
569		556

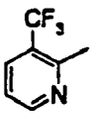
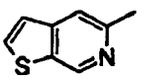
[Table 78]



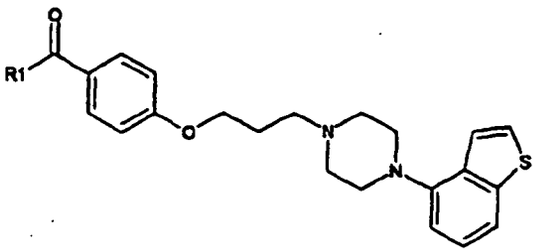
Example	R1	MS (M+1)
570		556
571		570
572		570
573		632
574		559
575		545
576		561
577	-4-PYRIDYL	542
578	-3-PYRIDYL	542
575	-2-PYRIDYL	542
580		567
581		556
582		556

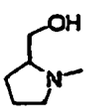
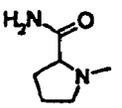
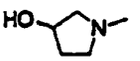
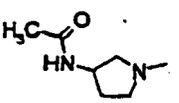
[Table 79]



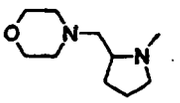
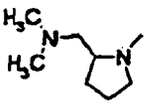
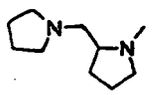
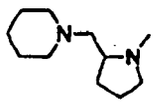
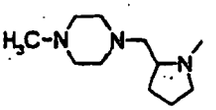
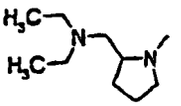
Example	R1	MS (M+1)
583		610
584		598

[Table 80]

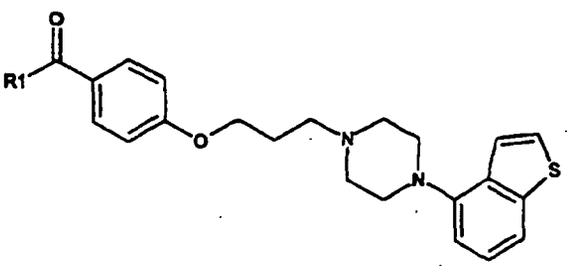


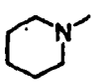
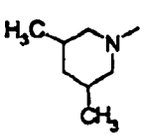
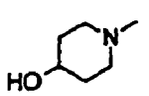
Example	R1	MS (M+1)
585		450
586		480
587		493
588		466
589		507

(continued)

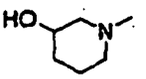
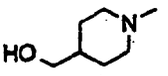
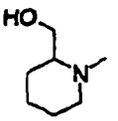
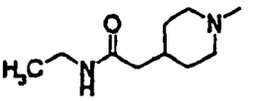
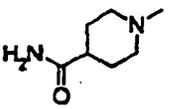
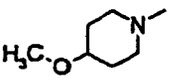
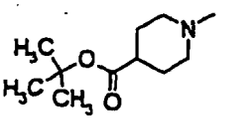
Example	R1	MS (M+1)
590		549
591		507
592		533
593		547
594		562
595		535

[Table 81]

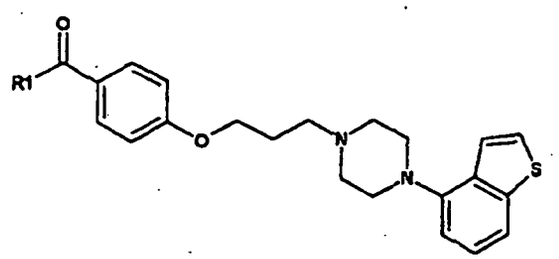


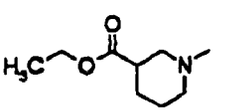
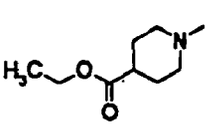
Example	R1	MS (M+1)
596		464
597		492
598		480

(continued)

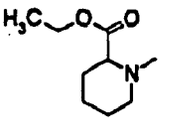
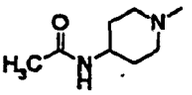
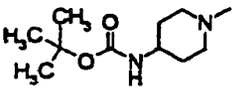
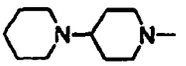
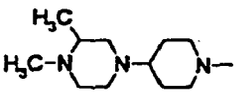
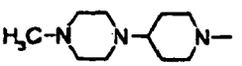
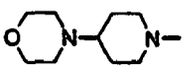
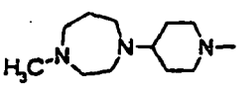
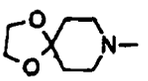
Example	R1	MS (M+1)
599		480
600		494
601		494
602		549
603		507
604		494
605		564

[Table 82]

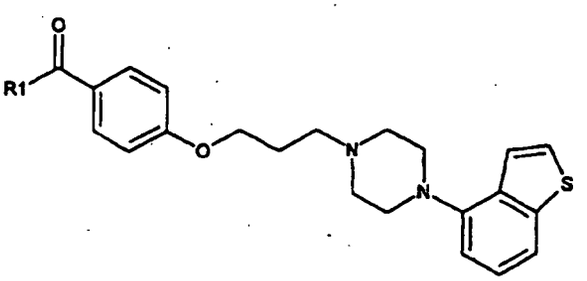


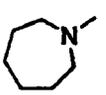
Example	R1	MS (M+1)
606		536
607		536

(continued)

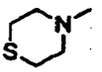
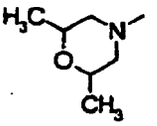
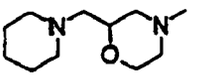
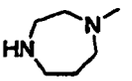
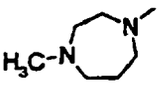
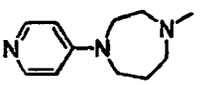
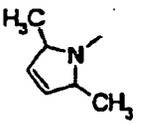
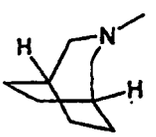
Example	R1	MS (M+1)
608		536
609		521
610		578
611		547
612		576
613		562
614		549
615		576
616		522

[Tablet 83]

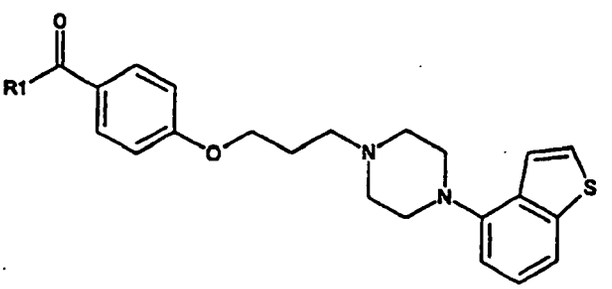


Example	R1	MS (M+1)
617		478

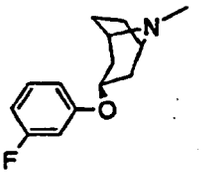
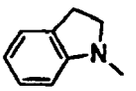
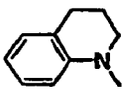
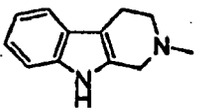
(continued)

Example	R1	MS (M+1)
618		482
619		494
620		563
621		479
622		493
623		556
624		476
625		468
626		504

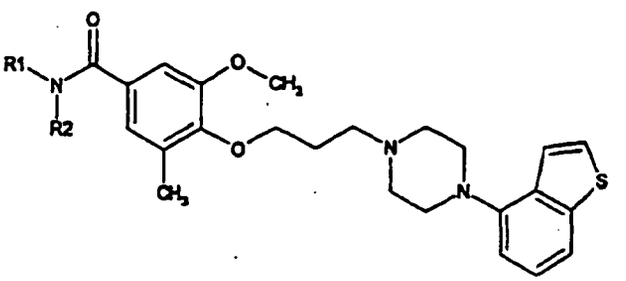
[Table 84]



(continued)

Example	R1	MS (M+1)
627		600
628		498
629		512
630		551

[Table 85]

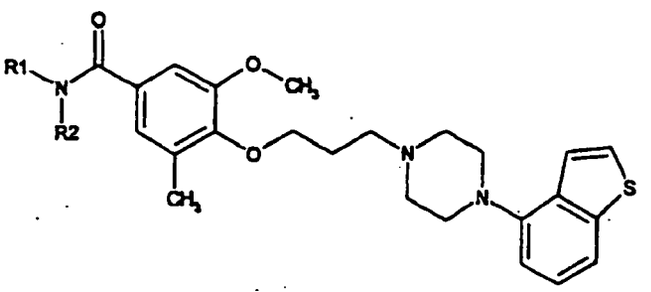


Example	R1	R2	MS (M+1)
631	-H	-cyclo- C_6H_{11}	522
632	-H	-CH $(CH_3)_2$	482
633	-H	$-C_4H_9$	496
634	-H	-cyclo- C_3H_5	480
635	-H	-cyclo- C_7H_{13}	536
636	-H	$-CH_2C_6H_5$	530
637	-H	$-C_3H_7$	482
638	-H	$-CH_2CH(CH_3)_2$	496
639	-H	$-CH_2CH_2OCH_3$	498
640	-H	$-CH_2CH_2OC_2H_5$	512
641	-H	$-(CH_2)_3OC_2H_5$	526
642	-H	-1-CH_3-CYCLOHEXYL	536
643	-H	$-(CH_2)_2OC_6H_5$	560
644	-H	-cyclo- C_5H_9	508
645	-H	$-CH_2$-cyclo- C_3H_5	494
646	-H	$-CH_2$-cyclo- C_6H_{11}	536
647	-H	$-CH(CH_3)C_6H_5$	544

(continued)

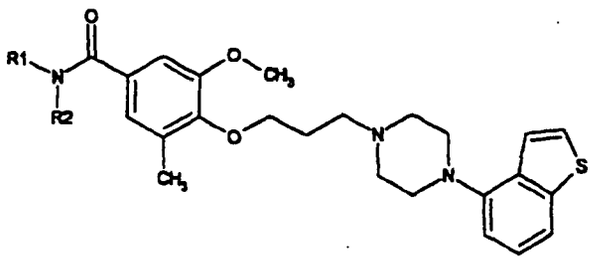
Example	R1	R2	MS (M+1)
648	-H	$-(CH_2)_2C_6H_5$	544
649	-H	$-CH_2CO_2CH_3$	512
650	-H	$-CH_2CONH_2$	497
651	-H	$-CH_2CCH$	478
652	-H	$-(CH_2)_2CH(CH_3)_2$	510
653	-H	$-CH(CH_3)C(CH_3)_3$	524
654	-H	$-CH_2C(CH_3)_3$	510
655	$-CH_3$	-cyclo- C_6H_{11}	536
656	$-C_2H_5$	$-C_2H_5$	496
657	-H	$-C(CH_3)_3$	496
658	$-CH_3$	$-CH_2C_8H_5$	544
659	$-C_2H_5$	$-CH(CH_3)_2$	510
660	$-CH_3$	$-CH_2CO_2CH_3$	526
661	$-CH_3$	$-CH(CH_3)_2$	496
662	$-CH_3$	$-CH_2$-cyclo- C_3H_5	508
663	-H	CH_2CF_3	522
664	-H	$-CH(C_2H_5)_2$	510

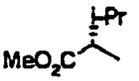
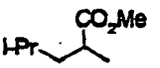
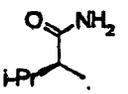
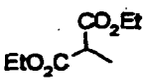
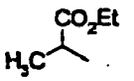
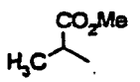
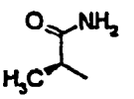
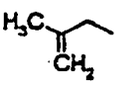
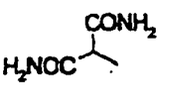
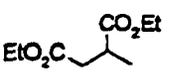
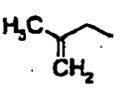
[Table 86]



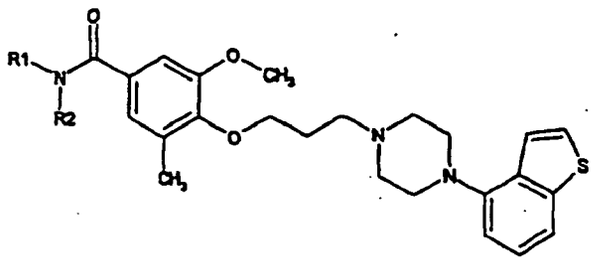
Example	R1	R2	MS (M+1)
665	-H	$-(CH_2)_3OCH_3$	512
666	-H	$-CH_2CH_2OH$	484
667	-H	$-CH_2CN$	479
668	$-C_2H_5$	-2-PYRIDYL	545
669	-H	-3-PYRIDYL	517
670	-H	$-C_6H_5$	516
671	-H	$-(CH_2)_2NHCOCH_3$	525
672	-H	$-CH_2CH(C_2H_5)_2$	524
673	-H	$-CH_2CH(OCH_3)_2$	528
674	-H	$-(CH_2)3OCH(CH_3)_2$	540
675	-H	$-(CH_2)_2OCH(CH_3)_2$	526
676	-H	$-CH_2CH_2F$	486
677	-H	$-CH_2CONHCH_3$	511
678	-H	$-CH_2CH_2SCH_3$	514
679	-H	$-CH_2CHF_2$	504

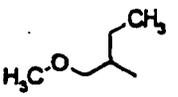
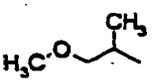
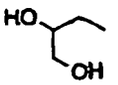
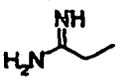
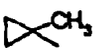
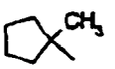
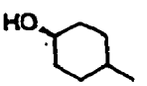
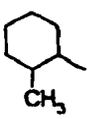
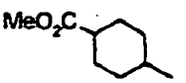
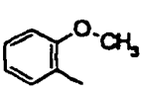
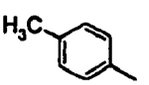
[Table 87]



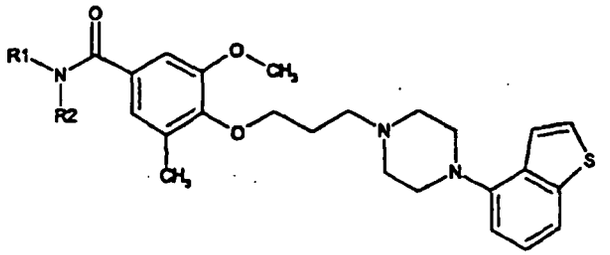
Example	R1		MS (M+1)
680	-H		554
681	-H		568
682	-H		539
683	-H		598
684	-H		540
685	-H		526
686	-H		511
687	-H		494
688	-H		540
689	-H		612
690	-C_2H_5		522

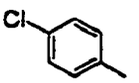
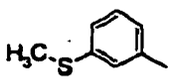
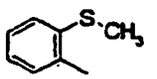
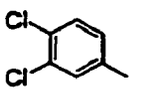
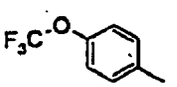
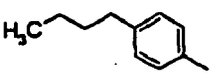
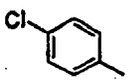
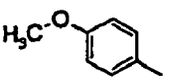
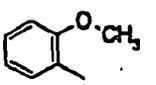
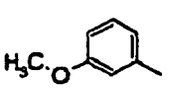
[Table 88]



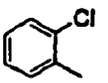
Example	R1	R2	MS (M+1)
691	-H		526
692	-H		512
693	-H		514
694	-H		496
695	-H		494
696	-H		522
697	-H		538
698	-H		536
699	-H		580
700	-CH_3		560
701	-CH_3		544

[Table 89]

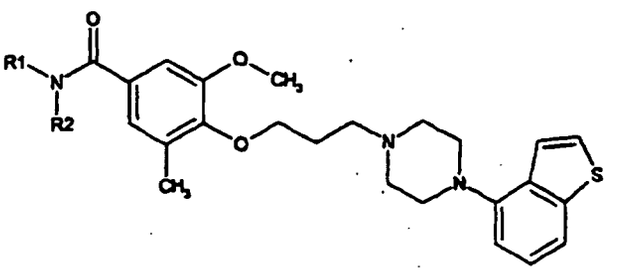


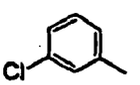
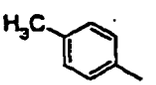
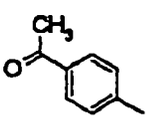
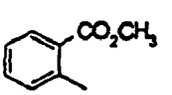
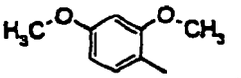
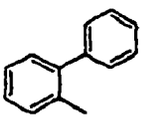
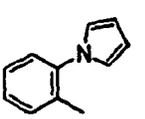
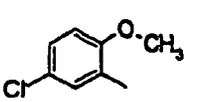
Example	R1	R2	MS (M+1)
702	-CH_3		564
703	-H		562
704	-H		562
705	-H		584
706	-H		600
707	-H		572
708	-H		550
709	-H		546
710	-H		546
711	-H		546

(continued)

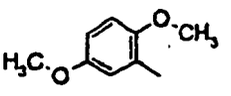
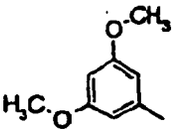
Example	R1	R2	MS (M+1)
712	-H		550

[Table 90]

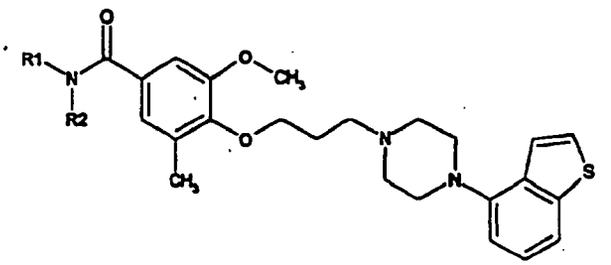


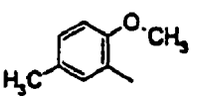
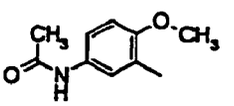
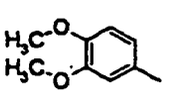
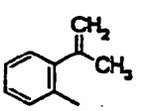
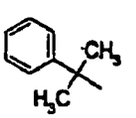
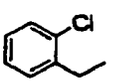
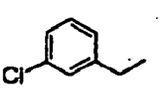
Example	R1	R2	MS (M+1)
713	-H		550
714	-H		530
715	-H		558
716	-H		574
717	-H		576
718	-H		592
719	-H		581
720	-H		580

(continued)

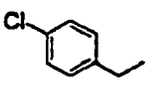
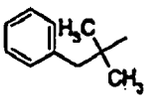
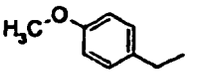
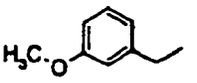
Example	R1	R2	MS (M+1)
721	-H		576
722	-H		576

[Table 91]

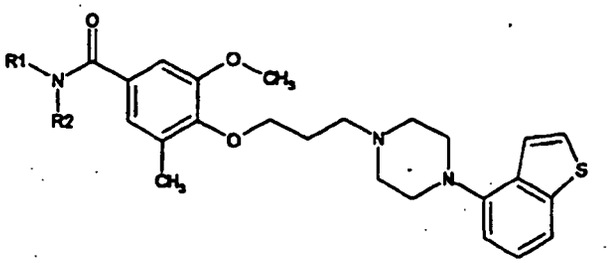


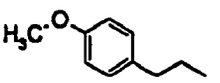
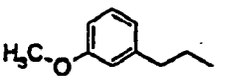
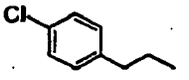
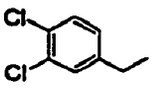
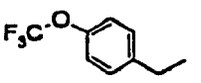
Example	R1	R2	MS (M+1)
723	-H		560
724	-H		603
725	-H		576
726	-H		556
727	-H		558
728	-H		564
729	-H		564

(continued)

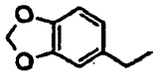
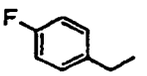
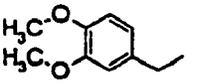
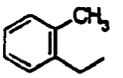
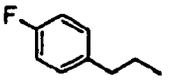
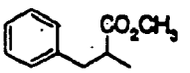
Example	R1	R2	MS (M+1)
730	-H		564
731	-H		572
732	-H		560
733	-H		560

[Table 92]

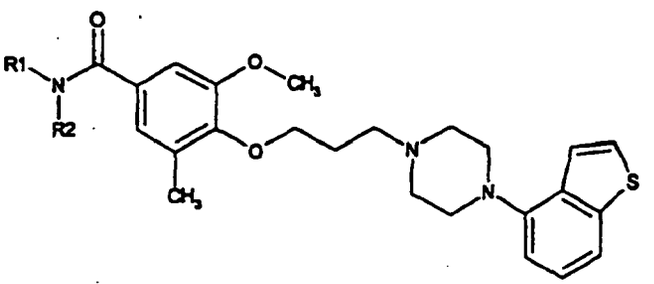


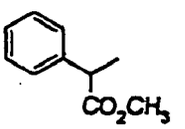
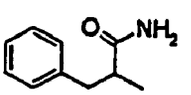
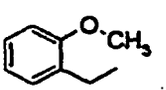
Example	R1	R2	MS (M+1)
734	-H		574
735	-H		574
736	-H		578
737	-H		598
738	-H		614

(continued)

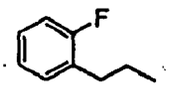
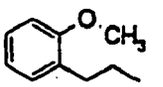
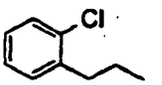
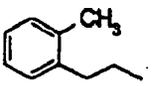
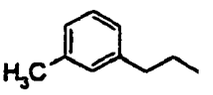
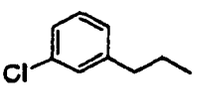
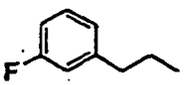
Example	R1	R2	MS (M+1)
739	-H		574
740	-H		548
741	-H		590
742	-H		544
743	-H		562
744	-H		602

[Table 93]

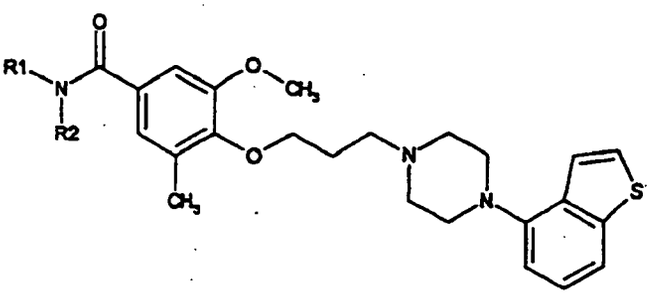


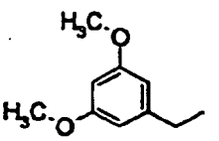
Example	R1	R2	MS (M+1)
745	-H		588
746	-H		587
747	-H		560

(continued)

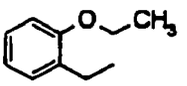
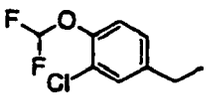
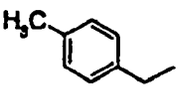
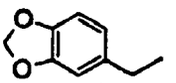
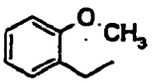
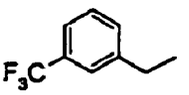
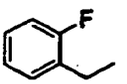
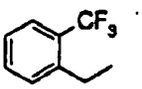
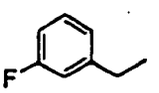
Example	R1	R2	MS (M+1)
748	-H		562
745	-H		574
750	-H		578
751	-H		558
752	-H		558
753	-H		578
754	-H		562

[Table 94]

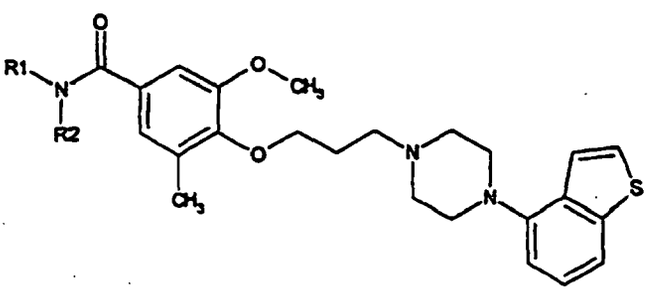


Example	R1	R2	MS (M+1)
755	-H		590

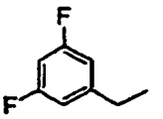
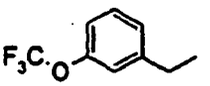
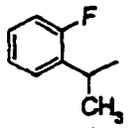
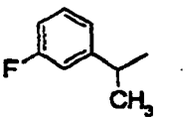
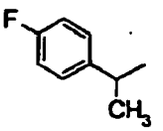
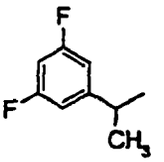
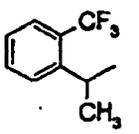
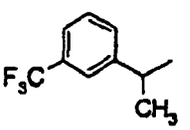
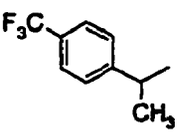
(continued)

Example	R1	R2	MS (M+1)
756	-H		574
757	-H		830
758	-CH_3		558
759	-CH_3		588
760	-CH_3		574
761	-H		598
762	-H		548
763	-H		598
764	-H		548

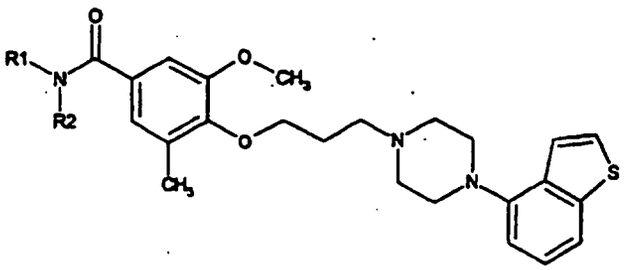
[Table 95]

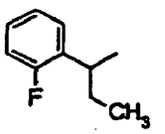
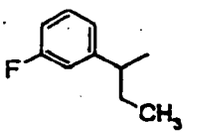
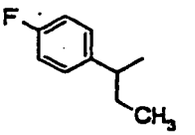
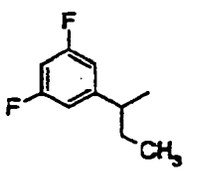
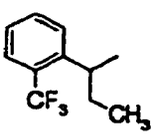
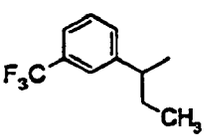
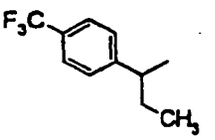
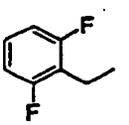


(continued)

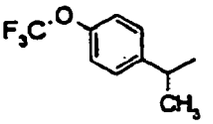
Example	R1	R2	MS (M+1)
765	-H		566
766	-H		614
767	-H		562
768	-H		562
769	-H		562
770	-H		580
771	-H		612
772	-H		612
773	-H		612

[Table 96]

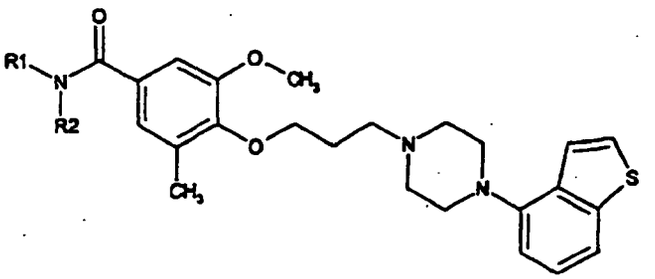


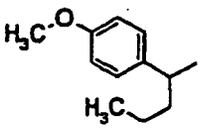
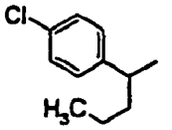
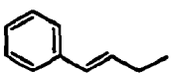
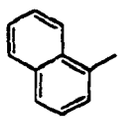
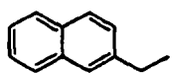
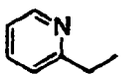
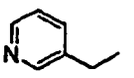
Example	R1	R2	MS (M+1)
774	-H		576
775	-H		576
776	-H		576
777	-H		594
778	-H		626
779	-H		626
780	-H		626
781	-H		566

(continued)

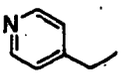
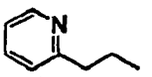
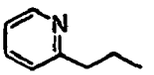
Example	R1	R2	MS (M+1)
782	-H		628

[Table 97]

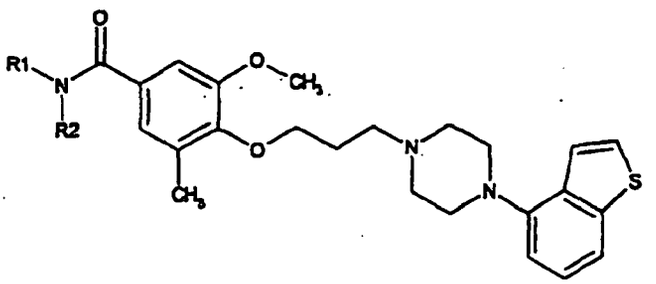


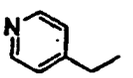
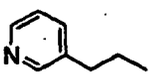
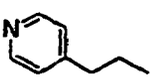
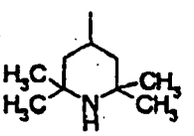
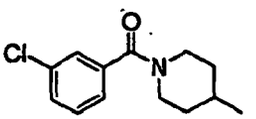
Example	R1	R2	MS (M+1)
783	-H		602
784	-H		606
785	$-C_2H_5$		584
786	-H		566
787	-H		580
788	-H		531
789	-H		531

(continued)

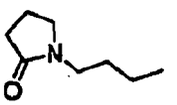
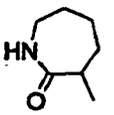
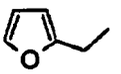
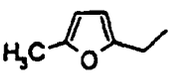
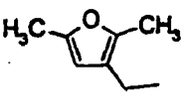
Example	R1	R2	MS (M+1)
790	-H		531
791	-H		545
792	-C_2H_5		573

[Table 98]

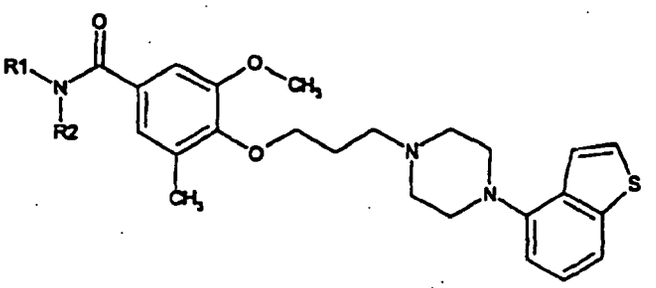


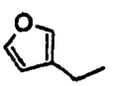
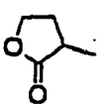
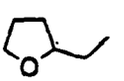
Example	R1	R2	MS (M+1)
793	-C_2H_8		559
794	-H		545
795	-H		545
796	-H		579
797	-CH_3		675

(continued)

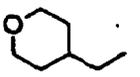
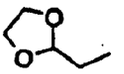
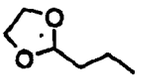
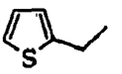
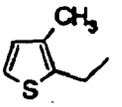
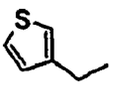
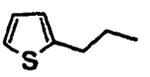
Example	R1	R2	MS (M+1)
798	-H		565
799	-H		551
800	-H		520
801	-H		534
802	-H		548

[Table 99]

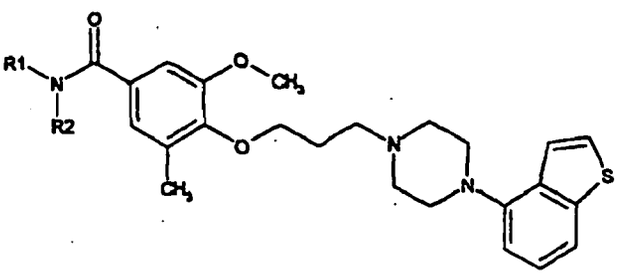


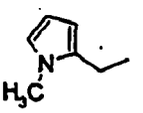
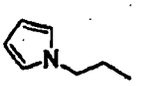
Example	R1	R2	MS (M+1)
803	-H		520
804	-H		524
805	-H		524

(continued)

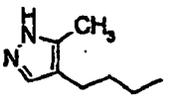
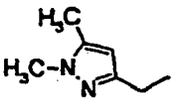
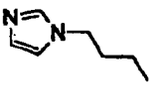
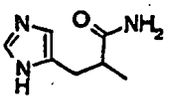
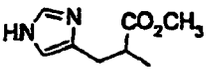
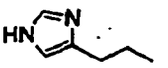
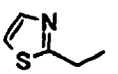
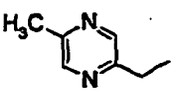
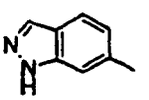
Example	R1	R2	MS (M+1)
806	-H		538
807	-H		526
808	-H		540
809	-H		536
810	-H		550
811	-H		536
812	-H		550

[Table 100]

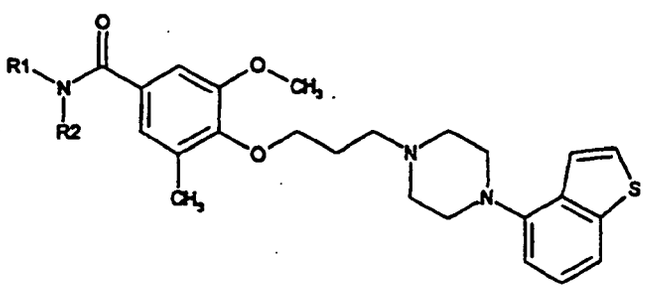


Example	R1	R2	MS (M+1)
813	-H		533
814	-H		533

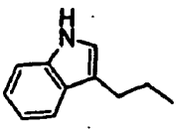
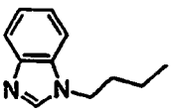
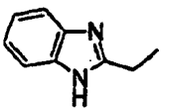
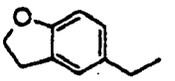
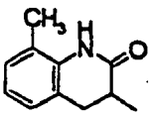
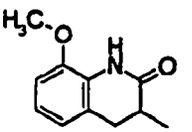
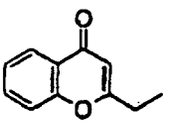
(continued)

Example	R1	R2	MS (M+1)
815	-H		562
816	-H		548
817	-H		548
818	-H		577
819	-H		592
820	-H		534
821	-H		537
822	-H		546
823	-H		556

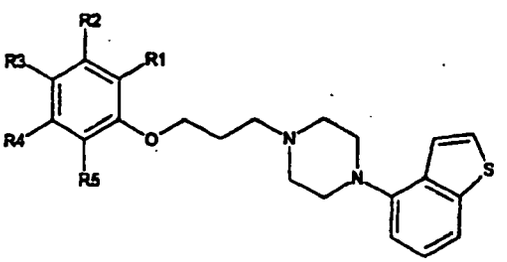
[Table 101]



(continued)

Example	R1	R2	MS (M+1)
824	-H		583
825	-H		598
826	-H		570
827	-H		572
828	-H		599
829	-H		615
830	-H		598

[Table 102]

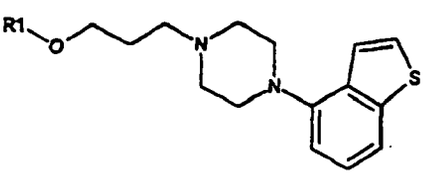


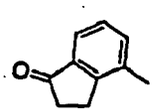
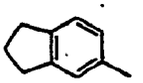
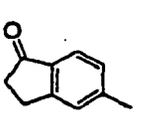
Example	R1	R2	R3	R4	R5	MS (M+1)
831	-H	-H	$-NHCOCH_3$	-H	-H	410
832	-H	$-NHCOCH_3$	-H	-H	-H	410
833	-H	-H	$-OCH_3$	-H	-H	383
834	-H	-H	-Cl	-H	-H	387
835	-H	-H	$-CH_6$	-H	-H	367
836	-H	-H	$-CF_3$	-H	-H	421

(continued)

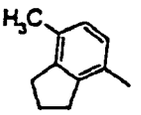
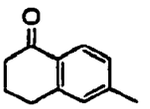
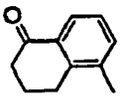
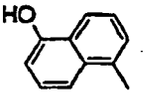
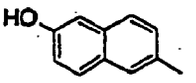
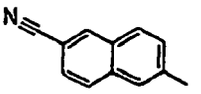
Example	R1	R2	R3	R4	R5	MS (M+1)
837	-H	-H	$-OCF_3$	-H	-H	437
838	-H	-H	$-SCH_3$	-H	-H	399
839	-H	-H	C_6H_5	-H	-H	429
840	-H	-H	$-OCH_2C_6H_5$	-H	-H	459
841	-H	-H	$-NO_2$	-H	-H	398
842	-H	-H	$-COCH_3$	-H	-H	395
843	$-OCH_3$	$-OCH_3$	-H	-H	-H	413
844	$-OCH_3$	-H	-H	-H	$-OCH_3$	413
845	-H	$-OCH_3$	$-OCH_3$	-H	-H	413
846	-H	$-CH_3$	-H	-H	-H	367
847	$-CH_3$	-H	-H	-H	$-CH_3$	381
848	-F	-H	-H	-H	-H	371
849	-H	-F	-H	-H	-H	371
850	-H	-H	-F	-H	-H	371
851	-F	-H	-F	-H	-H	389
852	-H	-F	-H	-H	-H -F	389
853	-F	-H	-H	-H	-F	389
854	-F	-H	-H	$-CH_3$	-H	385
855	-H	-H	$-CH_2CO_2CH_3$	-H	-H	425
856	$-CH_3$	-H	$-COCH_3$	-H	-H	409
857	-H	$-OC_6H_5$	-H	-H	-H	445
858		-H	-H	-H	-H	420
859	-H	-H		-H	-H	419

[Table 103]

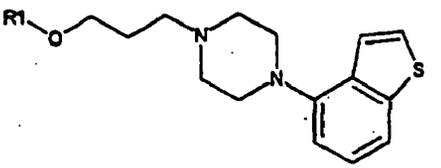


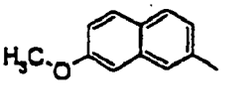
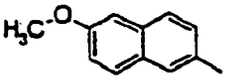
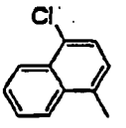
Example	R1	MS (M+1)
860		407
861		393
862		407

(continued)

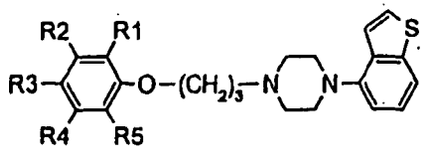
Example	R1	MS (M+1)
863		407
864		421
865		421
866		419
867		419
868		428

[Table 104]



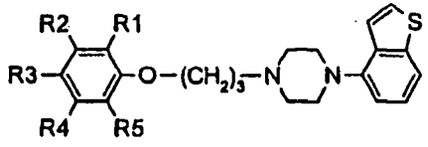
Example	R1	MS (M+1)
869		433
870		433
871		437

[Table 105]



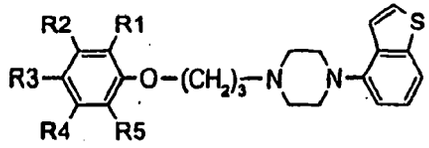
Example	R1	R2	R3	R4	R5	Crystal form (Recrystalization solvent)	Melting point (˚C)	salt
872	$-OCH_3$	-H	$-NHSO_2C_2H_5$	-H	$-CH_3$	White powder (Ethyl acetate)	235.5-237.5	Hydrochloride
873	$-CH_3$	-H	$-CONHCH_3$	-H	-OH	White powder (Ethyl acetate)	246.5 (dec)	Hydrochloride
874	$-CH_3$	-H	-Br	-H	$-OCH_3$	White powder (Ethanol/ethyl acetate)	265.0 (dec)	Hydrochloride
875	$-OCH_3$	-H	$-NHCOCH_2NHCO_2C(CH_3)_3$	-H	$-CH_3$	White powder (Ethyl acetate/ isopropyl ether)	140.5-142.5	-
876	$-CH_3$	-H	$-NHCOCH_2NH_2$	-H	$-OCH_3$	White powder (Methanol/water)	268.0 (dec)	Dihydrochloride
877	$-OCH_3$	-H	$-NHCOCH_2NHCOCH_3$	-H	$-CH_3$	White powder (Ethyl acetate)/ isopropyl ether)	167.5-170.5	-
878	$-OCH_3$	-H	$-NHCOCH_2NHCO_22H_3$	-H	$-CH_3$	White powder (Ethyl acetate)/ Isopropyl ether)	157.0-159.5	-
879	$-CH_3$	-H	$-NHCOCH_2NHCHO$	-H	$-OCH_3$	White powder (Dichloromethane/water)	235.5 (dec)	Hydrochloride

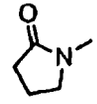
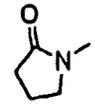
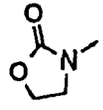
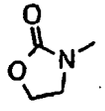
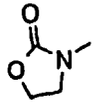
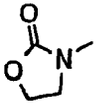
[Table 106]



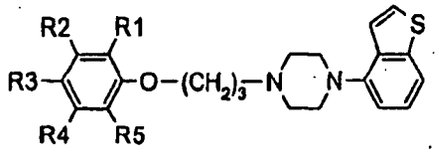
Example	R1	R2	R3	R4	R5	Crystal form (Recrystalization solvent)	Melting point (˚C)	salt
880	$-CH_3$	-H	$-CONHCH_3$	-H	$-O(CH_2)_2N(CH_3)_2$	White powder (Ethyl acetate)	235.5-240.5 (dec)	Dihydrochloride
881	$-CH_3$	-H	$-CONHCH_3$	-H	$-O(CH_2)_2OH_3$,	White powder (isopropyl alcohol/ isopropyl ether)	194.0-197.5	Hydrochloride
882	$-CH_3$	-H	$-CONHCH_3$	-H	$-OCH_2CF_3$	Light yellow powder (Ethyl acetate)/ Isopropyl ether)	156.0-157.5	Hydrochloride

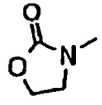
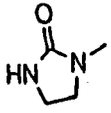
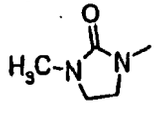
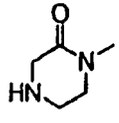
[Table 107]



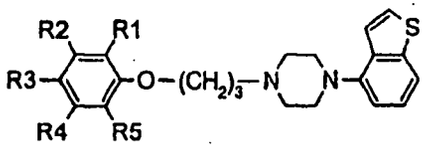
Example	R1	R2	R3	R4	R5	Crystal form (Recrystalization solvent)	Melting point (˚C)	Salt
883	-H	-H		-H	-H	White powder (Ethyl acetate/ isopropyl ether)	114.0-115.5	-
884	$-OCH_3$	-H		-H	$-CH_3$	Whitepowder (Ethanol/ ethyl acetate)	245.0 (dec)	Hydrochloride
885	-H	-H		-H	-H	White powder (Ethyl acetate)	217.0-224.5 (dec)	Hydrochloride
886	$-OCH_3$	-H		-H	-CHO	White powder (Ethanol)	218.0 (dec)	Hydrochloride
887	$-CCH_3$	-H		-H	$-CH_2OH$	White powder (Ethanol)	224.0-226.5 (dec)	Hydrochloride
888	$-OCH_3$	-H		-H	$-CH_2OCH_3$	White powder (methanol)	224.0-226.0	Hydrochloride

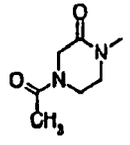
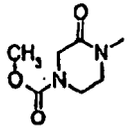
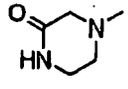
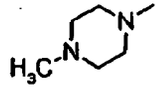
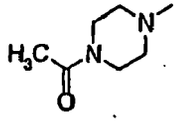
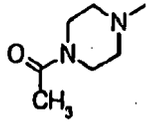
[Table 108]



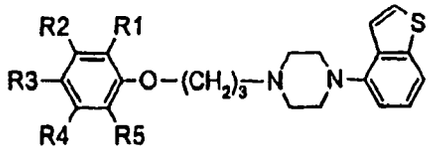
Example	R1	R2	R3	R4	R5	Crystal form (Recrystalization solvent)	Melting point (°C)	Salt
889	$-OCH_3$	-H		-H	$-CH_2(CH_3)_2$	White powder (Ethanol/other)	151.0-152.0	Difumarate
890	$-OCH_3$	-H		-H	$-CH_3$	Light yellow powder (Ethanol/water)	264.0 (dec)	Hydrochloride
891	$-OCH_3$	-H		-H	$-CH_3$	Light yellow powder (Ethyl acetate/ Isopropyl ether)	143.5-151.0	-
892	$-OCH_3$	-H		-H	$-CH_3$	White powder (Ethyl acetate)	246.5-249.0 (dec)	Hydrochloride
893	$-OCH_3$	-H		-H	$-CH_3$	Light yellow powder (Ethyl acetate)	234.0-240.0 (dec)	Dihydrochloride
894	$-OCH_3$	-H		-H	$-CH_3$	White powder (Methenol/weter)	288.5 (dec)	Dihydrochloride

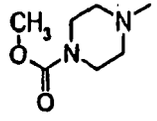
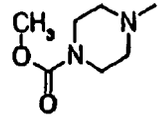
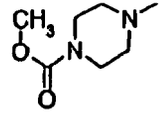
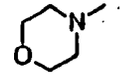
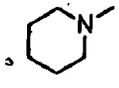
[Table 109]



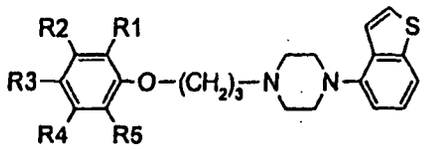
Example	R1	R2	R3	R4	R5	Crystal form (Recrystalization solvent)	Melting point (˚C)	Salt
895	$-OCH_3$	-H		-H	$-CH_3$	White powder (Ethanol/water)	218.0-221.5	Hydrochloride
896	$-OCH_3$	-H		-H	$-CH_3$	White powder (Ethanol/ethyl acetate)	223.0-228.0	Hydrochloride
897	$-OCH_3$	-H		-H	$-CH_3$	White powder (Ethyl acetate/ isopropyl ether)	139. 5-142.	-
898	$-OCH_3$	-H		-H	$-CH_3$	White powder (Ethyl acetate)	270. 0 (dec)	Trihydrochloride
899	$-OCll_3$	-H		-H	$-CH_3$	White powder (Ethyl acetate)	257.0-261.0 0 (dec)	Hydrochloride
900	$-OCH_3$	-H		-H	$-CH_2OH$	White powder (Ethyl acetate)	217.5-221.0 0	Hydrochloride

[Table 110]



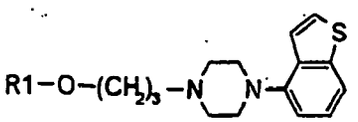
Example	R1	R2	R3	R4	R5	Crystal form (Recrystalization solvent)	Melting point (˚C)	Salt
901	-OCH_3	-H		-H	-CH_3	White powder (Ethyl acetate)	250. 0 (dec)	Hydrochloride
902	-OCH_3	-H		-H	-CHO	Light yellow powder (Ethyl acetate)	225. 0 (dec)	Hydrochloride
903	-OCH_3	-H		-H	-CH_2OH	White powder (Ethyl acetate/ isopropyl ether)	128.0-130.0	-
904	-OCH_3	-H		-H	-CH_3	White powder. (Ethyl acetate)	246.0 (dec)	Hydrochloride
905	-OCH_3	-H		-H	-CH_3	White powder (Ethyl acetate).	248.0-251.0 (dec)	Dihydrochloride

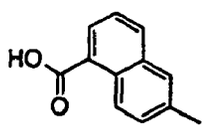
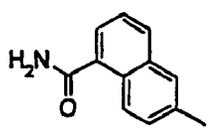
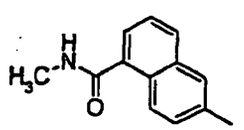
[Table 111]



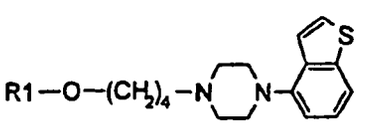
Example	R1	R2	R3	R4	R5	NMR	Salt
906	$-NH_2$	-H	$-CONHC_2H_5$	-H	-H	^{1}H-NMR ($COCl_3$) δ ppm: 1.23 (3H, t, J=7.4 Hz), 2.00-2.15 (2H, m), 2.67 (2H, t, J=7.3 Hz) , 2.75 (4H, brs), 3.21 (4H. brs). 3.40-3.50 (2H. m), 3.50-4.30 (2H, br), 4.13 (2H, t, J=6.5 Ht), 6.99 (1H, brs), 6.80 (1H, d, J=8.4 Hz), 6.90 (1H, d, J=7.8 Hz). 7.08 (1H, dd, J=2.1, 8.3 Hz). 1.19 (1H, d, J=2.1 Hz), 7.25-7.30 (1H, m), 7.35-7.45 (2H, m), 7.55 (1H, d, J=8.0 Hz).	-

[Table 112]

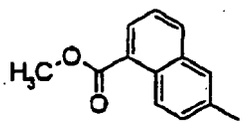
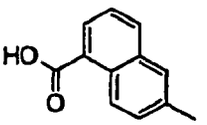
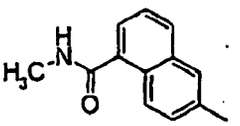
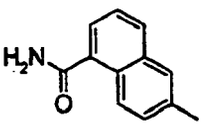


Example	R1	Crystal form (Recrystalization solvent)	Melting point Melting point (˚C)	Salt
907		White powder (water)	203.0-210.0	-
908		White powder (Ethyl-acetate/ isopropyl ether)	167.0-169.0	-
909		White powder (Ethyl acetate)	138. 0-140.0	-

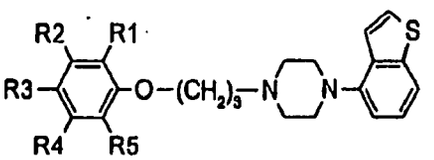
[Table 113]



(continued)

Example.	R1	Crystal form (Recrystalization solvent)	Melting point (°C)	Salt
910		White powder (Ethyl acetate/ isopropyl ether)	96.5-97.0	-
911		White powder, (acetic acid)	254.0 (dec)	Dihydrochloride
912		White powder (Ethyl acetate/ isopropyl ether)	124.0-126.5	-
913		White powder (Ethanol/ethyl acetate)	181.5-183.5	-

[Table 114]

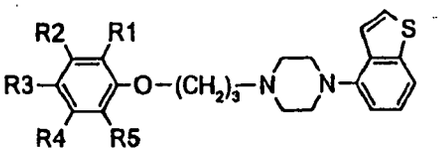


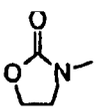
Example	R1	R2	R3	R4	R5	NMR
914	$-OCH_3$	-H	$-NHCO_2C(CH_3)$	-H	$-CH_3$	^{1}H-NNR ($CDCl_3$) δ ppm: 1.51(9H, s) , 1. 95-2. 10 (2H. m), 2.24(3H, s), 2. 66-2.81(6H, m) , 3.14-3.3)(2H, m) , 3.84(3H, s), 3.95(2H, t, J=6.3Hz) 6.36(1H, br), 6.60(1H, d, J=2.5Hz), 6.87-6.92(1H, m). 7.01 (1H, d. J=2.0Hz). 7.24-7.31(1H, m) , 7.37-7.44(2H, m), 7.55(1H, d, J=8.0Hz)
915	$-OCH_3$	-H	-I	-H	$-CH_3$	^{1}H-MMR ($CDCl_3$) δ ppm: 1.92-2.10 (2H, m), 2.23(3H, s), 2.57-2.86(6H. m). 3.11-3.31(4H, m), 3.82(3H, s), 3.98(2N, t, J=6.4Hz), 6. 90 (1H, d, J=7.6Hz), 7.03(1H, d, J=2.0Hz) , 1.13(1H, d, J=1.6Hz), 7.22-7.34(1H m), 7.40 (1H. dd, J=5.5Hz, 9.3Hz), 7.55(1H, d; J=6.OHz).

(continued)

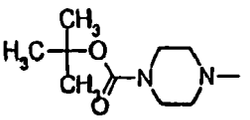
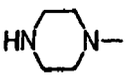
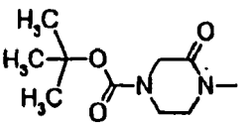
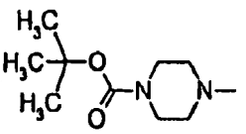
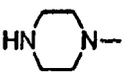
Example	R1	R2	R3	R4	R5	NMR
916	$-OCH_3$	-H	$-NHCONH(CH_2)$ C I	-H	$-CH_3$	^{1}H-NMR ($CDCl_3$) δ ppm: 1.94-2.13 (2H, m) , 2.26(3H, s) 2.60-2.90 (6H.m), 3.12-3.33(4H, m), 3.49-3.76(4H, m), 3.83(3H,s), 3.97 (2H, t, J=6.4Hz) , 5.22(1H, br), 6.25 (1H, br), 6.59(1H, d, J=2.3Hz), 6.88 (1H, d, J=2.3Hz), 8.91(1H, d, -J=7.4Hz), 7.21-7.33(1H, m), 7.41 (1H, dd, J=5.6Hz. 7.6Hz), 7.56(iH, d, 4=8,0Hz) .
917	$-OCH_3$	-H	$-NH(CH_2)_2NH_2$	-H	$-CH_3$	^{1}H-NMR ($CDCl_3$) δ ppm: 1.91-2.08 (2H, m), 2.22(3H, s), 2.62-2.81(6H, m), 2. 95 (2H, t, J=5. 7Hz) , 3.08-3.27 (6H, m) , 3.80(3H, s), 3.91 (2H. t, J=6.4Hz), 6.05(1H, d. J=2.6Hz), 6.10(1H, d, J=2.6Nz); 6.80(1H, d, J=7.5Hz) , 7: 20-7.32 (1H, m), 7.34-7.46 (2H, m), 7.55(1H, d, J=8.0Hz).
918	$-OCH_3$,	-H	$-NH(CH_2)NHCOCH_2Cl$	-H	$-CH_3$	^{1}H-NMR ($CDCl_3$) δ ppm: 1. 91-2.11 (2H, m), 2.23(3H, s), 2.60-2.84 (6H, m), 3.11-3.26(4H. m), 3.26-3.36 (2H, m) , 3.46-3.63 (2H, m), 3.81 (3H, $_8$), 3.91(2H, t, J=6.4Hz). 4.06 (2H. s), 6.04(1H. d, J=2.5Hz). 6.10 (1H. d, J=2.5Hz), 6.78-6.96 (2H, m), 7-.21-7. 33 (1H, m), 7.35-7.47 (2H, m), 7.55(1H. d. J=8.1Hz).

[Table 115]

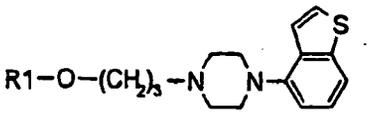


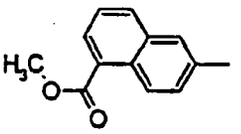
Example	R1	R2	R3	R4	R5	NMR
919	$-OCH_3$	-H		-H	$-CH_2Cl$	^{1}H-NMR ($CDCl_3$) δ ppm: 2. 00-2.17 (2H, m), 2.63-2.83(6H, m), 3.14-3.28(2H. m), 3.89(3H, s), 3.98-4.17(4H, m), 4.40-4.54 (2H. m), 4.69(2H, m). 6.77(1H, d. J=2.5Hz), 6.91 (1H, d, J=2.5Hz), 7. 21-7.32(1H, m), 7.35-7.46(2H, m), 7.66(1H, d. J=9. 3Hz)

(continued)

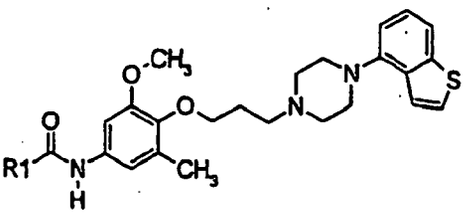
Example	R1	R2	R3	R4	R5	NMR
920	$-OCH_3$	-H		-H	$-CH_3$	^{1}H-NMR ($CDCl_3$) δ ppm: 1.48 (9H. s), 1.93-2.12 (2H, m), 2.26 (3H, a), 2.60-2.86(6H, m), 2.95-312(4H, m), 3.14-3.31(4H, m), 3.60-3.67(4H, m) , 3.83(3H, s), 3.84(2H, t.J=6.3Hz). 6.33(1H, d, J=2.5Hz), 6.38(1H. d. J=2. 6Hz). 6.90(1H, d, J=7.5Hz). 7.19-7.33(1H. m), 7.41 (2H, dd, J=5. 5Hz. 9.3Hz). 7.65(1H. d, J=8.0Hz).
921	$-OCH_3$	-H		-H	$-CH_3$	^{1}H-NMR ($CDCl_3$) δ ppm: 1.92-2.09 (2H, m), 2.26(3H, s), 2.61-2.81(6H, m), 2.98-3.12(8H. m), 3.14-3.25(4H, m), 3.83(3H, s), 3.94(2H. t, J=6. 4Hz), 6.33 (1H. d. J=2.5Hz), 6.38(1H, d, J=2.5Hz), 6.90(1H. d, J=7.OHz), 7.20-7.93(1H, m), 7.34-7. 45 (2H, m), 7.55(1H, d, J=8.0Hz).
922	$-OCH_3$	-H		-H	$-CH_3$	^{1}H-NMR ($CDCl_3$) δ ppm : 1.50 (9H, s), 1.95-2.11 (2H, m) , 2. 27 (3H, s) , 2.59-2.82 (6H, m), 3.12-3.27(4H. m) , 3.63-3.81 (4H. m). 3.83(3H. s). 4.01(2H. t, J=6. 4Hz) , 4.24(2H, s), 6.61-8.71(2H, m), 6.90(1H, d, J=7.6Hz), 7. 21-7,33(1H, m), 7.41 (211, dd, J=5,6Hz, 9. 8Hz) , 7.65(1H, d. J=8.1Hz).
923	$-OCH_3$	-H		-H	-CHO	^{1}H-NMR ($COCl_3$) δ ppm: 1.49 (9H. s), 1.96-2.12 (2H, m), 2.60-2.82(6H, m), 3.04-3.16 (4H, m). 3;16-3.28(4H. m), 3.52-3.64 (4H, m), 3.89(3H. s). 414(2H t. J=6.3Hz). 6.78(1H. d, J=2. 8Hz) , 6.86-6.96 (2H. m) , 7.20-7.33 (1H. m). 7.35-7.46 (2H, m). 7.55 (1H. d, J=8.0Hz). 10.44(1H, s).
924	$-OCH_3$	-H		-H	-CHO	^{1}H-NMR ($CDCl_3$) δ ppm: 1.97-2.13 (2H, m) , 2.59-2.83 (6H. m), 2.96-3.09(4H, m), 3.09-3.17(4H. m), 3.17-3. 28 (4H, m) , 3.89(3H, s) , 4.13(2H. t, J=6.5Hz). 6.79(1H, d, J=2.7Hz). 6.86-6.96 (2H, m), 7.20-7.34 (1H. m). 7. 36-7. 45 (2H, m), 7.55 (1H. d. J=8.1Hz), 10.44(1H. s).

[Table 116]



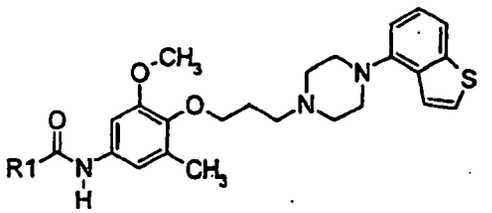
Example	R1	NMR
925		^{1}H-NMR ($CDCl_3$) δ ppm: 2.01-2 20 (2H. , m), 2.62-2.87 (6H. m), 3.10-3.30 (4H, m), 3.99(3H. s), 4. 20 (2H, t, J=6.3Hz). 6.91 (1H. dd, J=0.7Hz. 7.6Hz). 7.20(1H. d. J=2. 6Hz), 7. 22-7. 34 (2H, m), 7.35-7.50 (3H. m), 7.55 (1H, d. J=8, Hz). 7.90(1H. d. J=8.1Hz), 8.030H. dd. J=1. 2Hz, 7. 3Hz) . 8.83 (1H, d, J=9. 4Hz) .

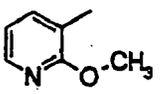
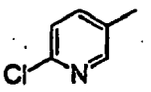
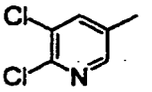
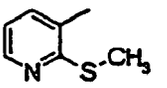
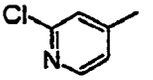
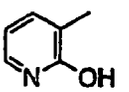
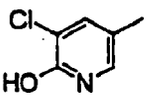
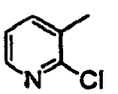
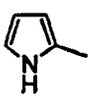
[Table 117]



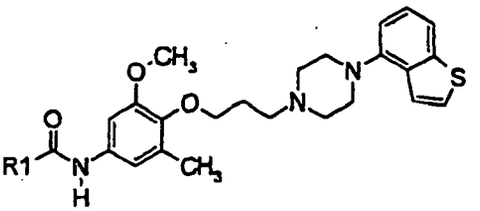
Example	R1	MS(M+1)
926	-2-PYRIDYL	517
927	-3-PYRIDYL	517
928	-4-PYRIDYL	517
929	-2-FURYL	506
930	-2-THIENYL	522
931	-3-FURYL	505
932	-3-THENYL	522
933	$-CH_3$	454
934	$-C_2H_5$	468
935	$-C_3H_7$	482
936	$-CH(CH_3)_2$	482
937	-cyclo- C_3H_5	480
938	-cyclo- C_5H_9	508
939	-cyclo- C_6H_{11}	522
940	$-CH_2$-cyclo- C_3H_3	494
941	$-CH_2$-cyclo- C_6H_{11}	536
942	$-CH_2OCH_3$	484
943	$-CH_2N(CH_3)_2$	497
944	$-(CH_2)_3N(CH_3)_2$	525
945	$<CH_2)_2N(C_2H_5)_2$	539
946	$-CH_2NHCHO$	497
947	$-CH_2N(CH_2CH_2OH)_2$	557
948	$-CH_2N(CH_3)CO_2C(CH_3)_3$	583
949	$-(CH_2)_3NHCO_2C(CH_3)_3$	597
950	$-CH_2NHCH_3$	483
951	$-(CH_2)_3NH_2$	497
952	$-CH_2NHCOCH_3$	511

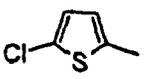
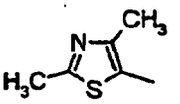
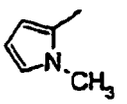
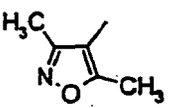
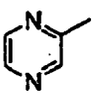
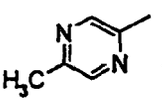
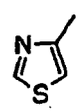
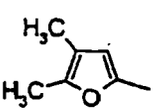
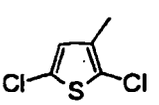
[Table 118]



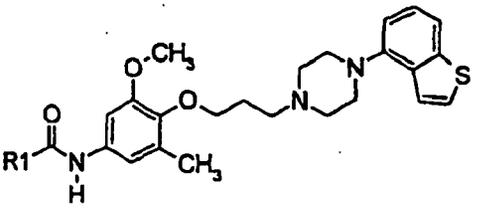
Example	R1	MS(M+1)
953		547
954		551
955		585
956		563
957		551
958		533
959		567
960		551
961		505

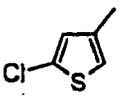
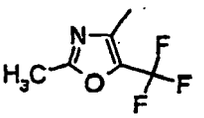
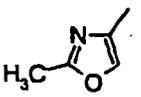
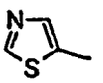
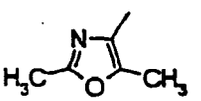
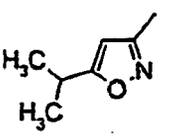
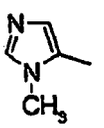
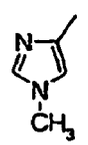
[Table 119]



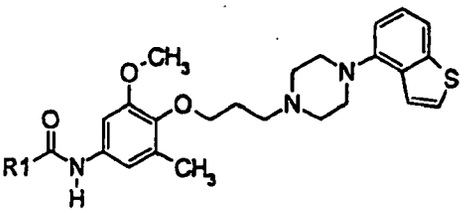
Example	R1	MS(M+1)
962		556
963		551
964		519
965		535
966		518
967		532
968		523
969		534
970		590

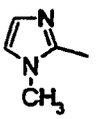
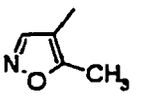
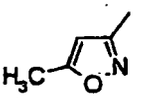
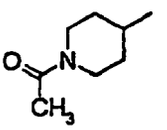
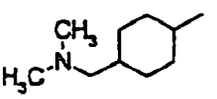
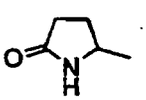
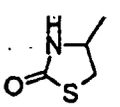
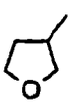
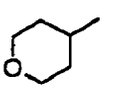
[Table 120]



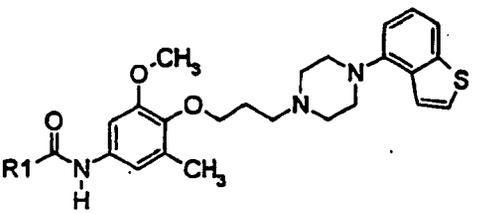
Example	R1	MS(M+1)
971		556
972		589
973		521
974		523
975		535
976		549
977		520
978		520

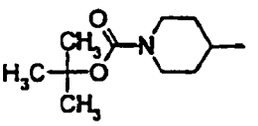
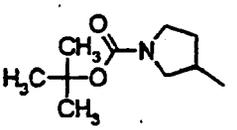
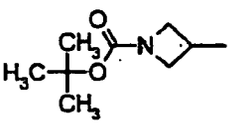
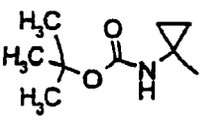
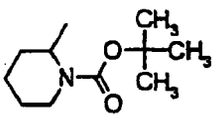
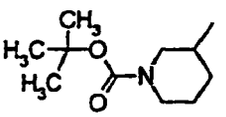
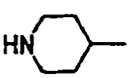
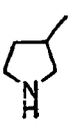
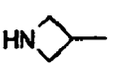
[Table 121]



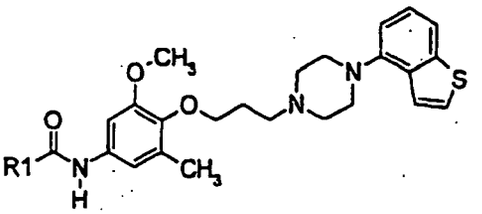
Example	R1	MS(M+1)
979		520
980		521
981		521
982		565
983		579
984		523
985		541
986		510
987		524

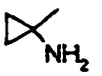
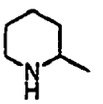
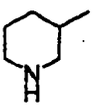
[Table 122]



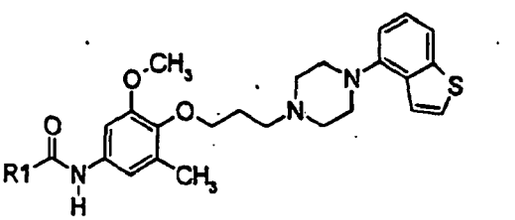
Example	R1	MS(M+1)
988		623
989		609
990		595
991		595
992		623
993		623
994		523
995		509
996		495

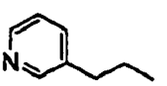
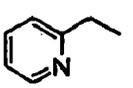
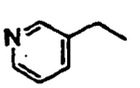
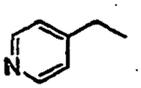
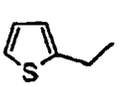
[Table 123]



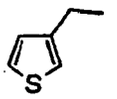
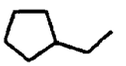
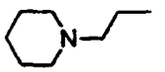
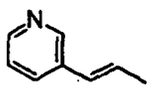
Example	R1	MS(M+1)
997		495
998		523
999		523

[Table 124]

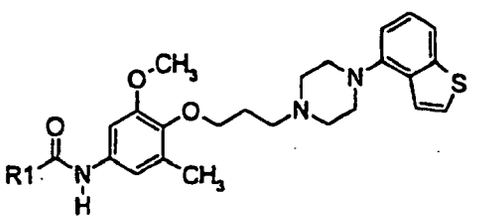


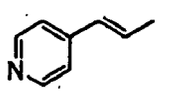
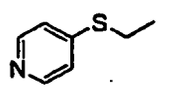
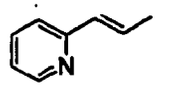
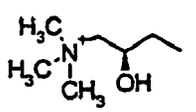
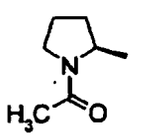
Example	R1	MS(M+1)
1000		545
1001		531
1002		531
1003		531
1004		536

(continued)

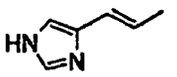
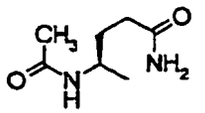
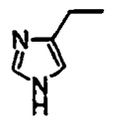
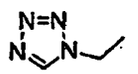
Example	R1	MS(M+1)
1005		536
1006		522
1007		551
1008		543

[Table 125]

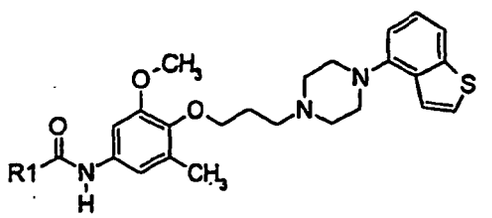


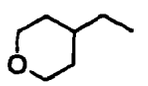
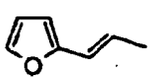
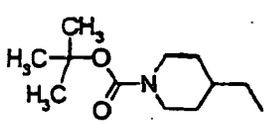
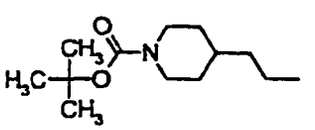
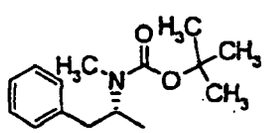
Examples	R1	MS(M+1)
1009		543
1010		563
1011		543
1012		556
1013		551

(continued)

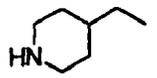
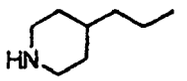
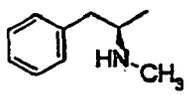
Examples	R1	MS(M+1)
1014		532
1015		582
1016		520
1017		522

[Table 126]

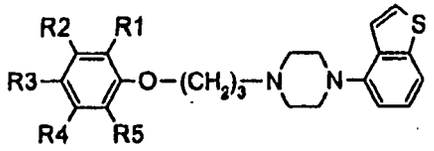


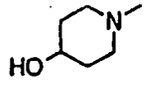
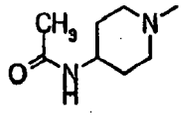
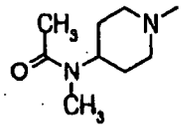
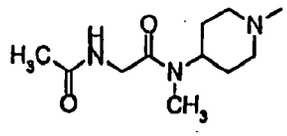
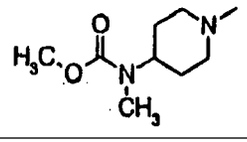
Example	R1	MS(M+1)
1018		538
1019		532
1020		637
1021		651
1022		673

(continued)

Example	R1	MS(M+1)
1023		537
1024		551
1025		573

[Table 127]

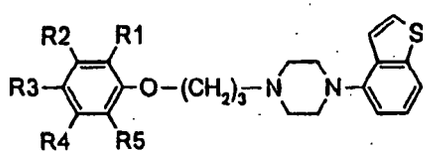


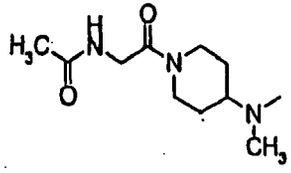
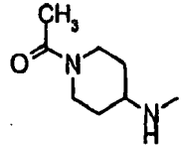
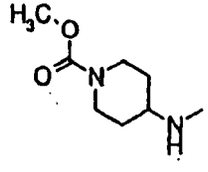
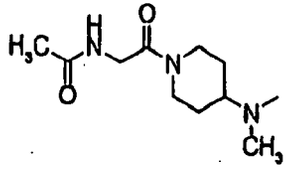
Example	R1	R2	R3	R4	R5	Crystal form (Recrystalization solvent)	Melting Point (˚C)	Salt
1026	$-CH_3$	-H		-H	$-OCH_3$	White powder (Ethyl acetate)	230.0 (dec)	Hydrochloride
1027	$-CH_3$	-H		-H	$-OCH_3$			
1028	$-CH_3$	-H		-H	$-OCH_3$	White powder (Ethyl acetate)	235.0 (dec)	Hydrochloride
1029	$-CH_3$	-H		-H	$-OCH_3$	White powder (Ethyl acetate)	227.0 (dec)	Hydrochloride
1030	$-CH_3$	-H		-H	$-OCH_3$	White powder (Ethyl acetate)	240.0 (dec)	Hydrochloride

(continued)

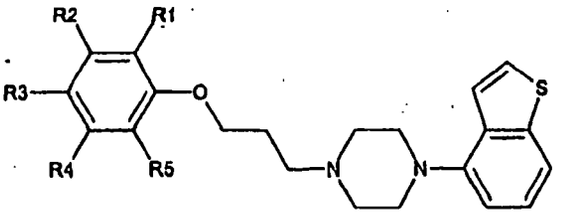
Example	R1	R2	R3	R4	R5	Crystal form (Recrystalization solvent)	Melting Point (°C)	Salt
1031	$-OCH_3$	-H		-H	$-CH_3$	White powder (Ethyl acetate)	211.0-213.5	Hydrochloride

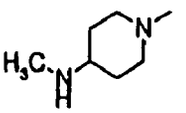
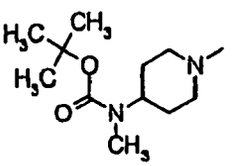
[Table 128]



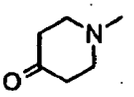
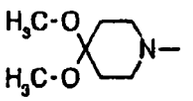
Example	R1	R2	R3	R4	R5	Crystal form (Recrystalization solvent)	Melting Point (°C)	Salt
1032	$-OCH_3$	-H		-H	$-CH_3$	White powder (Ethyl acetate)	207.5-210.0	Hydrochloride
1033	$-OCH_3$	-H		-H	$-CH_3$	White powder (Ethanol/ethyl acetate)	247.0 (dec)	-
1034	$-CH_3$	-H	-CONHCH,	-H	$-OC_3H_7$	White powder (Ethanol)	178.5-179.5	Hydrochloride
1035	$-OCH_3$	-H		-H	$-CH_3$			Hydrochloride
1036	$-OCH_3$	-H		-H	$-CH_3$	White powder (Ethyl acetate)	248.5-257.5	Hydrochloride

[Table 129]



Example	R1	R2	R3	R4	R5	NMR	Salt
1037	$-CH_3$	-H		-H	$-OCH_3$	^{1}H-NMR (CDCl3) δ ppm : 1.38-1.85(4H, m), 1.88-2.11 (3H, m), 2.25(3H, s), 2.47 (3H, s), 2.60-2.82 (8H, m), 3,1 2-3.29 (4H, m), 3.47-3.63 (2H, m), 3.82(3H, s), 3.93(2H, t, J=6.4Hz), 8.34(1H, d, J=2.7Hz), 6.40(1H, d, J=2.7Hz), 8.80 (1H, d, J=7.1Hz), 7.21 - 7.34(1H, m), 7.40 (2H, dd, J=5.5Hz, 9.9Hz), 7.55(1H, d, J=8.0Hz).	-
1038	$-CH_3$	-H		-H	$-OCH_3$	^{1}H-NMR (CDCl3) δ ppm: 1.48(6H, s), 1.67-1.92(4H, m), 1.95-2.11 (2H, m), 2.25(3H, s), 2.81-2.87(12H, m), 3.11-3.28(4H, m), 3.54-3.70(2H, m), 3.83(3H, s), 3.94 (2H, t, J=8.3Hz), 8.34(1H, d, J=2.8Hz), 6.39(1H, d, J=2.6Hz), 6.90 (1H, d, J=6.9Hz), 7.17- 7.34(1H, m), 7.35-7.47 (2H, m), 7.55(1H, d, J=8.0Hz).	-

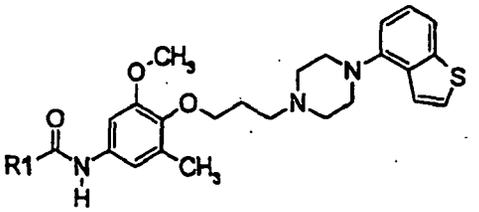
(continued)

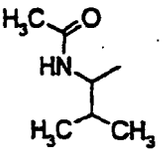
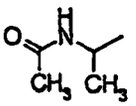
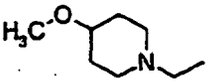
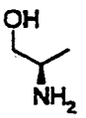
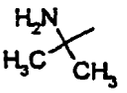
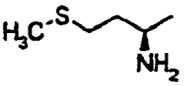
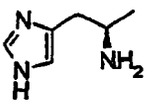
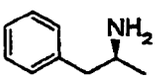
Example	R1	R2	R3	R4	R5	NMR	Salt
1039	$-CH_3$	-H		-H	$-OCH_3$	^{1}H-NMR (CDCl3) δ ppm : 1.96-2.11(2H, m), 2.27(3H, s), 2.57 (4H. t, J=6.0Hz), 2.84- 2.84(6H, m), 3.13-3.27(14H, m), 3.51(4H, t, J=6.0Hz), 3.84(3H, s), 3.96 (2H, t, J=6.4Hz), 6.38(1H, d, J=2.7Hz), 8.20(1H, d, J=2.7Hz), 6.90 (1H, d, J=7.5Hz), 7.21-7.32(1H, m). 7.40 (2H, dd, J=5.5Hz, 10.0Hz), 7.55(1H, d, J=8.1Hz).	-
1040	$-CH_3$	-H		-H	$-OCH_3$	^{1}H-NMR (CDCl3) δ ppm : 1.83-1.95 (4H, m), 1.95-2.10(2H, m), 2.25(3H, s), 2.81- 2.81(6H, m), 3.07-3.28(14H, m), 3.82(3H, s), 3.93 (2H, t, J=6.5Hz), 6.30-6.43(2H. m), 6.90(1H, d, J=7.5Hz), 7.29-7.34 (1H, m), 7.41 (2H, dd, J=6.0Hz, 10.0Hz), 7.55(1H, d, J=7.9Hz).	-

[Table 130]

Example	R1	R2	R3	R4	R5	Crystal form (Recrystalization solvent)	Melting Point (°C)	Salt
1041	$-OCH_3$	-H	$-CONH_2$	-H	$-CH_3$	White powder (Ethanol)	189.0-102.6	Hydrochloride
1042	$-OCH_3$	-H	$-CONHCH_3$	-H	$-CH_3$	White powder (Isopropyl alcohol/water)	165.5-167.0	-

[Table 131]



Example	R1	MS(M+1)
1043		553
1044		525
1045		567
1046		499
1047		497
1048		543
1049		549
1050		559

Example 1051

Synthesis of 3-amino-4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-N-ethyl-benzamide

[0349] 5% palladium carbon (0.8 g) was added to an ethanol solution (30 ml) of 4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-N-ethyl-3-nitrobenzamide (1.0 g, 2.1 mmol) and the mixture was subjected to catalytic reduction at room temperature under normal pressure. The catalyst was removed by filtration and the filtrate was concentrated under reduced pressure. Water was added to the residue and the solution was extracted with ethyl acetate. The organic layer was dried over anhydrous sodium sulfate and thereafter concentrated under reduced pressure. The residue was purified by silica gel column chromatography (dichloromethane : methanol = 30:1 → 20:1). The purified product was concentrated under reduced pressure to obtain 3-amino-4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-N-ethyl-benzamide (0.78 g, 83% yield) as yellow amorphous solid.

^{1}H-NMR ($CDCl_3$) δppm: 1.23 (3H, t, J=7.4 Hz), 2.00-2.15 (2H, m), 2.67 (2H, t, J=7.3 Hz), 2.75 (4H, brs), 3.21 (4H, brs), 3.40-3.50 (2H, m), 3.50-4.30 (2H, br), 4.13 (2H, t, J=6.5 Hz), 5.99 (1H, brs), 6.80 (1H, d, J=8.4 Hz), 6.90 (1H, d, J=7.6 Hz), 7.08 (1H, dd, J=2.1, 8.3 Hz), 7.19 (1H, d, J=2.1 Hz), 7.25-7.30 (1H, m), 7.35-7.45 (2H, m), 7.55 (1H, d, J=8.0 Hz).

Example 1052 (Reference)

Synthesis of 1-benzo[b]thiophen-4-yl-4-[3-(1-acetylpiperidin-4-yloxy)propyl]piperazine hydrochloride

[0350] Triethylamine (0.28 ml, 2.0 mmol) was added to a dichloromethane solution (15 ml) of 1-benzo[b]thiophen-4-yl-4-[3-(piperidin-4-yloxy)-propyl]-piperazine (0.45 g, 1.25 mmol) and the mixture was cooled in an ice bath. To this, acetyl chloride (0.1 ml, 1.4 mmol) was added and the mixture was stirred at room temperature overnight. Water was added to the reaction solution, which was then extracted with dichloromethane. The organic layer was dried over anhydrous sodium sulfate and thereafter concentrated under reduced pressure. The residue was purified by silica gel column chromatography (dichloromethane : methanol = 30:1). The purified product was concentrated under reduced pressure. To the residue, 0.5 N hydrochloride-methanol solution (3 ml) was added. The crystal produced was obtained by filtration and dried to obtain 1-benzo[b]thiophen-4-yl-4-[3-(1-acetylpiperidin-4-yloxy)propyl]piperazine hydrochloride as white powder (0.36 g, 66% yield).
Melting point: 208-210˚C

Example 1053 (Reference)

Synthesis of 1-[3-(4-Benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]pyrrolidine-2,5-dione hydrochloride

[0351] PS-triphenylphosphine (3 mmol/g, 1.80 g), ditert-butylazodicarboxylate (1.27 g, 5.4 mmol) and N-hydroxysuccinimide (510 mg, 4.3 mmol) were added to a THF solution (50 ml) of 3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propanol (1.00 g, 3.6 mmol) and the mixture was stirred at room temperature for 4 hours. The resin was removed by filtration and the filtrate was concentrated under reduced pressure. The residue was purified by basic silica gel column chromatography (n-hexane : ethyl acetate = 1:2). The purified product was concentrated under reduced pressure to obtain white amorphous solid (762 mg, 47% yield). 157 mg of the white amorphous solid was dissolved in ethanol. To the solution, 1N hydrochloric acid-ethanol solution (0.42 ml) was added and further ether was added. The solution was stand still in a refrigerator. The crystal produced was filtrated and dried to obtain 1-[3-(4-Benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-pyrrolidine-2,5-dione hydrochloride (158 mg) as a white powder.
Melting point: 255.0-257.0˚C

Example 1054

Synthesis of 6-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]naphthalene-1-carboxylic acid amide

[0352] Triethylamine (0.24 ml, 1.7 mmol) and isobutyl chloroformate (0.19 ml, 1.4 mmol) were added to an acetonitrile solution (10 ml) of 6-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)-propoxy]-naphthalene-1-carboxylic acid (0.52 g; 1.2 mmol) under ice cooling and the mixture was stirred for 20 minutes. To the reaction solution, 28 % ammonia water (0.5 ml) was added and the mixture was stirred at room temperature for 20 minutes. To the reaction solution, ethyl acetate was added and the solution was washed with water. The organic layer was dried over anhydrous magnesium sulfate and thereafter concentrated under reduced pressure. The residue was purified by basic silica gel column chromatography (n-hexane : ethyl acetate = 2:1 → 0:1). The purified product was concentrated under reduced pressure and the residue was recrystallized from a solvent mixture of ethyl acetate-diisopropylether to obtain 6-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1-naphthalene-1-carboxylic acid amide (0.27 g, 53% yield) as white powder.
Melting point 167.0-169.0˚C

Example 1055 (Reference)

Synthesis of 1-allyl-5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1H-pyrazole-3-carboxylic acid methylamide

[0353] 40% methylamine methanol solution (5 ml) was added to a methanol solution (5 ml) of 1-allyl-5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1H-pyrazole-3-carboxylic acid ethyl ester (0.5 g, 1.1 mmol) and the mixture was stirred at room temperature for 3 days. The solution was concentrated under reduced pressure and the residue was purified by basic silica gel column chromatography (n-hexane : ethyl acetate = 5:1 → 0:1). The purified product was concentrated under reduced pressure and the residue was recrystallized from a solvent mixture of ethyl acetate-diiso-

propylether to obtain 1-allyl-5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1H-pyrazole-3-carboxylic acid methylamide (0.32 g, 67% yield) as white powder.
Melting point 138.5-140.5˚C

Example 1056 (Reference)

Synthesis of 4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-cyclohexanecarboxylic acid amide

[0354] Ammonia water (28%, 0.5 ml), 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride (WSC)(0.36 g, 1.9 mmol) and 4-dimethylaminopyridine (DMAP) (0.05 g, 0.4 mmol) were added to a dichloromethane solution (10 ml) of 4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-cyclohexanecarboxylic acid (0.5 g, 1.2 mmol) and the mixture was stirred at room temperature for 19 hours. To the reaction solution, dichloromethane was added and the mixture was washed with water. The organic layer was dried over anhydrous magnesium sulfate and thereafter concentrated under reduced pressure. The residue was purified by basic silica gel column chromatography (n-hexane : ethyl acetate = 3:1 → 0:1). The purified product was concentrated under reduced pressure and the residue was recrystallized from a solvent mixture of ethyl acetate-diisopropylether to obtain 4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)-propoxy]-cyclohexanecarboxylic acid amide (0.1 g, 22% yield), as white powder.
Melting point 107.5-108.5˚C

Example 1057

Synthesis of ethanesulfonic acid {4-[3-(4-benzo[b]thiophen-4-yl-piperazin-l-yl)propoxy]-3-methoxy-5-methyl-phenyl} amide hydrochloride

[0355] A dichloromethane solution (4 ml) of 4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-methylphenylamine (0.2 g, 0.49 mmol) was cooled on ice. To this, N-ethyldiisopropylamine (0.15 ml, 0.87 mmol) and ethane sulfonylchloride (0.07 ml, 0.73 mmol) were added and the mixture was stirred at room temperature for one hour. Further, N-ethyldiisopropylamine (0.15 ml, 0,87 mmol) and ethane sulfonylchloride (0.07 ml, 0.73 mmol) were added and the mixture was stirred at room temperature for 19 hours. To this, an aqueous 6N-sodium hydroxide solution (0.5 ml) and ethanol (2 ml) were added and the mixture was stirred at room temperature overnight. Dichloromethane was added to the reaction solution, which was then washed with water. The organic layer was dried over anhydrous magnesium sulfate and thereafter concentrated under reduced pressure. The residue was purified by basic silica gel column chromatography (n-hexane : ethyl acetate = 2:1 → 0:1). The purified product was concentrated under reduced pressure. 4N-hydrochloride/ethyl acetate solution was added to the residue. The crystal generated was filtrated and dried to obtain ethanesulfonic acid {4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-methyl-phenyl}amide hydrochloride (222 mg, 85% yield) as white powder.
Melting point: 235.5-237.5˚C

Example 1058 (Reference)

Synthesis of 5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1-methyl-1H-pyrazol-3-yl}-carbamic acid methyl ester

[0356] A dichloromethane solution (2 ml) of 5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1-methyl-1H-pyrazol-3-yl-amine (0.17 g, 0.47 mmol) was cooled on ice. To this, pyridine (0.08 ml, 0.94 mmol) and methyl chloroformate (0.04 ml, 0.52 mmol) were added and the mixture was stirred at room temperature for 17 hours. To the reaction solution, ethyl acetate was added and the reaction mixture was washed with water. The water layer was extracted with ethyl acetate. The organic layers were combined, dried over anhydrous magnesium sulfate, and thereafter, concentrated under reduced pressure. The residue was purified by basic silica gel column chromatography (n-hexane : ethyl acetate = 2:1 → 1:1). The purified product was concentrated under reduced pressure and the residue was recrystallized from a solvent mixture of ethyl acetate-diisopropylether to obtain 5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1-methyl-1H-pyrazol-3-yl}carbamic acid methyl ester (0.10 g, 51% yield) as white powder.
Melting point: 162.5-165.0˚C.

Example 1059 (Reference)

Synthesis of 3-{5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1-methyl-1H-pyrazol-3-yl}-1,1-dimethyl-urea hydrochloride

[0357] A dichloromethane solution (5 ml) of 5-[3-(4-benzo[b]thiophen-4-yl-piperazin-l-yl)propoxy]-1-methyl-1H-pyrazol-3-yl-amine (0.27 g, 0.73 mmol) was cooled on ice. To this, triethylamine (0.36 ml, 2.5 mmol), dimethylcarbamoyl chloride (0.20 ml, 2.1 mmol) and pyridine (0.06 ml, 0.73 mmol) were added and the mixture was stirred at room temperature overnight. To the reaction solution, water was added and the reaction solution was extracted with ethyl acetate. The organic layer was dried over anhydrous magnesium sulfate and thereafter concentrated under reduced pressure. The residue was purified by basic silica gel column chromatography (n-hexane : ethyl acetate = 3:1 → 0:1). The purified product was concentrated under reduced pressure and the residue was dissolved in ethyl acetate and a 4N-hydrochloride/ethyl acetate solution was added thereto. The crystal produced was filtrated and dried to obtain 3-{5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1-methyl-1H-pyrazol-3-yl}-1,1-dimethyl-urea hydrochloride (0.10 g, 30% yield), as light yellow powder.
Melting point: 174.0-176.5˚C

Example 1060 (Reference)

Synthesis of 3-{5-[4-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)butoxy]-1-methyl-1H-pyrazol-3-yl}-1,1-dimethyl-urea hydrochloride

[0358] An aqueous dimethylamine solution (50%, 0.16 ml, 1.6 mmol) was added to a DMF solution (3 ml) of 5-[4-(4-Benzo[b]thiophen-4-yl-piperazin-1-yl)butoxy]-1-methyl-1H-pyrazol-3-yl.carbamic acid phenyl ester (0.26 g, 0.52 mmol) and the mixture was stirred at room temperature for 16 hours. Water was added to the reaction solution, which was then extracted with ethyl acetate. The organic layer was dried over anhydrous magnesium sulfate and thereafter concentrated under reduced pressure. The residue was purified by basic silica gel column chromatography (n-hexane : ethyl acetate = 7:3 → 0:1). The purified product was concentrated under reduced pressure and the residue was dissolved in ethyl acetate. A 1N-hydrochloric acid/ethanol solution was added and the crystal produced was filtrated and dried to obtain 3-{5-[4-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)butoxy]-1-methyl-1H-pyrazol-3-yl}-1,1-dimethyl-urea hydrochloride (95 mg, 37% yield) as white powder.
Melting point: 186.0-187.5˚C

Example 1061 (Reference)

Synthesis of N-{5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1-methyl-1H-pyrazol-3-yl}-acetamide

[0359] Acetic anhydride (1 ml) and triethylamine (0.09 ml, 0.65 mmol) were added to a dichloromethane solution (4 ml) of 5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1-methyl-1H-pyrazol-3-yl-amine (0.20 g, 0.54 mmol) and the mixture was stirred at room temperature for 6 hours. An aqueous potassium carbonate solution was added to the reaction solution, which was then extracted with ethyl acetate. The organic layer was dried over anhydrous magnesium sulfate and thereafter concentrated under reduced pressure. The residue was purified by basic silica gel column chromatography (n-hexane : ethyl acetate = 2:1 → 0:1). The purified product was concentrated under reduced pressure and the residue was recrystallized from a solvent mixture of ethyl acetate-diisopropylether to obtain N-{5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1-methyl-1H-pyrazol-3-yl} acetamide (0.19 g, 89% yield) as white powder.
Melting point: 137.0-139.0˚C

Example 1062 (Reference)

Synthesis of 3-{4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-hydroxymethyl-5-methoxyphenyl}oxazolidin-2-one hydrochloride

[0360] First, 2-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-(2-oxo-oxazolidin-3-yl)benzaldehyde hydrochloride (1.28 g. 2.4 mmol)) was added to an aqueous potassium hydrochloride solution. The mixture was extracted with dichloromethane. The extracted solution was concentrated under reduced pressure and the residue was dissolved in THF (15 ml). To the solution, sodium borohydride (0.05 g, 1.2 mmol) was added under ice cooling and the mixture was stirred at room temperature for 3 hours. Then, 10% hydrochloric acid was added to the mixture under ice cooling to decompose the reagent excessively present. After an aqueous 6N sodium hydroxide solution was added to

the solution to make it an alkaline solution, which was then extracted with ethyl acetate. The organic layer was dried over anhydrous magnesium sulfate and thereafter concentrated under reduced pressure. The residue was purified by silica gel column chromatography (dichloromethane : ethyl acetate = 3:7 → dichloromethane : methanol = 100:3). The purified product was concentrated under reduced pressure and the residue was dissolved in ethanol. A 1N hydrochloric acid/ethanol solution was added to this. The crystal produced was recrystallized from ethanol to obtain 3-{4-[3-(4-benzo [b]thiophen-4-yl-piperazin-1-yl)-propoxy]-3-hydroxymethyl-5-methoxy-phenyl}oxazolidin-2-one hydrochloride (0.52 g, 41% yield) as white powder.
Melting point: 224.0-226.5˚C (decomposed)

Example 1063

Synthesis of 1-acetyl-4-{4-[3-(4-benzo[b]thiophen-4-yl-piperazin-l-yl)propoxy]-3-methoxy-5-methylphenyl)piperazin hydrochloride

[0361] 1-benzo[b]thiophen-4-yl-4-[3-(4-bromo-2-methoxy-6-methylphenoxy)propyl]piperazine hydrochloride (0.5 g, 0.98 mmol), 1-acetyl piperazine (0.15 g, 1.2 mmol), palladium acetate (11 mg, 0.048 mmol), 2,2'-bis (diphenylphosph3.no)-1,1'-binaphtyl (BINAP)(63 mg, 0.098 mmol) and sodium t-butoxide (0.23 g, 2.3 mmol) were added to toluene (10 ml) and the mixture was stirred under an argon atmosphere at 90˚C for 22 hours. The reaction mixture was cooled to room temperature and filtrated by cerite. The filter cake was washed with ethyl acetate. The filtrate and wash liquid were combined and thereafter concentrated under reduced pressure. The residue was purified by basic silica gel column chromatography (n-hexane: ethyl acetate = 11:1→ 1:1). The purified product was concentrated under reduced pressure and the residue was dissolved in ethyl acetate. A 1N hydrochloric acid/ethanol solution was added to this and the crystal produced was filtrated and dried to obtain 1-acetyl-4-{4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-methoxy-5-methylphenyl}-piperazin hydrochloride (75 mg, 14% yield) as white powder.
Melting point: 257.0-261.0 ˚C (decomposed)

Example 1064

Synthesis of 1-benzo[b]thiophen-4-yl-4-[3-(4-imidazol-1-yl-2-methoxy-6-methyl-phenoxy)-propyl]-piperazine dihydrochloride

[0362] 1-benzo[b]thiophen-4-yl-4-[3-(4-iodo-2-methoxy-6-methyl-phenoxy)-propyl]-piperazine (0.6 g, 0.69 mmol), imidazole (0.07 g, 1.03 mmol), copper iodide (1) (13 mg, 0.069 mmol), trans-N,N'-dimethyl-1,2-cyclohexanedimaine (0.02 ml, 0.14 mmol) and cesium carbonate (0.47 g, 1.38 mmol) were added to 1,4-dioxane (6 ml) and the mixture was refluxed with heating under an argon atmosphere for 50 hours. After the resultant reaction mixture was cooled to room temperature, water was added to the reaction solution, which was then extracted with ethyl acetate. The organic layer was dried over anhydrous magnesium sulfate and thereafter concentrated under reduced pressure. The residue was purified by basic silica gel column chromatography (n-hexane: ethyl acetate = 5:1 → 1:1). The purified product was concentrated under reduced pressure and the residue was dissolved in ethyl acetate. A 1N-hydrochloric acid/ethanol solution was added to this and the crystal produced was filtrated and dried to obtain 1-benzo[b]thiophen-4-yl-4-[3-(4-imidazol-1-yl-2-methoxy-6-methylplienoxy)propyl]-piperazine dihydrochloride (60 mg, 17% yield) as light yellow powder.
Melting point: 234.0-240.0˚C (decomposed).

Example 1065

Synthesis of 4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3,N-dimethyl-5-(2,2,2-trifluoroethoxy)benzamide hydrochloride

[0363] Cesium carbonate (0.34 g, 0.99 mmol) and 1,1,1-trifluoro-2-iodoethane (0.05 ml, 0.47 mmol) were added to a DMF solution (2 ml) of 4-[3-(4-Benzo[b]thiophen-4-yl-piperazin-l-yl)propoxy]-3-hydroxy-5,N-dimethylbenzamide (188 mg, 0.39 mmol), and the mixture was stirred at 40˚C for 2 hours. Then, 1,1,1-trifluoro-2-iodoethane (0.1 ml, 0.94 mmol) was further added and the mixture was stirred at 40˚C for 5 hours. After the reaction mixture was cooled to room temperature, water was added to the reaction solution, which was then extracted with ethyl acetate. The organic layer was dried over anhydrous magnesium sulfate and thereafter concentrated under reduced pressure. The residue was purified by basic silica gel column chromatography (n-hexane: ethyl acetate = 3:1 → 0:1). The purified product was concentrated under reduced pressure and the residue was dissolved in isopropyl alcohol. A 1N-hydrochloric acid/ethanol solution was added to this and thereafter concentrated under reduced pressure. The residue was recrystallized from a solvent mixture of isopropyl alcohol/ethyl acetate to obtain 4-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3,N-

dimethyl-5-(2,2,2-trifluoro-ethoxy)benzamide hydrochloride (88 mg, 40% yield) as light yellow powder.
Melting point: 156.0-157.5˚C

Example 1066 (Reference)

Synthesis of 1-{5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1-methyl-1H-pyrazol-3-yl}-ethanone hydrochloride

[0364] 5-[3-(4-Benzo[b]thiophen-4-yl-piperazin-1-yl)-propoxy]-1-methyl-1H-pyrazol-3-carboxylic acid methoxy methylamide hydrochloride (0.61 g, 1.3 mmol) was added to an aqueous sodium hydroxide solution and the solution mixture was extracted with dichloromethane. The extracted solution was concentrated under reduced pressure and the residue was dissolved in THF (12 ml). The solution was cooled to-78˚C and 1N-methyllithium ether solution (1.2 ml) was added thereto and the mixture was stirred at the same temperature for 2 hours. To the reaction solution, an aqueous ammonium chloride solution was added and the solution was heated to room temperature. Potassium chloride was added to the solution, which was then extracted with ethyl acetate. The organic layer was dried over anhydrous magnesium sulfate and thereafter concentrated under reduced pressure. The residue was purified by silica gel column chromatography (dichloromethane: ethyl acetate = 3:1 → 0:1). The purified product was concentrated under reduced pressure and the residue was dissolved in ethanol. A 1N hydrochloric acid/ethanol solution was added to this and the crystal produced was recrystallized from water-containing ethanol to obtain 1-{5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-1-methyl-1H-pyrazol-3-yl}ethanone hydrochloride (0.22 g, 40% yield) as white powder.
Melting point: 245.0˚C (decomposed)

Example 1067 (Reference)

Synthesis of 5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-hydroxymethyl-1-methyl-1H pyrazole

[0365] A THF solution (8 ml) of 5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)propoxy]-3-(tert-butyl-dimethylsilanyloxymethyl)-1-methyl-1H-pyrazole (0.75 g, 1.5 mmol) was cooled on ice and a 1M THF solution of tetrabutyl ammonium fluoride (1.7 ml) was added thereto. The mixture was stirred at room temperature for 16 hours. Ethyl acetate was added to the reaction solution, which was washed with water. The organic layer was dried over anhydrous magnesium sulfate and thereafter concentrated under reduced pressure. The residue was purified by silica gel column chromatography (dichloromethane: methanol = 1:0 → 30:1 →15:1). The purified product was concentrated under reduced pressure and the residue was recrystallized from a solvent mixture of ethyl acetate and diisopropyl ether to obtain 5-[3-(4-benzo[b]thiophen-4-yl-piperazin-1-yl)-propoxy]-3-hydroxymethyl-1-methyl-1H-pyrazole (0.46 g, 79% yield) as white powder.
Melting temperature: 123.5-126.0˚C

Pharmacological Test 1

1) Dopamine D_2 receptor binding assay

[0366] The assay was performed according to the method by Kohler et al. (Kohler C, Hall H, Ogren SO and Gawell L, Specific in vitro and in vivo binding of 3H-raclopride. A potent substituted benzamide drug with high affinity for dopamine D-2 receptors in the rat brain. Biochem. Pharmacol., 1985; 34: 2251-2259).

[0367] Wistar male rats were decapitated, the brain was retrieved immediately and corpus striatum was taken out. It was homogenized in 50 mM tris(hydroxymethyl) aminomethane (Tris)-hydrochloric acid buffer (pH 7.4) of a volume 50 times of the weight of the tissue using a homogenizer with a high-speed rotating blade, and centrifuged at 4˚C, 48,000 x g for 10 minutes. The obtained precipitate was suspended again in the above-described buffer of a volume 50 times of the weight of the tissue and after incubated at 37˚C for 10 minutes, centrifuged in the above-described condition. The obtained precipitate was suspended in 50 mM (Tris)-hydrochloric acid buffer (containing 120 mM NaCl, 5 mM KCl, 2 mM $CaCl_2$, 1 mM $MgCl_2$, pH 7.4) of a volume 25 times of the weight of the tissue and preserved by freezing at -85˚C till it was used for binding assay as a membrane specimen.

[0368] The binding assay was performed using 40 μl of the membrane specimen, 20 μl of [^{3}H]-raclopride (final concentration 1 to 2 nM), 20 μl of a test drug and 50 mM Tris-hydrochloric acid buffer (containing 120 mM NaCl, 5 mM KCl, 2 mM $CaCl_2$, 1 mM $MgCl_2$, pH 7.4) so that the total amount was 200 μl (final dimethylsulfoxide concentration 1%). The reaction was performed at room temperature for 1 hour and terminated by conducting suction filtration with a cell harvester on a glass fiber filter plate. The filter plate made of glass fiber was washed with 50 mM Tris-hydrochloric acid buffer (pH 7.4), and after dried, a microplate liquid scintillation cocktail was added and the radioactivity was measured with a microplate scintillation counter.. Radioactivity in the presence of 10 μM (+)-butaclamol hydrochloride was assumed

as nonspecific binding.

[0369] IC_{50} value was calculated from concentration-dependent reaction using a non-linear analysis program. Ki value was calculated from IC_{50} value using Cheng-Prussoff formula. The results are shown in the following Table 132.

[Table 132]

Dopamine D2 receptor binding test	
Test compound	Ki (nM)
Compound of Example 10	0.2
Compound of Example 13	0.3
Compound of Example 14	0.4
Compound of Example 16	0.6
Compound of Example 23	2.0
Compound of Example 35	0.4
Compound of Example 44	0.9
Compound of Example 45	1.0
Compound of Example 61	1.3
Compound of Example 65	1.2
Compound of Example 107	1.1
Compound of Example 116	0.4
Compound of Example 118	0.2
Compound of Example 127	0.3
Compound of Example 146	1.2
Compound of Example 156	0.3
Compound of Example 161	0.2
Compound of Example 176	0.2
Compound of Example 178	1.0
Compound of Example 182	0.3
Compound of Example 188	0.7
Compound of Example 189	0.8
Compound of Example 198	1.5
Compound of Example 215	1.9
Compound of Example 218	0.9
Compound of Example 220	1.6
Compound of Example 229	0.2
Compound of Example 233	0.2
Compound of Example 234	0.2
Compound of Example 238	2.0
Compound of Example 243	0.4
Compound of Example 257	0.5
Compound of Example 269	3.8
Compound of Example 328	0.9
Compound of Example 337	0.4
Compound of Example 416	0.6
Compound of Example 521	1.2
Compound of Example 577	1.0
Compound of Example 673	0.6
Compound of Example 875	0.4
Compound of Example 876	0.1
Compound of Example 877	0.1
Compound of Example 887	0.1
Compound of Example 892	1.2
Compound of Example 895	0.4

(continued)

Dopamine D2 receptor binding test	
Test compound	Ki (nM)
Compound of Example 896	0.6
Compound of Example 899	0.3
Compound of Example 900	0.1
Compound of Example 902	1.0
Compound of Example 903	0.3
Compound of Example 905	1.0

2) Serotonin 5-HT_{2A} receptor binding assay

[0370] The assay was performed according to the method by Leysen JE et al. (Leysen JE, Niemegeers CJE, Van Nueten JM and Laduron PM. [3H] Ketanserin (R 41 468), a selective 3H-ligand for serotonin 2 receptor binding sites. Mol. Pharmacol., 1982, 21: 301-314).

[0371] Wistar male rats were decapitated, the brain was retrieved immediately and frontal cortex was taken out. It was homogenized in 0.25 M sucrose of a volume 10 times of the weight of the tissue using a Teflon glass homogenizer, and centrifuged at 4˚C, 1,000 × g for 10 minutes. The obtained supernatant was transferred to another centrifuge tube and suspended in 0.25 M sucrose of a volume 5 times of the weight of the tissue and the precipitate was centrifuged in the above-described condition. The obtained supernatant was combined with the supernatant obtained above and adjusted to a volume 40 times of the weight of the tissue with 50 mM Tris-hydrochloric acid buffer (pH 7.4), and centrifuged at 4˚C, 35,000 × g for 10 minutes. The obtained precipitate was suspended again in the above-described buffer of a volume 40 times of the weight of the tissue and centrifuged in the above-described condition. The obtained precipitate was suspended in the above-described buffer of a volume 20 times of the weight of the tissue and preserved by freezing at -85˚C till it was used for binding assay as a membrane specimen.

[0372] The binding assay was performed musing 40 μl of the membrane specimen, 20 μl of [^{3}H]-Ketanserin (final concentration 1 to 3 nM)-, 20 μl of a test drug and 50 mM Tris-hydrochloric acid buffer (pH 7.4) so that the total amount was 200 μl (finial dimethylsulfoxide concentration 1%). The redaction performed at 37˚C for 20 minutes and terminated by conducting suction filtration with a cell harvester on a glass fiber filter plate.

[0373] The filter plate made of glass fiber was washed with 50 mM Tris-hydrochloric acid buffer (pH 7.4), and after dried, a microplate liquid scintillation cocktail was added and the radioactivity was measured with a microplate scintillation counter. Radioactivity in the presence of 10 μM spiperone was assumed as nonspecific binding.

[0374] IC_{50} value was calculated from concentration-dependent reaction using a non-linear analysis program. Ki value was calculated from IC_{50} value using Cheng-Prussoff formula. The results are shown in the following Table 133

[Table 133]

Serotonion 5-HT_{2A} receptor binding test	
Test compound	Ki (nM)
Compound of Example 10	4.4
Compound of Example 13	2.4
Compound of Example 14	5.9
Compound of Example 16	3.4
Compound of Example 23	3.9
Compound of Example 35	0.6
Compound of Example 44	2.6
Compound of Example 45	3.3
Compound of Example 61	2.0
Compound of Example 65	0.6
Compound of Example 107	2.7
Compound of Example 116	0.7
Compound of Example 118	0.5
Compound of Example 127	0.3
Compound of Example 146	0.6

(continued)

Serotonion 5-HT_{2A} receptor binding test	
Test compound	Ki (nM)
Compound of Example 156	0.6
Compound of Example 161	0.8
Compound of Example 176	0.4
Compound of Example 178	2.5
Compound of Example 182	0.7
Compound of Example 188	1.1
Compound of Example 189	0.8
Compound of Example 198	0.7
Compound of Example 215	4.8
Compound of Example 218	0.5
Compound of Example 220	1.9
Compound of Example 229	0.6
Compound of Example 233	1.1
Compound of Example 234	1.1
Compound of Example 238	1.1
Compound of Example 243	0.7
Compound of Example 257	0.6
Compound of Example 269	4.7
Compound of Example 328	1.2
Compound of Example 337	1.7
Compound of Example 416	0.7
Compound of Example 521	0.6
Compound of Example 577	0.9
Compound of Example 673	1.4
Compound of Example 875	3.8
Compound of Example 876	1.2
Compound of Example 877	1.2
Compound of Example 887	1.3
Compound of Example 892	12.4
Compound of Example 895	2.8
Compound of Example 896	3.4
Compound of Example 899	1.5
Compound of Example 900	1.4
Compound of Example 902	5.8
Compound of Example 903	2.6
Compound of Example 905	13.9

3) Adrenalin α1 receptor binding assay

[0375] The assay was performed according to the method by Groβ G et al. (Groβ G, Hanft G and Kolassa N. Urapidil and some analogues with hypotensive properties show high affinities for 5-hydroxytryptamine (5-HT) binding sites of the 5-HT1A subtype and for α1-adrenoceptor binding sites. Naunyn-Schmiedeberg's Arch Pharmacol., 1987, 336: 597-601).

[0376] Wistar male rats were decapitated, the brain was retrieved immediately and cerebral cortex was taken out. It was homogenized in 50 mM Tris-hydrochloric acid buffer (100 mM NaCl, containing 2 mM dihydrogen disodium ethylene diamine tetraacetate, pH 7.4) of a volume 20 times of the weight of the tissue using a homogenizer with a high-speed rotating blade, and centrifuged at 4°C, 80,000 × g for 20 minutes. The obtained precipitate was suspended in the above-described buffer of a volume 20 times of the weight of the tissue and after incubated at 37°C for 10 minutes, centrifuged in the above-described condition. The obtained precipitate was suspended again in the above-described buffer of a

volume 20 times of the weight of the tissue and centrifuged in the above-described condition. The obtained precipitate was suspended in 50 mM (Tris)-hydrochloric acid buffer (containing 1 mM dihydrogen disodium ethylene diamine tetraacetate, pH 7.4) of a volume 20 times of the weight of the tissue and preserved by freezing at -85˚C till it was used for binding assay as a membrane specimen

[0377] The binding assay was performed using 40 μl of the membrane specimen, 20 μl of [^{3}H]-prazosin (final concentration 0.2 to 0.5 nM), 20 μl of a test drug and 50 mM Tris-hydrochloric acid buffer (containing 1 mM EDTA, pH 7.4) so that the total amount was 200 μl (final dimethylsulfoxide concentration 1%). The reaction was performed at 30˚C for 45 minutes and terminated by conducting suction filtration with a cell harvester on a glass fiber filter plate.

[0378] The filter plate made of glass fiber was washed with 50 mM Tris-hydrochloric acid buffer (pH 7.4), and after dried, a microplate liquid scintillation cocktail was added and the radioactivity was measured with a microplate scintillation counter. Radioactivity in the presence of 10 μM phentolamine hydrochloride was assumed as nonspecific binding.

[0379] IC_{50} value was calculated from concentration-dependent reaction using a non-linear analysis program. Ki value was calculated from ICso value using Cheng-Prussoff formula.

Pharmacological Test 2

Partial agonistic activity on dopamine D_2 receptor using D_2 receptor expression cells

[0380] Partial agonistic activity on dopamine D_2 receptor was evaluated by quantitatively determining cyclic AMP production inhibitory effect of a test compound in dopamine D_2 receptor expression cells in which adenosine 3',5'-cyclic monophosphate (cyclic AMP) production was induced by forskolin stimulation.

[0381] Human recombinant dopamine D_2 receptor expressing Chinese hamster ovary/DHFR(-) cells were cultured in a culture medium (Iscove's Modified Dulbecco's Medium (IMDM culture medium), 10% fetal bovine serum, 50 I.U./ml penicillin, 50 μg/ml streptomycin, 200 μg/ml geneticin, 0.1 mM sodium hypoxanthine, 16 μM thymidine) at 37˚C and 5% carbon dioxide condition. Cells were seeded at 10^4 cells/well on a 96-well microtiter plate coated with poly-L-lysine and grown under the same condition for 2 days. Each well was washed with 100 μl of a culture medium (IMDM culture medium, 0.1 mM sodium hypoxanthine, 16 μM thymidine). The culture medium was replaced with 50 μl of culture medium (IMDM culture medium, 0.1% sodium ascorbate, 0.1 mM sodium hypoxanthine, 16 μM thymidine) having dissolved therein 3 μM of a test compound. After allowed to incubate at 37˚C, 5% carbon dioxide condition for 20 minutes, the culture medium was replaced with 100 μl of forskolin stimulative culture medium (IMDM culture medium, 0.1% sodium ascorbate, 0.1 mM sodium hypoxanthine, 16 μM thymidine, 10 μM forskolin, 500 μM 3-isobutyl-1-methylxanthine) having 3 μM of the test compound dissolved therein and allowed to incubate at 37˚C, 5% carbon dioxide condition for 10 minutes. After the culture medium was removed, 200 μl of Lysis 1B aqueous solution (Amersham Bioscience, reagent attached to cyclic AMP biotrack enzyme immunoassay system) was dispensed and shaken for 10 minutes. The aqueous solution of each well was used as a sample for measurement. Samples for measurement quadruply diluted were subjected to measurement of the quantity of cyclic AMP using the above-described enzyme immunoassay system. Inhibition ratio of the respective test compound was calculated assuming that the quantity of cyclic AMP of the well to which no test compound was added was 100%. In this empiric test system, dopamine which was used as a control drug suppressed the quantity of cyclic AMP to about 10% as the maximum activity.

[0382] It was confirmed that test compounds had partial agonistic activity for dopamine D_2 receptor in the above-described test.

[0383] Since the test compounds has partial agonistic activity for dopamine D_2 receptor, they can stabilize dopamine neurotransmission to a normal condition in a schizophrenia patient and as a result, exhibit, for example, positive and negative condition improving effect, cognitive impairment improving effect and the other symptom improving effects without causing side effects.

Pharmacological Test 3

Inhibitory effect on apomorphine-induced stereotyped behavior in rats

[0384] Wistar rats (male, six-seven weeks old, Japan SLC, Inc.) were used as test animals. A test compound was suspended in 5% gum arabic/(physiological saline or water) using an agate mortar and was diluted with the same solvent if necessary.

[0385] Test animals were fasted overnight from the day before. Apomorphine (0.7 mg/kg) was subcutaneously administered (1 ml/kg) 1 hour after each test compound was orally administered (5 ml/kg). Stereotyped behavior was observed for 1 minute respectively 20, 30 and 40 minutes after apomorphine injection.

[0386] The stereotyped behavior of each animal was quantified according to the following condition and score made at three points were summed up and the anti-apomorphine effect was evaluated. Six test animals were used for each

group.

0: The appearance of the animals is the same as saline treated rats;
1: Discontinuous sniffing, constant exploratory activity;
2: Continuous sniffing, periodic exploratory activity;
3: Continuous sniffing, discontinuous biting, gnawing or licking. Very brief periods of locomotor activity;
4: Continuous biting, gnawing or licking; no exploratory activity.

[0387] Non-clinical statistical analysis system was used for all statistical processing. When the significance probability value was lower than 0.05, it was judged that a significant difference existed. The difference of the score between the solvent administration group and each test compound administration group was analyzed using Wilcoxon rank-sum test or Steel test. In addition, linear regression analysis was used for calculating 50% effective dose (95 % confidence interval).

[0388] Since the test compounds showed inhibitory effect for apomorphine-induced stereotyped behavior, it was confirmed that the test compounds have D_2 receptor antagonistic effect.

Pharmacological Test 4

Inhibitory effect on (±)D-2,5-dimethoxy-4-iodoamphetamine (DOI) induced head twitch in rats

[0389] Wistar rats (male, six-seven weeks old, Japan SLC, Inc.) were used as test animals. A test compound was suspended in 5% gum arabic/(physiological saline or water) using an agate mortar and was diluted with the same solvent if necessary.

[0390] Test animals were fasted overnight from the day before. DOI (5.0 mg/kg) was subcutaneously administered (1 ml/kg) 1 hour after each test compound was orally administered (5 ml/kg). The number of head twitches was counted for 10 minutes immediately after DOI injection. Six test animals were used for each group.

[0391] Non-clinical statistical analysis was used for all statistical processing. When the significance probability value was lower than 0.05, it was judged that a significant difference existed. The difference of the number of head twitches between the solvent administration group and each test compound administration group was analyzed using t-test or Dunnett's test. In addition, linear regression analysis was used for calculating 50% effective dose (95 % confidence interval).

[0392] Since the test compounds showed inhibitory effect for DOI-induced head twitch, it was confirmed that the test compounds have serotonin $5HT_{2A}$ receptor antagonistic effect.

Pharmacological Test 5

Catalepsy inducing effect in rats

[0393] Wistar rats (male, six-seven weeks old, Japan SLC, Inc.) were used as test animals. A test compound was suspended in 5% gum arabic/(physiological saline or water) using an agate mortar and was diluted with the same solvent if necessary.

[0394] Test animals were fasted overnight from the day before observation on catalepsy and ptosis was performed 1, 2, 4, 6 and 8 hours after each test compound was orally administered (5 ml/kg). Six test animals were used for each group.

[0395] One forepaw of a rat was placed on an edge of a steel small box (width: 6.5 cm, depth: 4.0 cm, height: 7.2 cm) (an unnatural pose) and when the rat maintained the pose for more than 30 seconds, it was judged that the case was catalepsy positive. This observation was performed three times at each point, and if there was at least one positive case, it was judged that catalepsy occurred in the individual.

[0396] As a result, catalepsy induction effect of a test compound was dissociated from inhibitory effect on apomorphine-induced stereotyped behavior, therefore it was suggested that apprehension for extrapyramidal side effect in clinic would be low.

Pharmacological Test 6

Measurement of serotonin (5-HT) uptake inhibitory activity of a test compound by rat brain synaptosome

[0397] Wistar male rats were decapitated, the brain was retrieved and frontal cortex was dissected out, and it was homogenized in 0.32 M sucrose solution of a weight 20 times of the weight of the tissue using a Potter type homogenizer. The homogenate was centrifuged at 4˚C, 1,000 × g for 10 minutes, the obtained supernatant was further centrifuged

at 4˚C, 20,000 × g for 20 minutes, and the pellet was suspended in an incubation buffer (20 mM Hepes buffer (pH 7.4) containing 10 mM glucose, 145 mM sodium chloride, 4.5 mM potassium chloride, 1.2 mM magnesium chloride, 1.5 mM calcium chloride), which was used as crude synaptosome fraction.

[0398] 5-HT uptake reaction was performed in a volume of 200 μl using a 96-well round bottom plate and pargyline (final concentration 10 μM) and sodium ascorbate (final concentration 0.2 mg/ml) were contained in the incubation buffer upon reaction and used.

[0399] Incubation buffer (total counting), non-labeled 5-HT(final concentration 10)μM, non-specific counting) and the diluted test compound (final concentration 300nM) were added to each well. One-tenth quantity of the final volume of the synaptosome fraction was added and after preincubated at 37˚C for 10 minutes, tritium labeled 5-HT solution (final concentration 8 nM) was added and uptake reaction was started at 37˚C. The uptake time was 10 minutes and the reaction was terminated by vacuum filtration through a 96-well fiber glass filter paper plate, and after the filter paper was washed with cold normal saline, it was dried enough and Microscint0 (Perkin-Elmer) was added to the filter and remaining radioactivity on the filter was measured.

[0400] Serotonin uptake inhibitory activity (%) was calculated from the radioactivity of total counting as 100%, of non-specific counting as 0%, and of counting obtained with test compound.

```
% of inhibition of 5-HT(%)=
100-[(Count obtained with test compound-Nonspecific
count(0% Uptake))/(Total count(100% Uptake)-
Nonspecific count(0% Uptake))]×100
```

[0401] The results are shown in the next Table 314.

[Table 314]

Test compound Test compound ratio	Serotonin uptake inhibitory (%) (300 nM)
Compound of Example 10	95.2
Compound of Example 14	95.3
Compound of Example 673	96.6
Compound of Example 887	94.4
Compound of Example 892	87.8
Compound of Example 905	85.0
Compound of Example 899	96.3
Compound of Example 895	82.3
Compound of Example 896	95.6
Compound of Example 875	97.2
Compound of Example 876	97.5
Compound of Example 877	97.5
Compound of Example 902	98.6
Compound of Example 903	97.1

Preparation Examples

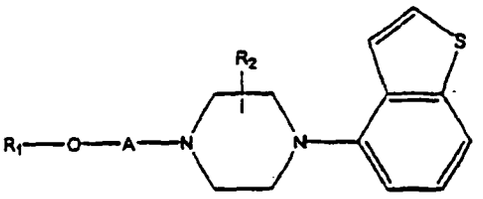
[0402] 100 g of a compound of the present invention, 40 g of Avicel (trade name, product of Asahi Chemical Industry Co., Ltd.), 30 g of corn starch and 2 g of magnesium stearate was mixed and polished and tableted with a pestle for glycocalyx R10 mm.

[0403] The obtained tablet was coated with a film using a film coating agent made up of 10 g of TC-5 (trade name, product of Shin-Etsu Chemical Co., Ltd., hydroxypropyl methylcellulose), 3 g of polyethylene glycol 6000, 40 g of castor oil and an appropriate amount of ethanol to produce a film coated tablet of the above composition.

Claims

1. A heterocyclic compound or a salt thereof represented by the formula (1):

[Formula 1]



(1)

where R^2 represents a hydrogen atom or a C_{1-6} alkyl group;
A represents a C_{1-6}alkylene group or a C_{2-6} alkenylene group; and
R^1 represents
an aromatic group selected from a phenyl group, a naphthyl group, a dihydroindenyl group and a tetrahydronaphthyl group;
wherein at least one group selected from the group consisting of the groups (1) to (66) below may be present as a substituent on the aromatic group represented by R^1:

(1) a C_{1-6} alkyl group,
(2) a C_{2-6} alkenyl group,
(3) a halogen substituted C_{1-6}alkyl group,
(4) a C_{1-6} alkoxy group,
(5) an aryloxy group,
(6) a C_{1-6} alkylthio group,
(7) a halogen substituted C_{1-6} alkoxy group,
(8) a hydroxy group,
(9) a protected hydroxy group,
(10) a hydroxy C_{1-6} alkyl group,
(11) a protected hydroxy C_{1-6} alkyl group,
(12) a halogen atom,
(13) a cyano group,
(14) an aryl group,
(15) a nitro group,
(16) an amino group,
(17) an amino group having a group(s) selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkanoyl group, a C_{1-6} alkoxycarbonyl group, a C_{1-6} alkylsulfonyl group, a carbamoyl group, a C_{1-6} alkyl carbamoyl group, an amino C_{1-6} alkanoyl group, a C_{1-6} alkanoylamino C_{1-6} alkanoyl group and a C_{1-6} alkoxy carbonylamino C_{1-6} alkanoyl group as a substituents,
(18) a C_{1-6} alkanoyl group,
(19) an arylsulfonyl group that may have a C_{1-6} alkyl group(s) on the aryl group,
(20) a carboxy group,
(21) a C_{1-6} alkoxycarbonyl group,
(22) a carboxy C_{1-6} alkyl group,
(23) a C_{1-6} alkoxycarbonyl C_{1-6} alkyl group,
(24) a C_{1-6} alkanoylamino C_{1-6} alkanoyl group,
(25) a carboxy C_{2-6} alkenyl group,
(26) a C_{1-6} alkoxycarbonyl C_{2-6}alkenyl group,
(27) a carbamoyl C_{2-6} alkenyl group that may have a group(s) selected from the group consisting of a C_{1-6} alkyl group and a halogen substituted C_{1-6} alkyl group as a substituent,
(28) a carbamoyl group that may have a group(s) selected from the group consisting of the groups (i) to (1xxviii) below as a substituent:

(i) a C_{1-6} alkyl group,
(ii) a C_{1-6} alkoxy group,
(iii) a hydroxy C_{1-6} alkyl group,
(iv) a C_{1-6} alkoxy C_{1-6} alkyl group,
(v) an aryloxyl C_{1-6} alkyl group,
(vi) a halogen substituted C_{1-6} alkyl group,
(vii) an amino C_{1-6} alkyl group that may have a group(s) selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkanoyl group, an aroyl group and a carbamoyl group,
(viii) a cyclo C3-C8 alkyl group that may have a group(s) selected from the group consisting of a C_{1-6} alkyl group, a hydroxy group, a C_{1-6} alkoxycarbonyl group and a phenyl C_{1-6} alkoxy group as a substituent,
(ix) a cyclo C3-C8 alkyl substituted C_{1-6} alkyl group,
(x) a C_{2-6} alkenyl group,
(xi) a carbamoyl C_{1-6} alkyl group that may have a group(s) selected from the group consisting of a C_{1-6} alkyl group, phenyl group that may have a C_{1-6} alkyl group(s) and a phenyl group(s) that may have a C_{1-6} alkoxy group(s) as a substituent,
(xii) a C_{1-6} alkoxycarbonyl C_{1-6} alkyl group,
(xiii) a furyl C_{1-6} alkyl group (that may have a C_{1-6} alkyl group(s) as a substituent on the furyl group).
(xiv) a tetrahydrofuryl C_{1-6} alkyl group,
(xv) a 1,3-dioxolanyl C_{1-6} alkyl group,
(xvi) a tetrahydropyranyl C_{1-6} alkyl group,
(xvii) a pyrrolyl C_{1-6} alkyl group (that may have a C_{1-6} alkyl group(s) as a substituent on the pyrrolyl group),
(xviii) a C_{1-6} alkyl group substituted with a dihydropyrazolyl group that may have an oxo group(s),
(xix) a pyrazolyl C_{1-6} alkyl group (that may have a C_{1-6} alkyl group(s) as a substituent on the pyrazolyl group),
(xx) an imidazolyl C_{1-6} alkyl group,
(xxi) a pyridyl C_{1-6} alkyl group,
(xxii) a pyrazinyl C_{1-6} alkyl group (that may have a C_{1-6} alkyl group (s) as a substituent on the pyrazinyl group),
(xxiii) a pyrrolidinyl C_{1-6} alkyl group (that may have a group(s) selected from the group consisting of an oxo group(s) and a C_{1-6} alkyl group as a substituent on the pyrrolidinyl group),
(xxiv) a piperidyl C_{1-6}alkyl group (that may have a group(s) selected from the group consisting of a benzoyl group and a C_{1-6} alkanoyl group as a substituent on the piperidyl group),
(xxv) a piperazinyl C_{1-6} alkyl group (that may have a C_{1-6} alkyl group(s) as a substituent on the piperazinyl group),
(xxvi) a morpholinyl C_{1-6} alkyl group,
(xxvii) a thienyl C_{1-6} alkyl group (that may have a C_{1-6} alkyl group(s) as a substituent on the thienyl group), thienyl group),
(xxviii) a thiazolyl C_{1-6} alkyl group,
(xxix) a dihydrobenzofuryl C_{1-6} alkyl group,
(xxx) a benzopyranyl C_{1-6} alkyl group (that may have an oxo group(s) as a substituent on the benzopyranyl group),
(xxxi) a benzimidazolyl C_{1-6} alkyl group,
(xxxii) an indolyl C_{1-6} alkyl group that may have a C_{1-6} alkoxycarbonyl group (s) on the C_{1-6} alkyl group),
(xxxiii) an imidazolyl C_{1-6} alkyl group that has a substituent(s) selected from the group consisting of a carbamoyl group and a C_{1-6} alkoxycarbonyl group on the C_{1-6} alkyl group,
(xxxiv) a pyridyl group that may have a group(s) selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkoxy group and a C_{1-6} alkylthio C_{1-6} alkyl group as a substituent,
(xxxv) a pyrrolidinyl group that may have a group (s) selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkoxycarbonyl group, a C_{1-6} alkanoyl group and an aroyl group as a substituent,
(xxxvi) a piperidyl group that may have a group(s) selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkoxycarbonyl group, a C_{1-6} alkanoyl group and an aroyl group that may have a group (s) selected from the group consisting of a C_{1-6} alkyl group and a halogen atom as a substituent,
(xxxvii) a tetrahydrofuryl group that may have an oxo group(s),
(xxxviii) a hexahydroazepinyl group that may have an oxo group(s),
(xxxix) a pyrazolyl group that may have a group(s) selected from the group consisting of a C_{1-6} alkyl group, an aryl group and a furyl group as a substituent,
(xl) a thiazolyl group,
(xli) a thiadiazolyl group that may have a C_{1-6} alkyl group(s),
(xlii) an isoxazolyl group that may have a C_{1-6} alkyl group(s),
(xliii) an indazolyl group,

(xliv) an indolyl group,
(xlv) a tetrahydrobenzothiazolyl group,
(xlvi) a tetrahydroquinolyl group that may have a group(s) selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkoxy group, a halogen atom and an oxo group as a substituent,
(xlvii) a quinolyl group that may have a C_{1-6} alkyl group (s),
(xlviii) a benzodioxolyl C_{1-6} alkyl group,
(xlix) an aryl group that may have a group(s) as a substituents, selected from the group consisting of a halogen atom; a C_{1-6} alkyl group; a C_{1-6} alkoxy group; a halogen substituted C_{1-6} alkyl group; a halogen substituted C_{1-6} alkoxy group; a C_{2-6} alkenyl group; an amino group that may have a group selected from the group consisting of a C_{1-6} alkanoyl group, a C_{1-6} alkyl sulfonyl group, a C_{1-6} alkyl group and an aryl group; a sulfamoyl group; a C_{1-6} alkylthio group; a C_{1-6} alkanoyl group; a C_{1-6} alkoxycarbonyl group; a pyrrolyl group; a C_{2-6} alkynyl group; a cyano group; a nitro group; an aryloxy group; an aryl C_{1-6} alkoxy group; a hydroxy group; a hydroxy C_{1-6} alkyl group; a carbamoyl group that may have a group (s) selected from the group consisting of a C_{1-6} alkyl group and an aryl group; a pyrazolyl group; a pyrrolidinyl group that may have an oxo group(s); an oxazolyl group; an imidazolyl group that may have a C_{1-6} alkyl group (s); a dihydrofuryl group that may have an oxo group (s); a thiazolidinyl C_{1-6} alkyl group that may have an oxo group (s); an imidazolyl C_{1-6} alkanoyl group and a piperidinylcarbonyl group,
(l) a cyano C_{1-6} alkyl group,
(li) a dihydroquinolyl group that may have a group(s) selected from the group consisting of a C_{1-6} alkyl group and an oxo group,
(lii) a halogen substituted C_{1-6} alkylamino group,
(liii) a C_{1-6} alkylthio C_{1-6} alkyl group,
(liv) an amidino group that may have a C_{1-6} alkyl group(s),
(lv) an amidino C_{1-6} alkyl group,
(lvi) a C_{1-6} alkenyloxy C_{1-6} alkyl group,
(lvii) an arylamino group that may have a substituent(s) selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkoxy group, a halogen substituted C_{1-6} alkyl group and a halogen substituted C_{1-6} alkoxy group, on the aryl group,
(lviii) an aryl C_{2-6} alkenyl group,
(lix) a pyridylamino group that may have a C_{1-6} group(s),
(lx) an aryl C_{1-6} alkyl group (that may have on the aryl group and/or the C_{1-6} alkyl group a group(s) selected from the group consisting of a halogen atom, a C_{1-6} alkyl group, a halogen substituted C_{1-6} alkyl group, a halogen substituted C_{1-6} alkoxy group, a C_{1-6} alkoxy group, a carbamoyl group and a C_{1-6} alkoxycarbonyl group as a substituent),
(lxi) a C_{2-6} alkynyl group,
(lxii) an aryloxy C_{1-6} alkyl group (that may have as a substituent on the aryl group a group(s) selected from the group consisting of a C_{1-6} alkoxy group; a carbamoyl group that may have a group(s) selected from the group consisting of a C_{1-6} alkoxy group and a C_{1-6} alkyl group; and a pyrrolidinyl group that may have an oxo group(s)),
(lxiii) an isoxazolidinyl group that may have an oxo group(s),
(lxiv) a dihydroindenyl group,
(lxv) an aryl C_{1-6} alkoxy C_{1-6} alkyl group,
(lxvi) a tetrahydropyranyl group,
(lxvii) an azetidinyl group that may have a group(s) selected from the group consisting of a C_{1-6} alkanoyl group and an iroyl group
(lxviii) an azetidinyl C_{1-6} alkyl group that may have a group(s) selected from the group consisting of a C_{1-6} alkanoyl group and aroyl group,
(lxix) a tetrazolyl group,
(lxx) an indolinyl group that may have an oxo group(s),
(lxxi) a triazolyl group that may have a group(s) selected from the group consisting of a C_{1-6} alkyl group and a C_{1-6} alkylthio group,
(lxxii) an imidazolyl group that may have a carbamoyl group(s),
(lxxiii) an oxazolyl group that may have a C_{1-6} alkyl group(s),
(lxxiv) an isothiazolyl group that may have a C_{1-6} alkyl group(s),
(lxxv) a benzimidazolyl group,
(lxxvi) a dihydrobenzothiazolyl group that may have an oxo group(s),
(lxxvii) a thienyl group that may have a C_{1-6} alkoxycarbonyl group(s), and
(lxxviii) an oxazolyl C_{1-6} alkyl group that may have a C_{1-6} alkyl group (s)

(29) an amino C_{1-6} alkyl group that may have a group(s) selected from the group consisting of a C_{1-6} alkyl group, a halogen substituted C_{1-6} alkyl group, a C_{1-6} alkoxycarbonyl group, a C_{1-6} alkanoyl group, an aryl group, an aryl C_{1-6} alkyl group, an aroyl group and an amino substituted alkyl group (that may have a C_{1-6} alkyl group (s) as a substituent on the amino group) on the amino group,
(30) a C_{1-6} alkyl group substituted with a carbamoyl group that may have a group(s) selected from the group consisting of a C_{1-6} alkyl group and a halogen substituted C_{1-6} alkyl group,
(31) a thiocarbamoyl group that may have a C_{1-6} alkyl group(s),
(32) a sulfamoyl group,
(33) an oxazolidinyl group that may have an oxo group(s),
(34) an imidazolidinyl group that may have a substituent(s) selected from the group consisting of an oxo group and a C_{1-6} alkyl group,
(35) a pyrrolidinyl group that may have an oxo group(s),
(36) an imidazolyl group,
(37) a triazolyl group,
(38) an isoxazolyl group,
(39) a piperidyl group that may have a substituent(s) selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkanoyl group, an arylsulfonyl group, an oxo group, a hydroxy group, and an amino group that may have a group(s) selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkanoyl group, a C_{1-6} alkoxycarbonyl group and C_{1-6} alkanoylamino C_{1-6} alkanoyl group,
(40) a piperidylcarbonyl group that may have a substituent(s) selected from the group consisting of a C_{1-6} alkyl group, a hydroxy group, a hydroxy C_{1-6} alkyl group, a C_{1-6} alkanoyl group, a carboxy C_{1-6} alkyl group, a C_{1-6} alkyl carbamoyl C_{1-6} alkyl group, a carbamoyl group, a C_{1-6} alkoxy group, a carboxy group, a C_{1-6} alkoxycarbonyl group, an amino group (on which 1 to 2 groups selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkanoyl group, a C_{1-6} alkoxycarbonyl group and an aroyl group may be present), a piperidyl group (on which a group(s) selected from the group consisting of a C_{1-6} alkanoyl group, a C_{1-6} alkoxy-carbonyl group and an aroyl group may be present), piperazinyl group (on which a C_{1-6} alkyl group(s) may be present as a substituent), a 1,4-dioxa-8-azaspiro[4.5]decyl group, a morpholinyl group, a hexahydro-1,4-diazepinyl group (on which a C_{1-6} alkyl group(s) may be present as a substituent) a pyridyl group, a pyridyloxy group, a pyridyl C_{1-6} alkoxy group, a tetrahydroquinolyl group (on which an oxo group(s) may be present), a benzodioxolyl group, an aryl C_{1-6} alkoxy group (that may have a group (s) selected from the group consisting of a halogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group and a halogen substituted C_{1-6} alkoxy group on the aryl group), an aryl group (on which a group(s) selected from the group consisting of a halogen atom, a C_{1-6} alkoxy group, hydroxy group may be present), an aryloxy group (that may have on the aryl group a group(s) selected from the group consisting of a cyano group, a halogen atom, C_{1-6} alkyl group, a C_{1-6} alkoxy group and a halogen substituted C_{1-6} alkyl group), an aryl C_{1-6} alkyl group (that may have on the aryl group a group(s) selected from the group consisting of a halogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group and a halogen substituted C_{1-6} alkyl group), and an aroyl group (that may have on the aryl group a group(s) selected from the group consisting of a halogen atom and a C_{1-6} alkoxy group),
(41) a pyrrolidinylcarbonyl group that may have a group as a substituent, selected from the group consisting of a hydroxy C_{1-6} alkyl group, a carbamoyl group, a hydroxy group, an amino group (that may have on the amino group a group(s) selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkanoyl group and an aroyl group), a morpholinyl C_{1-6} alkyl group, a pyrrolidinyl C_{1-6} alkyl group, a piperidyl C_{1-6} alkyl group, a piperazinyl C_{1-6} alkyl group (that may have a C_{1-6} alkyl group(s) as a substituent on the piperazinyl group), an amino C_{1-6} alkyl group (that may have a C_{1-6} alkyl group(s) as a substituent on the amino group), an aryloxy group (that may have a halogen substituted C_{1-6} alkoxy group(s) on the aryl group), an aryloxy C_{1-6} alkyl group (that may have a halogen substituted C_{1-6} alkoxy group(s) on the aryl group) and a tetrahydroquinolyl group (on which an oxo group(s) may be present),
(42) a piperazinylcarbonyl group that may have a group(s) as a substituent, selected from the group consisting of a C_{1-6} alkyl group, a cyclo C3-C8 alkyl group, a C_{1-6} alkanoyl group, a hydroxy C_{1-6} alkyl group, a C_{1-6} alkoxy C_{1-6} alkyl group, a C_{1-6} alkoxycarbonyl group, an amino C_{1-6} alkyl group (that may have a C_{1-6} alkyl group(s) as a substituent on the amino group), a piperidyl C_{1-6} alkyl group (that may have a C_{1-6} alkyl group(s) as a substituent on the piperidyl group), a morpholinyl C_{1-6} alkyl group, a pyrrolidinyl C_{1-6} alkyl group, a 1, 3-dioxolanyl C_{1-6} alkyl group, a tetrahydrofuryl C_{1-6} alkyl group, a pyridyl C_{1-6} alkyl group (that may have a phenyl group(s) as a substituent on the C_{1-6} alkyl group), a imidazolyl C_{1-6} alkyl group, a furyl C_{1-6} alkyl group, a pyrrolidinyl-carbonyl C_{1-6} alkyl group, a piperidyl group that may have a C_{1-6} alkyl group(s) as a substituent, pyridyl group (that may have on the pyridyl group a group(s) selected from the group consisting of a C_{1-6} alkyl group, a cyano group and a halogen substituted C_{1-6} alkyl group as a substituent), a thieno[2,3-b]pyridyl group, an aryl group (on which a group(s) selected from the group consisting of a halogen atom and a C_{1-6} alkyl group may be

present), an aroyl group, a furyl carbonyl group, an aryl C_{1-6} alkoxycarbonyl group and an oxo group,
(43) a hexahydroazepinylcarbonyl group,
(44) a hexahydro-1,4-diazepinylcarbonyl group that may have a substituent(s) selected from the group consisting of a C_{1-6} alkyl group and a pyridyl group,
(45) a dihydropyrrolylcarbonyl group that may have a C_{1-6} alkyl group(s),
(46) a thiomorpholinylcarbonyl group,
(47) a morpholinylcarbonyl group that may have a group(s) selected from the group consisting of a C_{1-6} alkyl group, a piperidyl C_{1-6} alkyl group and an aryl group,
(48) a thiazolidinyl carbonyl group that may have an aryl group(s) that may have a group(s) selected from the group consisting of a C_{1-6} alkoxy group and a cyano group,
(49) an azabicyclo[3.2.2]nonylcarbonyl group,
(50) an 8-azabicyclo[3.2.1]octylcarbonyl group that may have a halogen substituted or unsubstituted aryloxy group(s),
(51) an indolinylcarbonyl group,
(52) a tetrahydroquinolylcarbonyl group,
(53) a tetrahydropyrido[3.4-b]indolylcarbonyl group,
(54) a morpholinyl C_{1-6} alkyl group,
(55) a piperazinyl C_{1-6} alkyl group that may have a C_{1-6} alkyl group(s) on the piperazinyl group,
(56) a morpholinyl carbonyl C_{1-6} alkyl group,
(57) a piperazinylcarbonyl C_{1-6} alkyl group that may have a C_{1-6} alkyl group(s) on the piperazinyl group,
(58) an oxo group,
(59) an amino C_{1-6} alkoxy group (that may have a C_{1-6} alkyl group(s) on the amino group),
(60) a C_{1-6} alkoxy C_{1-6} alkoxy group,
(61) a piperazinyl group that may have a group(s) selected from the group consisting of an oxo group, a C_{1-6} alkyl group, a C_{1-6} alkanoyl group and a C_{1-6} alkoxycarbonyl group,
(62) a morpholinyl group,
(63) a 1,3,8-triazaspiro[4.5]decanylcarbonyl group that may have a group(s) selected from the group consisting of an oxo group and an aryl group,
(64) a tetrahydropyridylcarbonyl group that may have a pyridyl group(s),
(65) an imidazolidinylcarbonyl group that may have a thioxo group(s), and
(66) a 1,4-dioxa-8-azaspiro[4.5]decanyl group.

2. The compound according to claim 1, wherein, on the aromatic group represented by R^1, 1 to 5 groups selected from the group consisting of the groups (1) to (66) below may be present as a substituent(s):

(1) a C_{1-6} alkyl group,
(2) a C_{2-6} alkenyl group,
(3) a halogen substituted C_{1-6} alkyl group,
(4) a C_{1-6} alkoxy group,
(5) a phenoxy group,
(6) a C_{1-6} alkylthio group,
(7) a halogen substituted C_{1-6} alkoxy group,
(8) a hydroxy group,
(9) a phenyl C_{1-6} alkoxy group,
(10) a hydroxy C_{1-6} alkyl group,
(11) a C_{1-6} alkoxy C_{1-6} alkyl group,
(12) a halogen atom,
(13) a cyano group,
(14) a phenyl group,
(15) a nitro group,
(16) an amino group,
(17) an amino group having 1 to 2 groups selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkanoyl group, a C_{1-6} alkoxycarbonyl group, a C_{1-6} alkylsulfonyl group, a carbamoyl group, a C_{1-6} alkyl carbamoyl group, an amino C_{1-6} alkanoyl group, a C_{1-6} alkanoylamino C_{1-6} alkanoyl group and a C_{1-6} alkoxycarbonylamino C_{1-6} alkanoyl group as a substituent(s),
(18) a C_{1-6} alkanoyl group,
(19) a phenylsulfonyl group that may have a single C_{1-6} alkyl group on the phenyl group,
(20) a carboxy group,

(21) a C_{1-6} alkoxycarbonyl group,
(22) a carboxy C_{1-6} alkyl group,
(23) a C_{1-6} alkoxycarbonyl C_{1-6} alkyl group,
(24) a C_{1-6} alkanoylamino C_{1-6} alkanoyl group,
(25) a carboxy C_{2-6} alkenyl group,
(26) a C_{1-6} alkoxycarbonyl C_{2-6} alkenyl group,
(27) a carbamoyl C_{2-6} alkenyl group that may have 1 to 2 groups selected from the group consisting of a C_{1-6} alkyl group and a C_{1-6} alkyl group substituted with 1 to 3 halogen atoms as a substituent(s),
(28) a carbamoyl group that may have 1 to 2 groups selected from the group consisting of the groups (i) to (lxxviii) below as a substituent(s):

(i) a C_{1-6} alkyl group,
(ii) a C_{1-6} alkoxy group,
(iii) a hydroxy C_{1-6} alkyl group,
(iv) a C_{1-6} alkoxy C_{1-6} alkyl group,
(v) an phenoxy C_{1-6} alkyl group,
(vi) a halogen substituted C_{1-6} alkyl group,
(vii) an amino C_{1-6} alkyl group that may have 1 to 2 groups selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkanoyl group, a benzoyl group and a carbamoyl group,
(viii) a cyclo C3-C8 alkyl group that may have 1 to 3 groups selected from the group consisting of a C_{1-6} alkyl group, a hydroxy group, a C_{1-6} alkoxycarbonyl group and a phenyl C_{1-6} alkoxy group as a substituent(s),
(ix) a cyclo C3-C8 alkyl substituted C_{1-6} alkyl groups,
(x) a C_{2-6} alkenyl group,
(xi) a C_{1-6} alkyl group having 1 to 2 carbamoyl groups that may have 1 to 2 groups as a substituent(s) selected from the group consisting of a C_{1-6} alkyl group, a phenyl group that may have a single C_{1-6} alkyl group and a phenyl group that may have a single C_{1-6} alkoxy group,
(xii) a C_{1-6} alkyl group having 1 to 2 C_{1-6} alkoxy carbonyl groups,
(xiii) a furyl C_{1-6} alkyl group (that may have 1 to 2 C_{1-6} alkyl groups as a substituent(s) on the furyl group),
(xiv) a tetrahydrofuryl C_{1-6} alkyl group,
(xv) a 1,3-dioxolanyl C_{1-6} alkyl group,
(xvi) a tetrahyoropyranyl C_{1-6} alkyl group,
(xvii) a pyrrolyl C_{1-6} alkyl group (that may have 1 to 2 C_{1-6} alkyl groups on the pyrrolyl group as a substituent (s)),
(xviii) a C_{1-6} alkyl group substituted with a dihydropyrazolyl group that may have a single oxo group,
(xix) a pyrazolyl C_{1-6} alkyl group (that may have 1 to 3 C_{1-6} alkyl groups as a substituent(s) on the pyrazolyl group),
(xx) an imidazolyl C_{1-6} alkyl group,
(xxi) a pyridyl C_{1-6} alkyl group,
(xxii) a pyrazinyl C_{1-6} alkyl group (that may have 1 to 3 (preferably 1) C_{1-6} alkyl groups as a substituent(s) on the pyrazinyl group),
(xxiii) a pyrrolidinyl C_{1-6} alkyl group (that may have 1 to 2 groups selected from the group consisting of an oxo group and a C_{1-6} alkyl group as a substituent(s) on the pyrrolidinyl group),
(xxiv) a piperidyl C_{1-6} alkyl group (that may have 1 to 3 groups selected from the group consisting of a benzoyl group and a C_{1-6} alkanoyl group as a substituent(s) on the piperidyl group),
(xxv) a piperazinyl C_{1-6} alkyl group (that may have 1 to 3 C_{1-6} alkyl groups as a substituent(s) on the piperazinyl group),
(xxvi) a morpholinyl C_{1-6} alkyl group,
(xxvii) a thienyl C_{1-6} alkyl group (that may have 1 to 3 C_{1-6} alkyl groups as a substituent(s) on the thienyl group),
(xxviii) a thiazolyl C_{1-6} alkyl group,
(xxix) a dihydrobenzofuryl C_{1-6} alkyl group,
(xxx) a benzopyranyl C_{1-6} alkyl group (that may have a single oxo group as a substituent on the benzopyranyl group),
(xxxi) a benzimidazolyl C_{1-6} alkyl group,
(xxxii) an indolyl C_{1-6} alkyl group that may have 1 to 3 C_{1-6} alkoxycarbonyl groups on the C_{1-6} alkyl group),
(xxxiii) an imidazolyl C_{1-6} alkyl group that has 1 to 3 substituents selected from the group consisting of a carbamoyl group and a C_{1-6} alkoxycarbonyl group, on the C_{1-6} alkyl group,
(xxxiv) a pyridyl group that may have 1 to 3 groups selected from the group consisting of a C_{1-6} alkyl group,

a C_{1-6} alkoxy group and a C_{1-6} alkylthio C_{1-6} alkyl group as a substituent (s)
(xxxv) a pyrrolidinyl group that may have 1 to 3 groups selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkoxycarbonyl group, a C_{1-6} alkanoyl group and a benzoyl group as a substituent(s),
(xxxvi) a piperidyl group that may have 1 to 3 groups selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkoxycarbonyl group, a C_{1-6} alkanoyl group and a benzoyl group (that may have 1 to 3 groups selected from the group consisting of a C_{1-6} alkyl group and a halogen atom as a substituent(s) on the phenyl group),
(xxxvii) a tetrahydrofuryl group that may have a single oxo group
(xxxviii) a hexahydroazepinyl group that may have a single oxo group,
(xxxix) a pyrazolyl group that may have 1 to 3 groups selected from the group consisting of a C_{1-6} alkyl group, a phenyl group and a furyl group as a substituent(s),
(xl) a thiazolyl group,
(xli) thiadiazolyl group that may have 1 to 3 C_{1-6} alkyl groups,
(xlii) an isoxazolyl group that may have 1 to 3 C_{1-6} alkyl groups,
(xliii) an indazolyl group,
(xliv) an indolyl group,
(xlv) a tetrahydrobenzothiazolyl group,
(xlvi) a tetrahydroquinolyl group that may have 1 to 3 groups selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkoxy group, a halogen atom and an oxo group as a substituent(s),
(xlvii) a quinolyl group that may have 1 to 3 C_{1-6} alkyl groups,
(xlviii) a benzodioxolyl C_{1-6} alkyl group,
(xlix) a phenyl group or naphthyl group that may have 1 to 3 groups as a substituent(s), selected from the group consisting of
a halogen atom; a C_{1-6} alkyl group; a C_{1-6} alkoxy group; a halogen substituted C_{1-6} alkyl group; a halogen substituted C_{1-6} alkoxy group; a C_{2-6} alkenyl group; an amino group that may have 1 to 2 groups selected from the group consisting of a C_{1-6} alkanoyl group, a C_{1-6} alkyl sulfonyl group, a C_{1-6} alkyl group and an aryl group; a sulfamoyl group; a C_{1-6} alkylthio group; a C_{1-6} alkanoyl group; a C_{1-6} alkoxycarbonyl group; pyrrolyl group; a C_{2-6} alkynyl group; a cyano group; a nitro group; a phenyloxy group; a phenyl C_{1-6} alkoxy group; a hydroxy group; a hydroxy C_{1-6} alkyl group; a carbamoyl group that may have 1 to 2 groups selected from the group consisting of a C_{1-6} alkyl group and a phenyl group; a pyrazolyl group; a pyrrolidinyl group that may have a single oxo group; oxazolyl group; an imidazolyl group that may have 1 to 3 C_{1-6} alkyl groups; a dihydrofuryl group that may have a single oxo group; thiazolidinyl C_{1-6} group that may have two oxo groups; imidazolyl C_{1-6} alkanoyl group and piperidinylcarbonyl group,
(l) a cyano C_{1-6} alkyl group,
(li) a dihydroquinolyl group that may have 1 to 3 group(s) selected from the group consisting of a C_{1-6} alkyl group and an oxo group,
(lii) a halogen substituted C_{1-6} alkylamino group,
(liii) a C_{1-6} alkylthio C_{1-6} alkyl group,
(liv) an amidino group that may have a C_{1-6} alkyl group,
(lv) an amidino C_{1-6} alkyl group,
(lvi) a C_{2-6} alkenyloxy C_{1-6} alkyl group,
(lvii) a phenylamino group that may have 1 to 3 substituents selected from the group consisting of a C_{1-6} allkyl group, a C_{1-6} alkoxy group, a halogen substituted C_{1-6} alkyl group and a halogen substituted C_{1-6} alkoxy group on the phenyl group,
(lviii) a phenyl C_{2-6} alkenyl group,
(lix) a pyridylamino group that may have 1 to 3 C_{1-6} alkyl groups,
(lx) a phenyl C_{1-6} alkyl group (that may have as a substituent(s) on the phenyl group and/or the C_{1-6} alkyl group 1 to 3 groups selected from the group consisting of a halogen atom, a C_{1-6} alkyl group, a halogen substituted C_{1-6} alkyl group, a halogen substituted C_{1-6} alkoxy group, a C_{1-6} alkoxy group, carbamoyl group and a C_{1-6} alkoxycarbonyl group),
(lxi) a C_{2-6} alkynyl group,
(lxii) a phenyloxy C_{1-6} alkyl group (that may have 1 to 3 groups selected from the group consisting of a C_{1-6} alkoxy group, N-C_{1-6} alkoxy-N-C_{1-6} alkylcarbamoyl group and oxopyrrolidinyl group as a substituent(s) on the phenyl group),
(lxiii) an isoxazolidinyl group that may have a single oxo group,
(lxiv) a dihydroindenyl group,
(lxv) a phenyl C_{1-6} alkoxy C_{1-6} alkyl group,
(lxvi) a tetrahydropyranyl group,

(lxvii) an azetidinyl group that may have 1 to 3 groups selected from the group consisting of a C_{1-6} alkanoyl group and benzoyl group,
(lxviii) an azetidinyl C_{1-6} alkyl group that may have 1 to 3 groups selected from the group consisting of a C_{1-6} alkanoyl group and benzoyl group,
(lxix) a tetrazolyl group,
(lxx) an indolinyl group that may have a single oxo group,
(lxxi) a triazolyl group that may have 1 to 3 groups selected from the group consisting of a C_{1-6} alkyl group and a C_{1-6} alkylthio group,
(lxxii) an imidazolyl group that may have 1 to 3 carbamoyl groups,
(lxxiii) an oxazolyl group that may have 1 to 3 C_{1-6} alkyl groups,
(lxxiv) an isothiazolyl group that may have 1 to 3 C_{1-6} alkyl groups,
(lxxv) a benzimidazolyl group,
(lxxvi) a dihydrobenzothiazolyl group that may have a single oxo group,
(lxxvii) a thienyl group that may have 1 to 3 C_{1-6} alkoxycarbonyl groups, and
(lxxviii) an oxazolyl C_{1-6} alkyl group that may have 1 to 3 C_{1-6} alkyl groups,

(29) an amino C_{1-6} alkyl group that may have 1 to 2 groups selected from the group consisting of a C_{1-6} alkyl group, a halogen substituted C_{1-6} alkyl group, a C_{1-6}alkoxycarbonyl group, a C_{1-6} alkanoyl group, a phenyl group, a phenyl C_{1-6} alkyl group, a benzoyl group and an amino substituted alkyl group (that may have 1 to 2 C_{1-6} alkyl groups as a substituent(s) on the amino group), on the amino group,
(30) a C_{1-6} alkyl group substituted with a single carbamoyl group that may have 1 to 2 groups selected from the group consisting of a C_{1-6} alkyl group and a halogen substituted C_{1-6} alkyl group,
(31) a thiocarbamoyl group that may have 1 to 2 C_{1-6} alkyl groups,
(32) a sulfamoyl group,
(33) an oxazolidinyl group that may have a single oxo group,
(34) an imidazolidinyl group that may have 1 to 2 substituents selected from the group consisting of an oxo group and a C_{1-6} alkyl group,
(35) a pyrrolidinyl group that may have a single oxo group,
(36) an imidazolyl group,
(37) a triazolyl group,
(38) an isoxazolyl group,
(39) a piperidyl group that may have 1 to 3 substituents selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkanoyl group, a C_{1-6} alkylphenylsulfonyl group, an oxo group, a hydroxy group, and an amino group that may have 1 to 2 groups selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkanoyl group, a C_{1-6} alkoxycarbonyl group, a C_{1-6} alkanoyl group, a C_{1-6} alkoxycarbonyl group and a C_{1-6} alkanoylamino C_{1-6} alkanoyl group,
(40) a piperidylcarbonyl group that may have 1 to 3 substituent(s) selected from the group consisting of a C_{1-6} alkyl group, a hydroxy group, a hydroxy C_{1-6} alkyl group, a C_{1-6} alkanoyl group, a carboxy C_{1-6} alkyl group, a C_{1-6} alkyl carbamoyl C_{1-6} alkyl group, a carbamoyl group, a C_{1-6} alkoxy group, a carboxy group, a C_{1-6} alkoxycarbonyl group, an amino group (on which 1 to 2 groups selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkanoyl group, a C_{1-6} alkoxycarbonyl group and a benzoyl group may be present), a piperidyl group (on which 1 to 3 groups selected from the group consisting of a C_{1-6} alkanoyl group, a C_{1-6} alkoxycarbonyl group and a benzoyl group may be present), a piperazinyl group (on which 1 to 3 C_{1-6} alkyl groups may be present as a substituent(s)1, a 1,4-dioxa-8-azaspiro[4.5]decyl group, a morpholinyl group, a hexahydro-1,4-diazepynyl group (on which a single C_{1-6} alkyl group may be present as a substituent), a pyridyl group, a pyridyloxy group, a pyridyl C_{1-6} alkoxy group, a tetrahydroquinolyl group (on which a single oxo group may be present), a benzodioxolyl group, a phenyl C_{1-6} alkoxy group (that may have on the phenyl group 1 to 3 groups selected from the group consisting of a halogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group and a halogen substituted C_{1-6} alkoxy group), a phenyl group (on which 1 to 3 groups selected from the group consisting of a halogen atom, a C_{1-6} alkoxy group and a hydroxy group may be present), phenyloxy group (that may have on the phenyl group 1 to 3 groups selected from the group consisting of a cyano group, a halogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group and a halogen substituted C_{1-6} alkyl group), a phenyl C_{1-6} alkyl group (on the phenyl group, -1 to 3 groups selected from the group consisting of a halogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group and a halogen substituted C_{1-6} alkyl group may be present), and a benzoyl group (that may have 1 to 3 groups selected from the group consisting of a halogen atom and a C_{1-6} alkoxy group on the phenyl group),
(41) a pyrrolidinylcarbonyl group that may have 1 to 3 groups as a substituent(s) selected from the group consisting of a hydroxy C_{1-6} alkyl group, carbamoyl group, a hydroxy group, an amino group (that may have 1 to 2 groups selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkanoyl group and a benzoyl group

on the amino group), a morpholinyl C_{1-6} alkyl group, a pyrrolidinyl C_{1-6} alkyl group, a piperidyl C_{1-6} alkyl group, a piperazinyl C_{1-6} alkyl group (that may have a single C_{1-6} alkyl group as a substituent on the piperazinyl group), an amino C_{1-6} alkyl group (that may have 1 to 2 C_{1-6} alkyl groups may be present as a substituent on the amino group), phenyloxy group (that may have 1 to 3 halogen substituted C_{1-6} alkoxy groups on the phenyl group), a phenyloxy C_{1-6} alkyl group (that may have 1 to 3 halogen substituted C_{1-6} alkoxy groups on the phenyl group) and a tetrahydroquinolyl group (on which an oxo group may be present),
(42) a piperazinylcarbonyl group that may have 1 to 3 groups as a substituent(s) selected from the group consisting of a C_{1-6} alkyl group, a cyclo C3-C8 alkyl group, a C_{1-6} alkanoyl group, a hydroxy C_{1-6} alkyl group, a C_{1-6} alkoxy C_{1-6} alkyl group, a C_{1-6} alkoxycarbonyl group, an amino C_{1-6} alkyl group (that may have 1 to 2 C_{1-6} alkyl groups as a substituent(s) on the amino group), a piperidyl C_{1-6} alkyl group (that may have 1 to 2 C_{1-6} alkyl groups as a substituent(s) on the piperidyl group), a morpholinyl C_{1-6} alkyl group, a pyrrolidinyl C_{1-6} alkyl group, a 1,3-dioxolanyl C_{1-6} alkyl group, a tetrahydrofuryl C_{1-6} alkyl group, a pyridyl C_{1-6} group (that may have 1 to 2 phenyl groups as a substituent(s) on the C_{1-6} alkyl group), an imidazolyl C_{1-6} alkyle group, a furyl C_{1-6} alkyl group, a pyrrolidinylcarbonyl C_{1-6} group, a piperidyl group that may have 1 to 2 C_{1-6} alkyl groups as a substituent(s)), a pyridyl group (that may have 1 to 3 groups selected from the group consisting of a C_{1-6} alkyl group, a cyano group and a halogen substituted C_{1-6} alkyl group as a substituent(s) on the pyridyl group), a thieno[2,3-b]pyridyl group, a phenyl group (on which 1 to 3 groups selected from the group consisting of a halogen atom and a C_{1-6} alkyl group may be present), a benzoyl group, a furyl carbonyl group, a phenyl C_{1-6} alkoxycarbonyl group and an oxo group,
(43) a hexahydroazepinylcarbonyl group,
(44) a hexahydro-1,4-diazepinylcarbonyl group that may have 1 to 3 substituent selected from the group consisting of a C_{1-6} group and a pyridyl group,
(45) a dihydropyrrolylcarbonyl group that may have 1 to 3 C_{1-6} alkyl groups,
(46) a thiomorpholinylcarbonyl group,
(47) a morpholinylcarbonyl group that may have 1 to 3 groups selected from the group consisting of a C_{1-6} alkyl group, a piperidyl C_{1-6} alkyl group and a phenyl group,
(48) a thiazolidinyl cabonyl group that may have 1 to 3 phenyl groups that may have 1 to 3 groups selected from the group consisting of a C_{1-6} alkoxy group and a cyano group,
(49) an azabicyclo[3.2.2]nonylcarbonyl group,
(50) an 8-azabicyclo[3.2.1]octylcarbonyl group that may have 1 to 3 halogen substituted or unsubstituted phenyloxy groups,
(51) an indolinylcarbonyl group,
(52) a tetrahydroquinolylcarbonyl group,
(53) a tetrahydropyrido[3.4-b]indolylcarbonyl group,
(54) a morpholinyl C_{1-6} alkyl group,
(55) a piperazinyl C_{1-6} alkyl group that may have 1 to 3 C_{1-6} alkyl groups on the piperazinyl group,
(56) a morpholinylcarbonyl C_{1-6} alkyl group,
(57) a piperazinylcarbonyl C_{1-6} alkyl group that may have 1 to 3 C_{1-6} alkyl groups on the piperazinyl group,
(58) an oxo group,
(59) an amino C_{1-6} alkoxy group (that may have 1 to 2 C_{1-6} alkyl groups on the amino group),
(60) a C_{1-6} alkoxy C_{1-6} alkoxy group,
(61) a piperazinyl group that may have 1 to 3 groups selected from the group consisting of an oxo group, a C_{1-6} alkyl group, a C_{1-6} alkanoyl group and a C_{1-6} alkoxycarbonyl .group,
(62) a morpholinyl group,
(63) a 1,3,8-triazaspiro[4.5]decanylcarbonyl group that may have 1 to 3 groups selected from the group consisting of an oxo group and a phenyl group,
(64) a tetrahydropyridylcarbonyl group that may have 1 to 3 pyridyl groups,
(65) an imidazolidinylcarbonyl group that may have a single thioxo group, and
(66) a 1,4-dioxa-8-azaspiro[4.5]decanyl group.

3. The compound according to claim 1 or 2, wherein A is a C_{1-6} alkylene group.

4. The compound according to claim 3, wherein R^1 represents
a phenyl group; and
on the phenyl group represented by R^1, 1 to 5 groups selected from the group consisting of (1) to (66) defined in claim 2 may be present as a substituent(s).

5. The compound according to claim 4, wherein R^1 represents

a phenyl group; and
on the phenyl group represented by R^1, 1 to 5 groups selected from the group consisting of (1), (4), (10), (17), (18), (21), (28), (29), (30), (33), (34), (35), (36), (39), (61) and (62) shown below may be present as a substituent(s):

(1) a C_{1-6} alkyl group,
(4) a C_{1-6} alkoxy group,
(10) a hydroxy C_{1-6} alkyl group,
(17) an amino group having 1 to 2 groups selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkanoyl group, a C_{1-6} alkoxycarbonyl group, a C_{1-6} alkylsulfonyl group, a carbamoyl group, a C_{1-6} alkyl carbamoyl group, an amino C_{1-6} alkanoyl group, a C_{1-6} alkanoylamino C_{1-6} alkanoyl group and a C_{1-6} alkoxycarbonylamino C_{1-6} alkanoyl group, as a substituent(s),
(18) a C_{1-6} alkanoyl group,
(21) a C_{1-6} alkoxycarbonyl group,
(28) a carbamoyl group that may have 1 to 2 groups selected from the group consisting of the groups (i), (ii), (iv), (xii) and (xxi) below as a substituent(s):

(i) a C_{1-6} alkyl group,
(ii) a C_{1-6} alkoxy group,
(iv) a C_{1-6} alkoxy C_{1-6} alkyl group,
(xii) a C_{1-6} alkyl group having 1 to 2 C_{1-6} alkoxy carbonyl groups,
(xxi) a pyridyl C_{1-6} alkyl group,

(29) an amino C_{1-6} alkyl group that may have, on the amino group, 1 to 2 groups selected from the group consisting of a C_{1-6} alkyl group, a halogen substituted C_{1-6} alkyl group, a C_{1-6} alkoxycarbonyl group, a C_{1-6} alkanoyl group, a phenyl group, a phenyl C_{1-6} alkyl group, a benzoyl group and an amino substituted C_{1-6} alkyl group (which may have 1 to 2 C_{1-6} alkyl groups may be present as a substituent(s) on the amino group),
(30) a C_{1-6} alkyl group substituted with a single carbamoyl group that may have 1 to 2 groups selected from the group consisting of a C_{1-6} alkyl group and a halogen substituted C_{1-6} alkyl group, (33) an oxazolidinyl group that may have a single oxo group,
(34) an imidazolidinyl group that may have 1 to 2 substituents selected from the group consisting of an oxo group and a C_{1-6} alkyl group,
(35) a pyrrolidinyl group that may have a single oxo group,
(36) an imidazolyl group,
(39) a piperidyl group that may have 1 to 3 substituents selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkanoyl group, a C_{1-6} alkyl phenylsulfonyl group, an oxo group, hydroxy group, and an amino group that may have 1 to 2 groups selected from the group consisting of a C_{1-6} alkyl group, a C_{1-6} alkanoyl group, a C_{1-6} alkoxycarbonyl group and a C_{1-6} alkanoylamino C_{1-6} alkanoyl group,
(61) a piperazinyl group that may have 1 to 3 groups selected from the group consisting of an oxo group, a C_{1-6} alkyl group, a C_{1-6} alkanoyl group and a C_{1-6} alkoxycarbonyl group, and
(62) a morpholinyl group.

6. The compound according to claim 5, wherein R^1 represents (II) a phenyl groups and, on the aromatic group represented by R^1, 1 to 3 groups selected from the group consisting of (1) , (4) , (10), (17) , (18) (21) , (28) , (29) , (30), (33) , (34) , (35) , (36), (39) , (61) and (62) defined in claim 5 may be present as a substituent(s).

7. The compound according to claim 6, wherein R^1 represents (II) a phenyl group, and, on the phenyl group represented by R^1, 1 to 3 groups selected from the group consisting of (1), (4), (10), (17), (18), (28), (33), (35), (39) and (61) shown below may be present as a substituent(s).

(1) a C_{1-6} alkyl group,
(4) a C_{1-6} alkoxy group,
(10) a hydroxy C_{1-6} alkyl group,
(17) an amino group having 1 to 2 groups selected from the group consisting of a C_{1-6} alkyl group, an amino C_{1-6} alkanoyl group, a C_{1-6} alkanoylamino C_{1-6} alkanoyl group and a C_{1-6} alkoxy carbonylamino C_{1-6} alkanoyl group, as a substituent(s),
(18) a C_{1-6} alkanoyl group,
(28) a carbamoyl group having a single C_{1-6} alkoxy C_{1-6} alkyl group,
(33) an oxazolidinyl group that may have a single oxo group,

(35) a pyrrolidinyl group that may have a single oxo group,
(39) a piperidyl group, and
(61) a piperazinyl group that may have 1 to 2 groups selected from the group consisting of an oxo group, a C_{1-6} alkanoyl group and a C_{1-6} alkoxycarbonyl group.

8. The compound according to claim 7, wherein R^1 is a phenyl group having, on the phenyl group, a single C_{1-6} alkyl group, a single C_{1-6} alkoxy group and a single amino group having 1 or 2 C_{1-6} alkyl groups on the amino group;
a phenyl group having, on the phenyl group, a single C_{1-6} alkyl group, a single C_{1-6} alkoxy group and a single carbamoyl group having a single C_{1-6} alkyl group, which has two C_{1-6} alkoxy groups on the C_{1-6} alkyl group;
a phenyl group having, on the phenyl group, a single hydroxy C_{1-6} alkyl group, a single C_{1-6} alkoxy group and a single oxazolidinyl group having a single oxo group on the oxazolidinyl group;
a phenyl group having, on the phenyl group, a single C_{1-6} alkyl group, a single C_{1-6} alkoxy group and a single pyrrolidinyl group;
a phenyl group having, on the phenyl group, a single C_{1-6} alkyl group, a single C_{1-6} alkoxy group and a single piperidyl group;
a phenyl group having, on the phenyl group, a single C_{1-6} alkyl group, a single C_{1-6} alkoxy group and a single piperazyl group having a single C_{1-6} alkanoyl group on the piperazyl group;
a phenyl group having, on the phenyl group, a single C_{1-6} alkyl group, a single C_{1-6} alkoxy group and a single piperazyl group having a single C_{1-6} alkanoyl group and a single oxo group on the piperazyl group;
a phenyl group having, on the phenyl group, a single C_{1-6} alkyl group, a single C_{1-6} alkoxy group and a single piperazyl group having a single C_{1-6} alkoxycarbonyl group and a single oxo group on the piperazyl group;
a phenyl group having, on the phenyl group, a single C_{1-6} alkyl group, a single C_{1-6} alkoxy group and a single N-[(N-C_{1-6} alkoxy-carbonylamino) C_{1-6} alkanoyl]amino group;
a phenyl group having, on the phenyl group, a single C_{1-6} alkyl group, a single C_{1-6} alkoxy group and a single N-(amino C_{1-6} alkanoyl) amino group;
a phenyl group having, on the phenyl group, a single C_{1-6} alkyl group, a single C_{1-6} alkoxy group and a single N-[(N-C_{1-6} alkanoyl amino C_{1-6} alkanoyl]amino group;
a phenyl group having, on the phenyl group, a single C_{1-6} alkoxy group, a single C_{1-6} alkanoyl group and a single piperazyl group having a single C_{1-6} alkoxycarbonyl group on the piperazyl group; or
a phenyl group having, on the phenyl group, a single C_{1-6} alkoxy group, a single hydroxy C_{1-6} alkyl group and a single piperazyl group having a single C_{1-6} alkoxycarbonyl group on the piperazyl group.

9. The compound according to claim 8 selected from the group consisting of :

(1) N-methyl-4-[3-{4-(benzo[b]thiophen-4-yl)piperazin-1-yl}propoxy]-3-methoxy-5-methylailine;
(2) 4-[3-{4-(Benzo[b]thiophen-4-yl)piperazin-1-yl}propoxy]-N,N-dimethyl-3-methoxy-5-methylaniline;
(3) 4-[3-{4-(Benzo[b]thiophen-4-yl)piperazin-1-yl}propoxy]-N-(2,2-dimethoxyethyl)-3-methoxy-5-methylbenzamide;
(4) 1-(Benzo[b]thiophen-4-yl)-4-[3-{2-methoxy-6-methyl-4-(pyrrolidin-1-yl)phenoxy}propyl]piperazine;
(5) 1-(Benzo[b]thiophen-4-yl)-4-[3-{2-methoxy-6-methyl-4-(piperidin-1-yl)phenoxy}propyl]piperazine;
(6) 1-Acetyl-4-{4-[3-{4-(Benzo[b]thiophen-4-yl)piperazin-1-yl}propoxy]-3-methoxy-5-methylphenyl}piperazine;,
(7) 4-Acetyl-1-{4-[3-{4-(benzo[b]thiophen-4-yl)piperazin-1-yl}propoxy]-3-methoxy-5-methylphenyl}piperazin-2-one;
(8) 4-(4-[3-(4-(Benzo[b]thiophen-4-yl)piperazin-1-yl)propoxy]-3-methoxy-5-methylphenyl)-3-axo-1-methoxycarbonylpiperazine;
(9) Tert-Butyl N-(N-{4-[3-{4-(benzo[b]thiophen-4-yl)piperazin-1-yl}proposy]-3-methoxy-5-methylphenyl}carbamoylmethyl)carbamate;
(10) 2-Amino-N-{4-[3-{4-(benzo[b]thiophen-4-yl)piperazin-1-yl}propoxy]-3-methoxy-5-methylphenyl}acetamide;
(11) 2-Acetylamino-N-{4-[3-{4-(benzo[b]thiophen-4-yl)piperazin-1-yl}propoxy]-3-methoxy-5-methylphenyl}acetamide;
(12) 4-{4-[3-{4-(Benzo[b]thiophen-4-yl)piperazin-1-yl}propoxy]-3-formyl-5-methoxyphenyl}-1-methoxycarbonylpiperazine; and
(13) 4-{4-[3-{4-(Benzo[b]thiophen-4-yl)piperazin-1-yl}propoxy]-3-hydroxymethyl-5-methoxyphenyl}-1-methoxycarbonylpiperazine, or a salt thereof.

10. A pharmaceutical composition comprising a heterocyclic compound of the formula (1) or a salt thereof according to any one of claims 1 to 9, as an active ingredient and a pharmaceutically acceptable carrier.

11. The pharmaceutical composition according to claim 10 for treating or preventing central nervous system disorders.

12. The pharmaceutical composition according to claim 11 for treating or preventing central nervous system disorders selected from the group consisting of schizophrenia; refractory, intractable or chronic schizophrenia; emotional disturbance; psychotic disorder; mood disorder; bipolar I type disorder; bipolar II type disorder; depression; endogenous; depression; major depression; melancholy and refractory depression; dysthymic disorder; cyclothymic disorder; panic attack; panic disorder; agoraphobia; social phobia; obsessive-compulsive disorder; post-traumatic stress disorder; generalized anxiety disorder; acute stress disorder; hysteria; somatization disorder; conversion disorder; pain disorder; hypochondriasis; factitious disorder; dissociative disorder; sexual dysfunction; sexual desire disorder; sexual arousal disorder; erectile dysfunction; anorexia nervosa; bulimia nervosa; sleep disorder; adjustment disorder; alcohol abuse; alcohol intoxication; drug addiction; stimulant intoxication; narcotism; anhedonia; iatrogenic anhedonia; anhedonia of a psychic or mental cause; anhedonia associated with depression; anhedonia associated with schizophrenia; delirium; cognitive impairment; cognitive impairment associated with Alzheimer's disease, Parkinson's disease and other neurodegenerative diseases; cognitive impairment caused by Alzheimer's disease; Parkinson's disease and associated neurodegenerative diseases; cognitive impairment of schizophrenia; cognitive impairment caused by refractory, intractable or chronic schizophrenia; vomiting; motion sickness; obesity; migraine; pain (ache); mental retardation; autism disorder (autism); Tourette's disorder; tic disorder; attention-deficit/hyperactivity disorder; conduct disorder; and Down's syndrome.

13. A process for producing a pharmaceutical composition comprising mixing a heterocyclic compound of the formula (1) or a salt thereof according to any one of claims 1 to 9 with a pharmaceutically acceptable carrier.

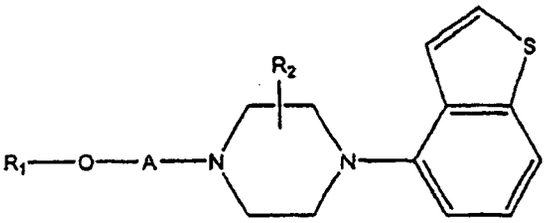
14. A heterocyclic compound of the formula (1) or a salt thereof according to any one of claims 1 to 9 for use as a drug.

15. A heterocylic compound of the formula (1) or a salt thereof according to any one of claims 1 to 9 for use as a dopamine D_2 receptor partial agonist and/or serotonin 5-HT_{2A} receptor antagonist and/or an adrenaline α_1 receptor antagonist and/or a serotonin uptake inhibitor and/or a serotonin reuptake inhibitor, effective for treating or preventing a central nervous system disorder.

16. A heterocylic compound of the formula (1) or a salt thereof according to any one of claims 1 to 9 for use in treating or preventing a central nervous system disorder.

17. The compound for use according to claim 16, wherein the central nervous system disorder is selected from the group consisting of schizophrenia; refractory, intractable or chronic schizophrenia, emotional disturbance; psychotic disorder; mood disorder; bipolar I type disorder; bipolar II type disorder; depression; endogenous depression; major depression; melancholy and refractory depression; dysthymic disorder; cyclothymic disorder; panic attack; panic disorder; agoraphobia; social phobia; obsessive-compulsive disorder; post-traumatic stress disorder; generalized anxiety disorder; acute stress disorder; hysteria; somatization disorder; conversion disorder; pain disorder; hypochondriasis; factitious disorder; dissociative disorder; sexual dysfunction; sexual desire disorder; sexual arousal disorder; erectile dysfunction; anorexia nervosa; bulimia nervosa; sleep disorder; adjustment disorder; alcohol abuse; alcohol intoxication; drug addiction; stimulant intoxication; narcotism; anhedonia; iatrogenic anhedonia, anhedonia of a psychic or mental cause; anhedonia associated with depression; anhedonia associated with schizophrenia; delirium; cognitive impairment; cognitive impairment associated with Alzheimer's disease, Parkinson's disease and other neurodegenerative diseases; cognitive impairment caused by Alzheimer's disease, Parkinson's disease and associated neurodegenerative diseases; cognitive impairment of schizophrenia; cognitive impairment caused by refractory, intractable or chronic schizophrenia; vomiting; motion sicknes; obesity; migraine; pain (ache); mental retardation; autism disorder (autism); Tourette's disorder; tic disorder; attention-deficit/hyperactivity disorder; conduct disorder; and Down's syndrome.

18. A process for producing a heterocyclic compound represented by the formula (1):

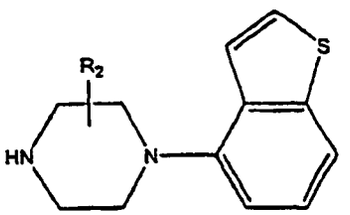


(1)

[wherein R_1, R_2 and A are the same as defined in claim 1] or a salt thereof, **characterized by** comprising a reaction of a compound represented by the formula:

$$R_1\text{-}O\text{-}A\text{-}X_1$$

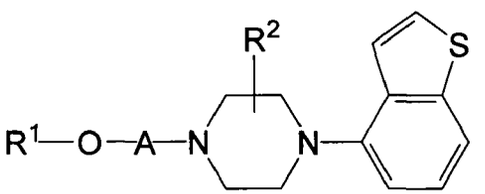
[wherein R_1 and A are the same as defined above, and X_1 represents a halogen atom or a group which causes a substitution reaction the same as in a halogen atom] or a salt thereof with a compound represented by the formula



[wherein R_2 is the same as defined above] or a salt thereof.

Patentansprüche

1. Heterocyclische Verbindung oder ein Salz davon, dargestellt durch die Formel (1):



(I)

worin
R^2 ein Wasserstoffatom oder eine C_{1-6}-Alkylgruppe darstellt;
A eine C_{1-6}-Alkylengruppe oder eine C_{2-6}-Alkenylengruppe darstellt; und
R^1 eine aromatische Gruppe, ausgewählt aus einer Phenylgruppe, einer Naphthylgruppe, einer Dihydroindenylgruppe und einer
Tetrahydronaphthalingruppe, darstellt;
wobei mindestens eine Gruppe, ausgewählt aus der Gruppe bestehend aus den nachstehenden Gruppen (1) bis (66), an der durch R^1 dargestellten aromatischen Gruppe als Substituent vorhanden sein kann/können:

(1) eine C_{1-6}-Alkylgruppe,
(2) eine C_{2-6}-Alkenylgruppe,
(3) eine Halogen-substituierte C_{1-6}-Alkylgruppe,
(4) eine C_{1-6}-Alkoxygruppe,
(5) eine Aryloxygruppe,

(6) eine C_{1-6}-Alkylthiogruppe,
(7) eine Halogen-substituierte C_{1-6}-Alkoxygruppe,
(8) eine Hydroxygruppe,
(9) eine geschützte Hydroxygruppe,
(10) eine Hydroxy-C_{1-6}-alkyl-Gruppe,
(11) eine geschützte Hydroxy-C_{1-6}-alkyl-Gruppe,
(12) ein Halogenatom,
(13) eine Cyanogruppe,
(14) eine Arylgruppe,
(15) eine Nitrogruppe,
(16) eine Aminogruppe,
(17) eine Aminogruppe mit (einer) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-}-Alkylgruppe, einer C_{1-6}-Alkanoylgruppe, einer C_{1-6}-Alkoxycarbonylgruppe, einer C_{1-6}-Alkylsulfonylgruppe, einer Carbamoylgruppe, einer C_{1-6}-Alkylcarbamoylgruppe, einer Amino-C_{1-6}-alkanoyl-Gruppe, einer C_{1-6}-Alkanoylamino-C_{1-6}-alkanoyl-Gruppe und einer C_{1-6}-Alkoxycarbonylamino-C_{1-6}-alkanoyl-Gruppe, als Substituent,
(18) eine C_{1-6}-Alkanoylgruppe,
(19) eine Arylsulfonylgruppe, die (eine) C_{1-6}-Alkylgruppe(n) an der Arylgruppe aufweisen kann,
(20) eine Carboxygruppe,
(21) eine C_{1-6}-Alkoxycarbonylgruppe,
(22) eine Carboxy-C_{1-6}-alkyl-Gruppe,
(23) eine C_{1-6}-Alkoxycarbonyl-C_{1-6}-alkyl-Gruppe,
(24) eine C_{1-6}-Alkanoylamino-C_{1-6}-alkanoyl-Gruppe,
(25) eine Carboxy-C_{2-6}-alkenyl-Gruppe,
(26) eine C_{1-6}-Alkoxycarbonyl-C_{2-6}-alkenyl-Gruppe,
(27) eine Carbamoyl-C_{2-6}-alkenyl-Gruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe und einer Halogen-substituierten C_{1-6}-Alkylgruppe, als Substituenten aufweisen kann,
(28) eine Carbamoylgruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer der nachstehenden Gruppen (i) bis (lxxviii), als Substituenten aufweisen kann:

(i) eine C_{1-6}-Alkylgruppe,
(ii) eine C_{1-6}-Alkoxygruppe,
(iii) eine Hydroxy-C_{1-6}-alkyl-Gruppe,
(iv) eine C_{1-6}-Alkoxy-C_{1-6}-alkyl-Gruppe,
(v) eine Aryloxy-C_{1-6}-alkyl-Gruppe,
(vi) eine Halogen-substituierte C_{1-6}-Alkylgruppe,
(vii) eine Amino-C_{1-6}-alkyl-Gruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkanoylgruppe, einer Aroylgruppe und einer Carbamoylgruppe, aufweisen kann,
(viii) eine Cyclo-C_{3-8}-alkyl-Gruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer Hydroxygruppe, einer C_{1-6}-Alkoxycarbonylgruppe und einer Phenyl-C_{1-6}-alkoxy-Gruppe, als Substituenten aufweisen kann,
(ix) eine Cyclo-C_{3-8}-alkyl-substituierte C_{1-6}-Alkylgruppe,
(x) eine C_{2-6}-Alkenylgruppe,
(xi) eine Carbamoyl-C_{1-6}-alkyl-Gruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer Phenylgruppe, die (eine) Alkylgruppe(n) aufweisen kann, und (einer) Phenylgruppe(n), die (eine) C_{1-6}-Alkoxygruppe(n) aufweisen kann, als Substituenten aufweisen kann,
(xii) eine C_{1-6}-Alkoxycarbonyl-C_{1-6}-alkylGruppe,
(xiii) eine Furyl-C_{1-6}-alkyl-Gruppe (die (eine) C_{1-6}-Alkylgruppe(n) als Substituenten an der Furylgruppe aufweisen kann),
(xiv) eine Tetrahydrofuryl-C_{1-6}-alkylGruppe,
(xv) eine 1,3-Dioxolanyl-C_{1-6}-alkyl-Gruppe,
(xvi) eine Tetrahydropyranyl-C_{1-6}-alkylGruppe,
(xvii) eine Pyrrolyl-C_{1-6}-alkyl-Gruppe (die (eine) C_{1-6}-Alkylgruppe(n) als Substituenten an der Pyrrolylgruppe aufweisen kann),
(xviii) eine C_{1-6}-Alkylgruppe, substituiert mit einer Dihydropyrazolylgruppe, die (eine) Oxogruppe(n) aufweisen kann,
(xix) eine Pyrazolyl-C_{1-6}-alkyl-Gruppe (die (eine) C_{1-6}-Alkylgruppe(n) als Substituenten an der Pyrazolylgruppe aufweisen kann),

(xx) eine Imidazolyl-C_{1-6}-alkyl-Gruppe,
(xxi) eine Pyridyl-C_{1-6}-alkyl-Gruppe,
(xxii) eine Pyrazinyl-C_{1-6}-alkyl-Gruppe (die (eine) C_{1-6}-Alkylgruppe(n) als Substituenten an der Pyrazinylgruppe aufweisen kann),
(xxiii) eine Pyrrolidinyl-C_{1-6}-alkyl-Gruppe (die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus (einer) Oxogruppe(n) und einer C_{1-6}-Alkylgruppe, als Substituenten an der Pyrrolidinylgruppe aufweisen kann),
(xxiv) eine Piperidyl-C_{1-6}-alkyl-Gruppe (die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer Benzoylgruppe und einer C_{1-6}-Alkanoylgruppe, als Substituenten an der Piperidylgruppe aufweisen kann),
(xxv) eine Piperazinyl-C_{1-6}-alkyl-Gruppe (die (eine) C_{1-6}-Alkylgruppe(n) als Substituenten an der Piperazinylgruppe aufweisen kann),
(xxvi) eine Morpholinyl-C_{1-6}-alkyl-Gruppe,
(xxvii) eine Thienyl-C_{1-6}-alkyl-Gruppe (die (eine) C_{1-6}-Alkylgruppe(n) als Substituenten an der Thienylgruppe aufweisen kann),
(xxviii) eine Thiazolyl-C_{1-6}-alkyl-Gruppe,
(xxix) eine Dihydrobenzofuryl-C_{1-6}-alkylGruppe,
(xxx) eine Benzopyranyl-C_{1-6}-alkyl-Gruppe (die (eine) Oxogruppe(n) als Substituenten an der Benzopyranylgruppe aufweisen kann),
(xxxi) eine Benzimidazolyl-C_{1-6}-alkyl-Gruppe,
(xxxii) eine Indolyl-C_{1-6}-alkyl-Gruppe, die (eine) C_{1-6}-Alkoxycarbonylgruppe(n) an der C_{1-6}-Alkylgruppe aufweisen kann,
(xxxiii) eine Imidazolyl-C_{1-6}-alkyl-Gruppe, die (einen) Substituenten, ausgewählt aus der Gruppe bestehend aus einer Carbamoylgruppe und einer C_{1-6}-Alkoxycarbonylgruppe, an der C_{1-6}-Alkylgruppe aufweisen kann,
(xxxiv) eine Pyridylgruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkoxygruppe und einer C_{1-6}-Alkylthio-C_{1-6}-alkyl-Gruppe, als Substituenten aufweisen kann,
(xxxv) eine Pyrrolidinylgruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkoxycarbonylgruppe, einer C_{1-6}-Alkanoylgruppe und einer Aroylgruppe, als Substituenten aufweisen kann,
(xxxvi) eine Piperidylgruppe, die (eine) Gruppe(n) aufweisen kann, ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkoxycarbonylgruppe, einer C_{1-6}-Alkanoylgruppe und einer Aroylgruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe und einem Halogenatom, als Substituenten aufweisen kann,
(xxxvii) eine Tetrahydrofurylgruppe, die (eine) Oxogruppe(n) aufweisen kann,
(xxxviii) eine Hexahydroazepinylgruppe, die (eine) Oxogruppe(n) aufweisen kann,
(xxxix) eine Pyrazolylgruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer Arylgruppe und einer Furylgruppe, als Substituenten aufweisen kann,
(xl) eine Thiazolylgruppe,
(xli) eine Thiadiazolylgruppe, die (eine) C_{1-6}-Alkylgruppe(n) aufweisen kann,
(xlii) eine Isoxazolylgruppe, die (eine) C_{1-6}-Alkylgruppe(n) aufweisen kann,
(xliii) eine Indazolylgruppe,
(xliv) eine Indolylgruppe,
(xlv) eine Tetrahydrobenzothiazolylgruppe,
(xlvi) eine Tetrahydrochinolylgruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkoxygruppe, einem Halogenatom und einer Oxogruppe, als Substituenten aufweisen kann,
(xlvii) eine Chinolylgruppe, die (eine) C_{1-6}-Alkylgruppe(n) aufweisen kann,
(xlviii) eine Benzodioxolyl-C_{1-6}-Gruppe,
(xlix) eine Arylgruppe, die (eine) Gruppe(n) als Substituenten aufweisen kann, ausgewählt aus der Gruppe bestehend aus einem Halogenatom; einer C_{1-6}-Alkylgruppe; einer C_{1-6}-Alkoxygruppe; einer Halogen-substituierten C_{1-6}-Alkylgruppe; einer Halogen-substituierten C_{1-6}-Alkoxygruppe; einer C_{2-6}-Alkenylgruppe; einer Aminogruppe, die eine Gruppe, ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkanoylgruppe, einer C_{1-6}-Alkylsulfonylgruppe, einer C_{1-6}-Alkylgruppe und einer Arylgruppe, aufweisen kann; einer Sulfamoylgruppe; einer C_{1-6}-Alkylthiogruppe; einer C_{1-6}-Alkanoylgruppe; einer C_{1-6}-Alkoxycarbonylgruppe; einer Pyrrolylgruppe; einer C_{2-6}-Alkinylgruppe; einer Cyanogruppe; einer Nitrogruppe; einer Aryloxygruppe; einer Aryl-C_{1-6}-alkoxyGruppe; einer Hydroxygruppe; einer Hydroxy-C_{1-6}-alkyl-Gruppe; einer Carbamoylgruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe und einer

Arylgruppe, aufweisen kann; einer Pyrazolylgruppe; einer Pyrrolidinylgruppe, die (eine) Oxogruppe(n) aufweisen kann; einer Oxazolylgruppe; einer Imidazolylgruppe, die (eine) C_{1-6}-Alkylgruppe(n) aufweisen kann; einer Dihydrofurylgruppe, die (eine) Oxogruppe(n) aufweisen kann; einer Thiazolidinyl-C_{1-6}-alkyl-Gruppe, die (eine) Oxogruppe(n) aufweisen kann; einer Imidazolyl-C_{1-6}-alkanoyl-Gruppe und einer Piperidinylcarbonylgruppe,

(l) eine Cyano-C_{1-6}-alkyl-Gruppe,

(li) eine Dihydrochinolylgruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe und einer Oxogruppe, aufweisen kann,

(lii) eine Halogen-substituierte C_{1-6}-Alkylaminogruppe,

(liii) eine C_{1-6}-Alkylthio-C_{1-6}-alkyl-Gruppe,

(liv) eine Amidinogruppe, die (eine) C_{1-6}-Alkylgruppe(n) aufweisen kann,

(lv) eine Amidino-C_{1-6}-alkyl-Gruppe,

(lvi) eine C_{2-6}-Alkenyloxy-C_{1-6}-alkylGruppe,

(lvii) eine Arylaminogruppe, die (einen) Substituenten, ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkoxygruppe, einer Halogen-substituierten C_{1-6}-Alkylgruppe und einer Halogen-substituierten C_{1-6}-Alkoxygruppe, an der Arylgruppe aufweisen kann,

(lviii) eine Aryl-C_{2-6}-alkenyl-Gruppe,

(lix) eine Pyridylaminogruppe, die (eine) C_{1-6}-Alkylgruppe(n) aufweisen kann,

(lx) eine Aryl-C_{1-6}-alkyl-Gruppe (die an der Arylgruppe und/oder der C_{1-6}-Alkylgruppe (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einem Halogenatom, einer C_{1-6}-Alkylgruppe, einer Halogen-substituierten C_{1-6}-Alkylgruppe, einer Halogen-substituierten C_{1-6}-Alkoxygruppe, einer C_{1-6}-Alkoxygruppe, einer Carbamoylgruppe und einer C_{1-6}-Alkoxycarbonylgruppe, als Substituenten aufweisen kann),

(lxi) eine C_{2-6}-Alkinylgruppe,

(lxii) eine Aryloxy-C_{1-6}-alkyl-Gruppe (die als Substituenten an der Arylgruppe (eine) Gruppe(n) aufweisen kann, ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkoxygruppe; einer Carbamoylgruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkoxygruppe und einer C_{1-6}-Alkylgruppe, aufweisen kann; und einer Pyrrolidinylgruppe, die (eine) Oxogruppe(n) aufweisen kann,

(lxiii) eine Isoxazolidinylgruppe, die (eine) Oxogruppe(n) aufweisen kann,

(lxiv) eine Dihydroindenylgruppe,

(lxv) eine Aryl-C_{1-6}-alkoxy-C_{1-6}-alkylGruppe,

(lxvi) eine Tetrahydropyranylgruppe,

(lxvii) eine Azetidinylgruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkanoylgruppe und einer Aroylgruppe, aufweisen kann,

(lxviii) eine Azetidinyl-C_{1-6}-alkyl-Gruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkanoylgruppe und einer Aroylgruppe, aufweisen kann,

(lxix) eine Tetrazolylgruppe,

(lxx) eine Indolinylgruppe, die (eine) Oxogruppe(n) aufweisen kann,

(lxxi) eine Triazolylgruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe und einer C_{1-6}-Alkylthiogruppe, aufweisen kann,

(lxxii) eine Imidazolylgruppe, die (eine) Carbamoylgruppe(n) aufweisen kann,

(lxxiii) eine Oxazolylgruppe, die (eine) C_{1-6}-Alkylgruppe(n) aufweisen kann,

(lxxiv) eine Isothiazolylgruppe, die (eine) C_{1-6}-Alkylgruppe(n) aufweisen kann,

(lxxv) eine Benzimidazolylgruppe,

(lxxvi) eine Dihydrobenzothiazolylgruppe, die (eine) Oxogruppe(n) aufweisen kann,

(lxxvii) eine Thienylgruppe, die (eine) C_{1-6}-Alkoxycarbonylgruppe(n) aufweisen kann, und

(lxxviii) eine Oxazolyl-C_{1-6}-alkyl-Gruppe, die (eine) C_{1-6}-Alkylgruppe(n) aufweisen kann;

(29) eine Amino-C_{1-6}-alkyl-Gruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer Halogen-substituierten C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkoxycarbonylgruppe, einer C_{1-6}-Alkanoylgruppe, einer Arylgruppe, einer Aryl-C_{1-6}-alkyl-Gruppe, einer Aroylgruppe und einer Amino-substituierten Alkylgruppe (die (eine) C_{1-6}-Alkylgruppe(n) als Substituenten an der Aminogruppe aufweisen kann), an der Aminogruppe aufweisen kann,

(30) eine C_{1-6}-Alkylgruppe, substituiert mit einer Carbamoylgruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe und einer Halogen-substituierten C_{1-6}-Alkylgruppe, aufweisen kann,

(31) eine Thiocarbamoylgruppe, die (eine) C_{1-6}-Alkylgruppe(n) aufweisen kann,

(32) eine Sulfamoylgruppe,

(33) eine Oxazolidinylgruppe, die (eine) Oxogruppe(n) aufweisen kann,

(34) eine Imidazolidinylgruppe, die (einen) Substituenten, ausgewählt aus der Gruppe bestehend aus einer Oxogruppe und einer C_{1-6}-Alkylgruppe, aufweisen kann,
(35) eine Pyrrolidinylgruppe, die (eine) Oxogruppe(n) aufweisen kann,
(36) eine Imidazolylgruppe,
(37) eine Triazolylgruppe,
(38) eine Isoxazolylgruppe,
(39) eine Piperidylgruppe, die (einen) Substituenten aufweisen kann, ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkanoylgruppe, einer Arylsulfonylgruppe, einer Oxogruppe, einer Hydroxygruppe und einer Aminogruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkanoylgruppe, einer C_{1-6}-Alkoxycarbonylgruppe und einer C_{1-6}-Alkanoylamino-C_{1-6}-alkanoyl-Gruppe, aufweisen kann,
(40) eine Piperidylcarbonylgruppe, die (einen) Substituenten aufweisen kann, ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer Hydroxygruppe, einer Hydroxy-C_{1-6}-alkylGruppe, einer C_{1-6}-Alkanoylgruppe, einer Carboxy-C_{1-6}-alkyl-Gruppe, einer C_{1-6}-Alkylcarbamoyl-C_{1-6}-alkyl-Gruppe, einer Carbamoylgruppe, einer C_{1-6}-Alkoxygruppe, einer Carboxygruppe, einer C_{1-6}-Alkoxycarbonylgruppe, einer Aminogruppe (an der 1 bis 2 Gruppen, ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkanoylgruppe, einer C_{1-6}-Alkoxycarbonylgruppe und einer Aroylgruppe, vorhanden sein können), einer Piperidylgruppe (an der (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkanoylgruppe, einer C_{1-6}-Alkoxycarbonylgruppe und einer Aroylgruppe, vorhanden sein kann/können), einer Piperazinylgruppe (an der (eine) C_{1-6}-Alkylgruppe(n) als Substituent vorhanden sein kann/können), einer 1,4-Dioxa-8-azaspiro[4.5]decyl-Gruppe, einer Morpholinylgruppe, einer Hexahydro-1,4-diazepinyl-Gruppe (an der (eine) C_{1-6}-Alkylgruppe(n) als Substituent vorhanden sein kann/können), einer Pyridylgruppe, einer Pyridyloxygruppe, einer Pyridyl-C_{1-6}-alkoxyGruppe, einer Tetrahydrochinolylgruppe (an der (eine) Oxogruppe(n) vorhanden sein kann/können), einer Benzodioxolylgruppe, einer Aryl-C_{1-6}-alkoxy-Gruppe (die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einem Halogenatom, einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkoxygruppe und einer Halogen-substituierten C_{1-6}-Alkoxygruppe, an der Arylgruppe aufweisen kann), einer Arylgruppe (an der (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einem Halogenatom, einer C_{1-6}-Alkoxygruppe, und einer Hydroxygruppe, vorhanden sein kann/können), einer Aryloxygruppe (die an der Arylgruppe (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer Cyanogruppe, einem Halogenatom, einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkoxygruppe und einer Halogen-substituierten C_{1-6}-Alkylgruppe; aufweisen kann), eine Aryl-C_{1-6}-alkyl-Gruppe (die an der Arylgruppe (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einem Halogenatom, einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkoxygruppe und einer Halogen-substituierten C_{1-6}-Alkylgruppe, aufweisen kann), und eine Aroylgruppe (die an der Arylgruppe (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einem Halogenatom und einer C_{1-6}-Alkoxygruppe, aufweisen kann),
(41) eine Pyrrolidinylcarbonylgruppe, die eine Gruppe als Substituenten aufweisen kann, ausgewählt aus der Gruppe bestehend aus einer Hydroxy-C_{1-6}-alkyl-Gruppe, einer Carbamoylgruppe, einer Hydroxygruppe, einer Aminogruppe (die an der Aminogruppe (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkanoylgruppe und einer Aroylgruppe, aufweisen kann), einer Morpholinyl-C_{1-6}-alkylGruppe, einer Pyrrolidinyl-C_{1-6}-alkyl-Gruppe, einer Piperidinyl-C_{1-6}-alkyl-Gruppe, einer Piperazinyl-C_{1-6}-alkyl-Gruppe (die (eine) C_{1-6}-Alkylgruppe(n) als Substituenten an der Piperazinylgruppe aufweisen kann), einer Amino-C_{1-6}-alkyl-Gruppe (die (eine) C_{1-6}-Alkylgruppe(n) als Substituenten an der Aminogruppe aufweisen kann), einer Aryloxygruppe (die (eine) Halogen-substituierte C_{1-6}-Alkoxygruppe(n) an der Arylgruppe aufweisen kann), einer Aryloxy-C_{1-6}-alkyl-Gruppe (die (eine) Halogen-substituierte C_{1-6}-Alkoxygruppe(n) an der Arylgruppe aufweisen kann) und einer Tetrahydrochinolylgruppe (an der (eine) Oxogruppe(n) vorhanden sein kann/können),
(42) eine Piperazinylcarbonylgruppe, die (eine) Gruppe(n) als Substituenten aufweisen kann, ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer Cyclo-C_{3-8}-alkyl-Gruppe, einer C_{1-6}-Alkanoylgruppe, einer Hydroxy-C_{1-6}-alkyl-Gruppe, einer C_{1-6}-Alkoxy-C_{1-6}-alkylGruppe, einer C_{1-6}-Alkoxycarbonylgruppe, einer Amino-C_{1-6}-alkyl-Gruppe (die (eine) C_{1-6}-Alkylgruppe(n) als Substituenten an der Aminogruppe aufweisen kann), einer Piperidyl-C_{1-6}-alkyl-Gruppe (die (eine) C_{1-6}-Alkylgruppe(n) als Substituenten an der Piperidylgruppe aufweisen kann), einer Morpholinyl-C_{1-6}-alkyl-Gruppe, einer Pyrrolidinyl-C_{1-6}-alkyl-Gruppe, einer 1,3-Dioxolanyl-C_{1-6}-alkyl-Gruppe, einer Tetrahydrofuryl-C_{1-6}-alkyl-Gruppe, einer Pyridyl-C_{1-6}-alkyl-Gruppe (die (eine) Phenylgruppe(n) als Substituenten an der C_{1-6}-Alkylgruppe aufweisen kann), einer Imidazolyl-C_{1-6}-alkyl-Gruppe, einer Furyl-C_{1-6}-alkylGruppe, einer Pyrrolidinylcarbonyl-C_{1-6}-alkylGruppe, einer Piperidylgruppe, die (eine) C_{1-6}-Alkylgruppe(n) als Substituenten aufweisen kann, einer Pyridylgruppe (die an der Pyridylgruppe (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer Cyanogruppe und einer Halogen-substituierten C_{1-6}-Alkylgruppe, als Substituenten aufweisen kann), einer Thieno[2,3-b]pyridyl-Gruppe, einer Arylgruppe (an der (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einem Halogenatom

und einer C_{1-6}-Alkylgruppe, vorhanden sein kann/können), einer Aroylgruppe, einer Furylcarbonylgruppe, einer Aryl-C_{1-6}-alkoxycarbonyl-Gruppe und einer Oxogruppe,
(43) eine Hexahydroazepinylcarbonylgruppe,
(44) eine Hexahydro-1,4-diazepinylcarbonyl-Gruppe, die (einen) Substituenten, ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe und einer Pyridylgruppe, aufweisen kann,
(45) eine Dihydropyrrolylcarbonylgruppe, die (eine) C_{1-6}-Alkylgruppe(n) aufweisen kann,
(46) eine Thiomorpholinylcarbonylgruppe,
(47) eine Morpholinylcarbonylgruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer Piperidyl-C_{1-6}-alkyl-Gruppe und einer Arylgruppe, aufweisen kann,
(48) eine Thiazolidinylcarbonylgruppe, die (eine) Arylgruppe(n) aufweisen kann, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkoxygruppe und einer Cyanogruppe, aufweisen kann,
(49) eine Azabicyclo[3.2.2]nonylcarbonyl-Gruppe,
(50) eine 8-Azabicyclo[3.2.1]octylcarbonyl-Gruppe, die (eine) Halogen-substituierte oder unsubstituierte Aryloxygruppe(n) aufweisen kann,
(51) eine Indolinylcarbonylgruppe,
(52) eine Tetrahydrochinolylcarbonylgruppe,
(53) eine Tetrahydropyrido[3.4-b]indolylcarbonyl-Gruppe,
(54) eine Morpholinyl-C_{1-6}-alkyl-Gruppe,
(55) eine Piperazinyl-C_{1-6}-alkyl-Gruppe, die (eine) C_{1-6}-Alkylgruppe(n) an der Piperazinylgruppe aufweisen kann,
(56) eine Morpholinylcarbonyl-C_{1-6}-alkyl-Gruppe,
(57) eine Piperazinylcarbonyl-C_{1-6}-alkyl-Gruppe, die (eine) C_{1-6}-Alkylgruppe(n) an der Piperazinylgruppe aufweisen kann,
(58) eine Oxogruppe,
(59) eine Amino-C_{1-6}-alkoxy-Gruppe (die (eine) C_{1-6}-Alkylgruppe(n) an der Aminogruppe aufweisen kann),
(60) eine C_{1-6}-Alkoxy-C_{1-6}-alkoxy-Gruppe,
(61) eine Piperazinylgruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer Oxogruppe, einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkanoylgruppe und einer C_{1-6}-Alkoxycarbonylgruppe, aufweisen kann,
(62) eine Morpholinylgruppe,
(63) eine 1,3,8-Triazaspiro[4.5]decanylcarbonyl-Gruppe, die (eine) Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer Oxogruppe und einer Arylgruppe, aufweisen kann,
(64) eine Tetrahydropyridylcarbonylgruppe, die (eine) Pyridylgruppe(n) aufweisen kann,
(65) eine Imidazolidinylcarbonylgruppe, die (eine) Thioxogruppe(n) aufweisen kann, und
(66) eine 1,4-Dioxa-8-azaspiro[4.5]decanyl-Gruppe.

2. Verbindung gemäss Anspruch 1, wobei an der durch R^1 dargestellten aromatischen Gruppe 1 bis 5 Gruppen, ausgewählt aus der Gruppe bestehend aus den nachstehenden Gruppen (1) bis (66), als Substituent vorhanden sein kann/können:

(1) eine C_{1-6}-Alkylgruppe,
(2) eine C_{2-6}-Alkenylgruppe,
(3) eine Halogen-substituierte C_{1-6}-Alkylgruppe,
(4) eine C_{1-6}-Alkoxygruppe,
(5) eine Phenoxygruppe,
(6) eine C_{1-6}-Alkylthiogruppe,
(7) eine Halogen-substituierte C_{1-6}-Alkoxygruppe,
(8) eine Hydroxygruppe,
(9) eine Phenyl-C_{1-6}-alkoxy-Gruppe,
(10) eine Hydroxy-C_{1-6}-alkyl-Gruppe,
(11) eine C_{1-6}-Alkoxy-C_{1-6}-alkyl-Gruppe,
(12) ein Halogenatom,
(13) eine Cyanogruppe,
(14) eine Phenylgruppe,
(15) eine Nitrogruppe,
(16) eine Aminogruppe,
(17) eine Aminogruppe mit 1 bis 2 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkanoylgruppe, einer C_{1-6}-Alkoxycarbonylgruppe, einer C_{1-6}-Alkylsulfonylgruppe, einer Carbamoylgruppe, einer C_{1-6}-Alkylcarbamoylgruppe, einer Amino-C_{1-6}-alkanoyl-Gruppe, einer C_{1-6}-Alkanoylamino-

C_{1-6}-alkanoyl-Gruppe und einer C_{1-6}-Alkoxycarbonylamino-C_{1-6}-alkanoyl-Gruppe, als Substituent(en),
(18) eine C_{1-6}-Alkanoylgruppe,
(19) eine Phenylsulfonylgruppe, die eine einzelne C_{1-6}-Alkylgruppe an der Phenylgruppe aufweisen kann,
(20) eine Carboxygruppe,
(21) eine C_{1-6}-Alkoxycarbonylgruppe,
(22) eine Carboxy-C_{1-6}-alkyl-Gruppe,
(23) eine C_{1-6}-Alkoxycarbonyl-C_{1-6}-alkyl-Gruppe,
(24) eine C_{1-6}-Alkanoylamino-C_{1-6}-alkanoyl-Gruppe,
(25) eine Carboxy-C_{2-6}-alkenyl-Gruppe,
(26) eine C_{1-6}-Alkoxycarbonyl-C_{2-6}-alkenyl-Gruppe,
(27) eine Carbamoyl-C_{2-6}-alkenyl-Gruppe, die 1 bis 2 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe und einer C_{1-6}-Alkylgruppe, substituiert mit 1 bis 3 Halogenatom(en), als Substituent (en) aufweisen kann,
(28) eine Carbamoylgruppe, die 1 bis 2 Gruppe(n), ausgewählt aus der Gruppe bestehend aus den nachstehenden Gruppen (i) bis (lxxviii), als Substituent(en) aufweisen kann:

(i) eine C_{1-6}-Alkylgruppe,
(ii) eine C_{1-6}-Alkoxygruppe,
(iii) eine Hydroxy-C_{1-6}-alkyl-Gruppe,
(iv) eine C_{1-6}-Alkoxy-C_{1-6}-alkyl-Gruppe,
(v) eine Phenoxy-C_{1-6}-alkyl-Gruppe,
(vi) eine Halogen-substituierte C_{1-6}-Alkylgruppe,
(vii) eine Amino-C_{1-6}-alkyl-Gruppe, die 1 bis 2 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkanoylgruppe, einer Benzoylgruppe und einer Carbamoylgruppe, aufweisen kann,
(viii) eine Cyclo-C_{3-8}-alkyl-Gruppe, die 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer Hydroxygruppe, einer C_{1-6}-Alkoxycarbonylgruppe und einer Phenyl-C_{1-6}-alkoxy-Gruppe, als Substituent(en) aufweisen kann,
(ix) eine Cyclo-C_{3-8}-alkyl-substituierte Alkylgruppe,
(x) eine C_{2-6}-Alkenylgruppe,
(xi) eine C_{1-6}-Alkylgruppe mit 1 bis 2 Carbamoylgruppe(n), die 1 bis 2 Gruppe(n) als Substituent(en) aufweisen kann, ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer Phenylgruppe, die eine einzelne C_{1-6}-Alkylgruppe aufweisen kann, und einer Phenylgruppe, die eine einzelne C_{1-6}-Alkoxygruppe(n) aufweisen kann,
(xii) eine C_{1-6}-Alkylgruppe mit 1 bis 2 C_{1-6}-Alkoxycarbonylgruppe(n),
(xiii) eine Furyl-C_{1-6}-alkyl-Gruppe (die 1 bis 2 C_{1-6}-Alkylgruppe(n) als Substituent(en) aufweisen kann) an der Furylgruppe,
(xiv) eine Tetrahydrofuryl-C_{1-6}-alkylGruppe,
(xv) eine 1,3-Dioxolanyl-C_{1-6}-alkyl-Gruppe,
(xvi) eine Tetrahydropyranyl-C_{1-6}-alkylGruppe,
(xvii) eine Pyrrolyl-C_{1-6}-alkyl-Gruppe (die 1 bis 2 C_{1-6}-Alkylgruppe(n) an der Pyrrolylgruppe als Substituent (en) aufweisen kann),
(xviii) eine C_{1-6}-Alkylgruppe, substituiert mit einer Dihydropyrazolylgruppe, die eine einzelne Oxogruppe aufweisen kann,
(xix) eine Pyrazolyl-C_{1-6}-alkyl-Gruppe (die 1 bis 3 C_{1-6}-Alkylgruppe(n) als Substituent(en) an der Pyrazolylgruppe aufweisen kann),
(xx) eine Imidazolyl-C_{1-6}-alkyl-Gruppe,
(xxi) eine Pyridyl-C_{1-6}-alkyl-Gruppe,
(xxii) eine Pyrazinyl-C_{1-6}-alkyl-Gruppe (die 1 bis 3 (vorzugsweise 1) C_{1-6}-Alkylgruppe(n) als Substituent (en) an der Pyrazinylgruppe aufweisen kann),
(xxiii) eine Pyrrolidinyl-C_{1-6}-alkyl-Gruppe (die 1 bis 2 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer Oxogruppe und einer C_{1-6}-Alkylgruppe, als Substituent(en) an der Pyrrolidinylgruppe aufweisen kann),
(xxiv) eine Piperidyl-C_{1-6}-alkyl-Gruppe (die 1 bis 3 Gruppe(n), bestehend aus einer Benzoylgruppe und einer C_{1-6}-Alkanoylgruppe, als Substituent(en) an der Piperidylgruppe aufweisen kann),
(xxv) eine Piperazinyl-C_{1-6}-alkyl-Gruppe (die 1 bis 3 C_{1-6}-Alkylgruppe(n) als Substituent(en) an der Piperazinylgruppe aufweisen kann),
(xxvi) eine Morpholinyl-C_{1-6}-alkyl-Gruppe,

(xxvii) eine Thienyl-C_{1-6}-alkyl-Gruppe (die 1 bis 3 C_{1-6}-Alkylgruppe(n) als Substituent(en) an der Thienylgruppe aufweisen kann),
(xxviii) eine Thiazolyl-C_{1-6}-alkyl-Gruppe,
(xxix) eine Dihydrobenzofuryl-C_{1-6}-alkylGruppe,
(xxx) eine Benzopyranyl-C_{1-6}-alkyl-Gruppe (die eine einzelne Oxogruppe als Substituenten an der Benzopyranylgruppe aufweisen kann),
(xxxi) eine Benzimidazolyl-C_{1-6}-alkyl-Gruppe,
(xxxii) eine Indolyl-C_{1-6}-alkyl-Gruppe, die 1 bis 3 C_{1-6}-Alkoxycarbonylgruppe(n) an der C_{1-6}-Alkylgruppe aufweisen kann,
(xxxiii) eine Imidazolyl-C_{1-6}-alkyl-Gruppe, die 1 bis 3 Substituenten, ausgewählt aus der Gruppe bestehend aus einer Carbamoylgruppe und einer C_{1-6}-Alkoxycarbonylgruppe, an der C_{1-6}-Alkylgruppe aufweisen kann,
(xxxiv) eine Pyridylgruppe, die 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkoxygruppe und einer C_{1-6}-Alkylthio-C_{1-6}-alkyl-Gruppe, als Substituent(en) aufweisen kann,
(xxxv) eine Pyrrolidinylgruppe, die 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkoxycarbonylgruppe, einer C_{1-6}-Alkanoylgruppe und einer Benzoylgruppe, als Substituent(en) aufweisen kann,
(xxxvi) eine Piperidylgruppe, die 1 bis 3 Gruppe(n) aufweisen kann, ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkoxycarbonylgruppe, einer C_{1-6}-Alkanoylgruppe und einer Benzoylgruppe (die 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe und einem Halogenatom, als Substituent(en) an der Phenylgruppe aufweisen kann),
(xxxvii) eine Tetrahydrofurylgruppe, die eine einzelne Oxogruppe aufweisen kann,
(xxxviii) eine Hexahydroazepinylgruppe, die eine einzelne Oxogruppe aufweisen kann,
(xxxix) eine Pyrazolylgruppe, die 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer Phenylgruppe und einer Furylgruppe, als Substituent(en) aufweisen kann,
(xl) eine Thiazolylgruppe,
(xli) eine Thiadiazolylgruppe, die 1 bis 3 C_{1-6}-Alkylgruppe(n) aufweisen kann,
(xlii) eine Isoxazolylgruppe, die 1 bis 3 C_{1-6}-Alkylgruppe(n) aufweisen kann,
(xliii) eine Indazolylgruppe,
(xliv) eine Indolylgruppe,
(xlv) eine Tetrahydrobenzothiazolylgruppe,
(xlvi) eine Tetrahydrochinolylgruppe, die 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkoxygruppe, einem Halogenatom und einer Oxogruppe, als Substituent(en) aufweisen kann,
(xlvii) eine Chinolylgruppe, die 1 bis 3 C_{1-6}-Alkylgruppe(n) aufweisen kann,
(xlviii) eine Benzodioxolyl-C_{1-6}-alkyl-Gruppe,
(xlix) eine Phenylgruppe oder Naphthylgruppe, die 1 bis 3 Gruppe(n) als Substituent(en) aufweisen kann, ausgewählt aus der Gruppe bestehend aus einem Halogenatom; einer C_{1-6}-Alkylgruppe; einer C_{1-6}-Alkoxygruppe; einer Halogen-substituierten C_{1-6}-Alkylgruppe; einer Halogen-substituierten C_{1-6}-Alkoxygruppe; einer C_{2-6}-Alkenylgruppe; einer Aminogruppe, die 1 bis 2 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkanoylgruppe, einer C_{1-6}-Alkylsulfonylgruppe, einer C_{1-6}-Alkylgruppe und einer Arylgruppe, aufweisen kann; einer Sulfamoylgruppe; einer C_{1-6}-Alkylthiogruppe; einer C_{1-6}-Alkanoylgruppe; einer C_{1-6}-Alkoxycarbonylgruppe; einer Pyrrolylgruppe; einer C_{2-6}-Alkinylgruppe; einer Cyanogruppe; einer Nitrogruppe; einer Phenyloxygruppe; einer Phenyl-C_{1-6}-alkoxy-Gruppe; einer Hydroxygruppe; einer Hydroxy-C_{1-6}-alkyl-Gruppe; einer Carbamoylgruppe, die 1 bis 2 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe und einer Phenylgruppe, aufweisen kann; einer Pyrazolylgruppe; einer Pyrrolidinylgruppe, die eine einzelne Oxogruppe aufweisen kann; einer Oxazolylgruppe; einer Imidazolylgruppe, die 1 bis 3 C_{1-6}-Alkylgruppe(n) aufweisen kann; einer Dihydrofurylgruppe, die eine einzelne Oxogruppe aufweisen kann; einer Thiazolidinyl-C_{1-6}-alkyl-Gruppe, die zwei Oxogruppen aufweisen kann; einer Imidazolyl-C_{1-6}-alkanoyl-Gruppe und einer Piperidinylcarbonylgruppe,
(l) eine Cyano-C_{1-6}-alkyl-Gruppe,
(li) eine Dihydrochinolylgruppe, die 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe und einer Oxogruppe, aufweisen kann,
(lii) eine Halogen-substituierte C_{1-6}-Alkylaminogruppe,
(liii) eine C_{1-6}-Alkylthio-C_{1-6}-alkyl-Gruppe,
(liv) eine Amidinogruppe, die eine C_{1-6}-Alkylgruppe aufweisen kann,
(lv) eine Amidino-C_{1-6}-alkyl-Gruppe,
(lvi) eine C_{2-6}-Alkenyloxy-C_{1-6}-alkylGruppe,

(lvii) eine Phenylaminogruppe, die 1 bis 3 Substituent(en), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkoxygruppe, einer Halogen-substituierten C_{1-6}-Alkylgruppe und einer Halogen-substituierten C_{1-6}-Alkoxygruppe, an der Phenylgruppe aufweisen kann,
(lviii) eine Phenyl-C_{2-6}-alkenyl-Gruppe,
(lix) eine Pyridylaminogruppe, die 1 bis 3 C_{1-6}-Alkylgruppe(n) aufweisen kann,
(lx) eine Phenyl-C_{1-6}-alkyl-Gruppe (die als Substituenten an der Phenylgruppe und/oder der C_{1-6}-Alkylgruppe 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einem Halogenatom, einer C_{1-6}-Alkylgruppe, einer Halogen-substituierten C_{1-6}-Alkylgruppe, einer Halogen-substituierten C_{1-6}-Alkoxygruppe, einer C_{1-6}-Alkoxygruppe, einer Carbamoylgruppe und einer C_{1-6}-Alkoxycarbonylgruppe, aufweisen kann),
(lxi) eine C_{2-6}-Alkinylgruppe,
(lxii) eine Phenyloxy-C_{1-6}-alkyl-Gruppe (die 1 bis 3 Gruppen(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkoxygruppe; einer N-C_{1-6}-Alkoxy-N-C_{1-6}-alkylcarbamoyl-Gruppe und einer Oxopyrrolidinylgruppe, als Substituent(en) an der Phenylgruppe aufweisen kann),
(lxiii) eine Isoxazolidinylgruppe, die eine einzelne Oxogruppe aufweisen kann,
(lxiv) eine Dihydroindenylgruppe,
(lxv) eine Phenyl-C_{1-6}-alkoxy-C_{1-6}-alkylGruppe,
(lxvi) eine Tetrahydropyranylgruppe,
(lxvii) eine Azetidinylgruppe, die 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkanoylgruppe und einer Benzoylgruppe, aufweisen kann,
(lxviii) eine Azetidinyl-C_{1-6}-alkyl-Gruppe, die 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkanoylgruppe und einer Benzoylgruppe, aufweisen kann,
(lxix) eine Tetrazolylgruppe,
(lxx) eine Indolinylgruppe, die eine einzelne Oxogruppe aufweisen kann,
(lxxi) eine Triazolylgruppe, die 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe und einer C_{1-6}-Alkylthiogruppe, aufweisen kann,
(lxxii) eine Imidazolylgruppe, die 1 bis 3 Carbamoylgruppe(n) aufweisen kann,
(lxxiii) eine Oxazolylgruppe, die 1 bis 3 C_{1-6}-Alkylgruppe(n) aufweisen kann,
(lxxiv) eine Isothiazolylgruppe, die 1 bis 3 C_{1-6}-Alkylgruppe(n) aufweisen kann,
(lxxv) eine Benzimidazolylgruppe,
(lxxvi) eine Dihydrobenzothiazolylgruppe, die eine einzelne Oxogruppe aufweisen kann,
(lxxvii) eine Thienylgruppe, die 1 bis 3 C_{1-6}-Alkoxycarbonylgruppe(n) aufweisen kann, und
(lxxviii) eine Oxazolyl-C_{1-6}-alkyl-Gruppe, die 1 bis 3 C_{1-6}-Alkylgruppe(n) aufweisen kann;

(29) eine Amino-C_{1-6}-alkyl-Gruppe, die 1 bis 2 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer Halogen-substituierten C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkoxycarbonylgruppe, einer C_{1-6}-Alkanoylgruppe, einer Phenylgruppe, einer Phenyl-C_{1-6}-alkylGruppe, einer Benzoylgruppe und einer Amino-substituierten Alkylgruppe (die 1 bis 2 C_{1-6}-Alkylgruppe(n) als Substituent(en) an der Aminogruppe aufweisen kann), an der Aminogruppe aufweisen kann,
(30) eine C_{1-6}-Alkylgruppe, substituiert mit einer einzelnen Carbamoylgruppe, die 1 bis 2 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe und einer Halogen-substituierten C_{1-6}-Alkylgruppe, aufweisen kann,
(31) eine Thiocarbamoylgruppe, die 1 bis 2 C_{1-6}-Alkylgruppe(n) aufweisen kann,
(32) eine Sulfamoylgruppe,
(33) eine Oxazolidinylgruppe, die eine einzelne Oxogruppe aufweisen kann,
(34) eine Imidazolidinylgruppe, die 1 bis 2 Substituenten, ausgewählt aus der Gruppe bestehend aus einer Oxogruppe und einer C_{1-6}-Alkylgruppe, aufweisen kann,
(35) eine Pyrrolidinylgruppe, die eine einzelne Oxogruppe aufweisen kann,
(36) eine Imidazolylgruppe,
(37) eine Triazolylgruppe,
(38) eine Isoxazolylgruppe,
(39) eine Piperidylgruppe, die 1 bis 3 Substituenten aufweisen kann, ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkanoylgruppe, einer C_{1-6}-Alkylphenylsulfonylgruppe, einer Oxogruppe, einer Hydroxygruppe und einer Aminogruppe, die 1 bis 2 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkanoylgruppe, einer C_{1-6}-Alkoxycarbonylgruppe und einer C_{1-6}-Alkanoylamino-C_{1-6}-alkanoyl-Gruppe, aufweisen kann,
(40) eine Piperidylcarbonylgruppe, die 1 bis 3 Substituent(en) aufweisen kann, ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer Hydroxygruppe, einer Hydroxy-C_{1-6}-alkylGruppe, einer C_{1-6}-Alkanoylgruppe, einer Carboxy-C_{1-6}-alkyl-Gruppe, einer C_{1-6}-Alkylcarbamoyl-C_{1-6}-alkyl-Gruppe, einer Carbamoyl-

gruppe, einer C_{1-6}-Alkoxygruppe, einer Carboxygruppe, einer C_{1-6}-Alkoxycarbonylgruppe, einer Aminogruppe (an der 1 bis 2 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkanoylgruppe, einer C_{1-6}-Alkoxycarbonylgruppe und einer Benzoylgruppe, vorhanden sein kann/können), eine Piperidylgruppe (an der 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkanoylgruppe, einer C_{1-6}-Alkoxycarbonylgruppe und einer Benzoylgruppe, vorhanden sein kann/können), einer Piperazinylgruppe (an der 1 bis 3 C_{1-6}-Alkylgruppe(n) als Substituent(en) vorhanden sein kann/können), einer 1,4-Dioxa-8-azaspiro[4.5]decyl-Gruppe, einer Morpholinylgruppe, einer Hexahydro-1,4-diazepinyl-Gruppe (an der eine einzelne C_{1-6}-Alkylgruppe als Substituent vorhanden sein kann), einer Pyridylgruppe, einer Pyridyloxygruppe, einer Pyridyl-C_{1-6}-alkoxyGruppe, einer Tetrahydrochinolylgruppe (an der eine einzelne Oxogruppe vorhanden sein kann), einer Benzodioxolylgruppe, einer Phenyl-C_{1-6}-alkoxy-Gruppe (die an der Phenylgruppe 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einem Halogenatom, einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkoxygruppe und einer Halogen-substituierten C_{1-6}-Alkoxygruppe, aufweisen kann), einer Phenylgruppe (an der 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einem Halogenatom, einer C_{1-6}-Alkoxygruppe, und einer Hydroxygruppe, vorhanden sein kann/können), einer Phenyloxygruppe (die an der Phenylgruppe 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer Cyanogruppe, einem Halogenatom, einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkoxygruppe und einer Halogen-substituierten C_{1-6}-Alkylgruppe, aufweisen kann), einer Phenyl-C_{1-6}-alkyl-Gruppe (die an der Phenylgruppe 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einem Halogenatom, einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkoxygruppe und einer Halogen-substituierten C_{1-6}-Alkylgruppe, aufweisen kann), und einer Benzoylgruppe (die 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einem Halogenatom und einer C_{1-6}-Alkoxygruppe, an der Phenylgruppe aufweisen kann),

(41) eine Pyrrolidinylcarbonylgruppe, die 1 bis 3 Gruppe(n) als Substituent(en) aufweisen kann, ausgewählt aus der Gruppe bestehend aus einer Hydroxy-C_{1-6}-alkyl-Gruppe, einer Carbamoylgruppe, einer Hydroxygruppe, einer Aminogruppe (die 1 bis 2 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkanoylgruppe und einer Benzoylgruppe, an der Aminogruppe aufweisen kann), einer Morpholinyl-C_{1-6}-alkyl-Gruppe, einer Pyrrolidinyl-C_{1-6}-alkyl-Gruppe, einer Piperidyl-C_{1-6}-alkyl-Gruppe, einer Piperazinyl-C_{1-6}-alkyl-Gruppe (die eine einzelne C_{1-6}-Alkylgruppe als Substituent(en) an der Piperazinylgruppe aufweisen kann), einer Amino-C_{1-6}-alkyl-Gruppe (die 1 bis 2 C_{1-6}-Alkylgruppe(n) aufweisen kann, die als Substituent an der Aminogruppe vorhanden kann/können), einer Phenyloxygruppe (die 1 bis 3 Halogen-substituierte C_{1-6}-Alkoxygruppe(n) an der Phenylgruppe aufweisen kann), einer Phenylyloxy-C_{1-6}-alkyl-Gruppe (die 1 bis 3 Halogen-substituierte C_{1-6}-Alkoxygruppe(n) an der Phenylgruppe aufweisen kann) und einer Tetrahydrochinolylgruppe (an der eine Oxogruppe vorhanden sein kann),

(42) eine Piperazinylcarbonylgruppe, die 1 bis 3 Gruppe(n) als Substituenten aufweisen kann, ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer Cyclo-C_{3-8}-alkyl-Gruppe, einer C_{1-6}-Alkanoylgruppe, einer Hydroxy-C_{1-6}-alkyl-Gruppe, einer C_{1-6}-Alkoxy-C_{1-6}-alkylGruppe, einer C_{1-6}-Alkoxycarbonylgruppe, einer Amino-C_{1-6}-alkyl-Gruppe (die 1 bis 2 C_{1-6} Alkylgruppe(n) als Substituent(en) an der Aminogruppe aufweisen kann), einer Piperidyl-C_{1-6}-alkyl-Gruppe (die 1 bis 2 C_{1-6} Alkylgruppe(n) als Substituent(en) an der Piperidylgruppe aufweisen kann), einer Morpholinyl-C_{1-6}-alkyl-Gruppe, einer Pyrrolidinyl-C_{1-6}-alkyl-Gruppe, einer 1,3-Dioxolanyl-C_{1-6}-alkyl-Gruppe, einer Tetrahydrofuryl-C_{1-6}-alkyl-Gruppe, einer Pyridyl-C_{1-6}-alkyl-Gruppe (die 1 bis 2 Phenylgruppe(n) als Substituent(en) an der C_{1-6}-Alkylgruppe aufweisen kann), einer Imidazolyl-C_{1-6}-alkyl-Gruppe, einer Furyl-C_{1-6}-alkylGruppe, einer Pyrrolidinylcarbonyl-C_{1-6}-alkylGruppe, einer Piperidylgruppe, die 1 bis 2 C_{1-6}-Alkylgruppe(n) als Substituent(en) aufweisen kann, einer Pyridylgruppe (die 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer Cyanogruppe und einer Halogen-substituierten C_{1-6}-Alkylgruppe, als Substituent(en) an der Pyridylgruppe aufweisen kann), einer Thieno[2,3-b]pyridyl-Gruppe, einer Phenylgruppe (an der 1 bis 2 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einem Halogenatom und einer C_{1-6}-Alkylgruppe, vorhanden sein kann/können), einer Benzoylgruppe, einer Furylcarbonylgruppe, einer Phenyl-C_{1-6}-alkoxycarbonyl-Gruppe und einer Oxogruppe,

(43) eine Hexahydroazepinylcarbonylgruppe,

(44) eine Hexahydro-1,4-diazepinylcarbonyl-Gruppe, die 1 bis 3 Substituent(en), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe und einer Pyridylgruppe, aufweisen kann,

(45) eine Dihydropyrrolylcarbonylgruppe, die 1 bis 3 C_{1-6}-Alkylgruppe(n) aufweisen kann,

(46) eine Thiomorpholinylcarbonylgruppe,

(47) eine Morpholinylcarbonylgruppe, die 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer Piperidyl-C_{1-6}-alkyl-Gruppe und einer Phenylgruppe, aufweisen kann,

(48) eine Thiazolidinylcarbonylgruppe, die 1 bis 3 Phenylgruppe(n) aufweisen kann, die 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkoxygruppe und einer Cyanogruppe, aufweisen kann,

(49) eine Azabicyclo[3.2.2]nonylcarbonyl-Gruppe,

(50) eine 8-Azabicyclo[3.2.1]octylcarbonyl-Gruppe, die 1 bis 3 Halogen-substituierte oder unsubstituierte Phe-

nyloxygruppe(n) aufweisen kann,
(51) eine Indolinylcarbonylgruppe,
(52) eine Tetrahydrochinolylcarbonylgruppe,
(53) eine Tetrahydropyrido[3.4-b]indolylcarbonyl-Gruppe,
(54) eine Morpholinyl-C_{1-6}-alkyl-Gruppe,
(55) eine Piperazinyl-C_{1-6}-alkyl-Gruppe, die 1 bis 3 C_{1-6}-Alkylgruppe(n) an der Piperazinylgruppe aufweisen kann,
(56) eine Morpholinylcarbonyl-C_{1-6}-alkyl-Gruppe,
(57) eine Piperazinylcarbonyl-C_{1-6}-alkyl-Gruppe, die 1 bis 3 C_{1-6}-Alkylgruppe(n) an der Piperazinylgruppe aufweisen kann,
(58) eine Oxogruppe,
(59) eine Amino-C_{1-6}-alkoxy-Gruppe (die 1 bis 2 C_{1-6}-Alkylgruppe(n) an der Aminogruppe aufweisen kann),
(60) eine C_{1-6}-Alkoxy-C_{1-6}-alkoxy-Gruppe,
(61) eine Piperazinylgruppe, die 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer Oxogruppe, einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkanoylgruppe und einer C_{1-6}-Alkoxycarbonylgruppe, aufweisen kann,
(62) eine Morpholinylgruppe,
(63) eine 1,3,8-Triazaspiro[4.5]decanylcarbonyl-Gruppe, die 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer Oxogruppe und einer Phenylgruppe, aufweisen kann,
(64) eine Tetrahydropyridylcarbonylgruppe, die 1 bis 3 Pyridylgruppe(n) aufweisen kann,
(65) eine Imidazolidinylcarbonylgruppe, die eine einzelne Thioxogruppe aufweisen kann, und
(66) eine 1,4-Dioxa-8-azaspiro[4.5]decanyl-Gruppe.

3. Verbindung gemäss Anspruch 1 oder 2, worin A eine C_{1-6}-Alkylengruppe ist.

4. Verbindung gemäss Anspruch 3, worin R^1 eine Phenylgruppe darstellt und an der durch R^1 dargestellten Phenylgruppe 1 bis 5 Gruppen, ausgewählt aus der Gruppe bestehend aus (1) bis (66), wie in Anspruch 2 definiert, als Substituent(en) vorhanden sein kann/können.

5. Verbindung gemäss Anspruch 4, worin R^1 eine Phenylgruppe darstellt und an der durch R^1 dargestellten Phenylgruppe 1 bis 5 Gruppen, ausgewählt aus der Gruppe bestehend aus (1), (4), (10), (17), (18), (21), (28), (29), (30), (33), (34), (35), (36), (39), (61) und (62), wie nachfolgend gezeigt, als Substituent(en) vorhanden sein kann/können:

(1) eine C_{1-6}-Alkylgruppe,
(4) eine C_{1-6}-Alkoxygruppe,
(10) eine Hydroxy-C_{1-6}-alkyl-Gruppe,
(17) eine Aminogruppe, mit 1 bis 2 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkanoylgruppe, einer C_{1-6}-Alkoxycarbonylgruppe, einer C_{1-6}-Alkylsulfonylgruppe, einer Carbamoylgruppe, einer C_{1-6}-Alkylcarbamoylgruppe, einer Amino-C_{1-6}-alkanoyl-Gruppe, einer C_{1-6}-Alkanoylamino-C_{1-6}-alkanoyl-Gruppe und einer C_{1-6}-Alkoxycarbonylamino-C_{1-6}-alkanoyl-Gruppe, als Substituent(en),
(18) eine C_{1-6}-Alkanoylgruppe,
(21) eine C_{1-6}-Alkoxycarbonylgruppe,
(28) eine Carbamoylgruppe, die 1 bis 2 Gruppe(n), ausgewählt aus der Gruppe bestehend aus den nachstehenden Gruppen (i), (ii), (iv), (xii) und (xxi), als Substituent(en) aufweisen kann:

(i) eine C_{1-6}-Alkylgruppe,
(ii) eine C_{1-6}-Alkoxygruppe,
(iv) eine C_{1-6}-Alkoxy-C_{1-6}-alkyl-Gruppe,
(xii) eine C_{1-6}-Alkylgruppe mit 1 bis 2 C_{1-6}-Alkoxycarbonylgruppen,
(xxi) eine Pyridyl-C_{1-6}-alkyl-Gruppe,

(29) eine Amino-C_{1-6}-alkyl-Gruppe, die an der Aminogruppe 1 bis 2 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer Halogen-substituierten C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkoxycarbonylgruppe, einer C_{1-6}-Alkanoylgruppe, einer Phenylgruppe, einer Phenyl-C_{1-6}-alkyl-Gruppe, einer Benzoylgruppe und einer Amino-substituierten C_{1-6}-Alkylgruppe (die 1 bis 2 C_{1-6}-Alkylgruppen aufweisen kann, die als Substituent(en) an der Aminogruppe vorhanden sein kann/können), aufweisen kann,
(30) eine C_{1-6}-Alkylgruppe, substituiert mit einer einzelnen Carbamoylgruppe, die 1 bis 2 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe und einer Halogen-substituierten C_{1-6}-Alkylgruppe, aufweisen kann,

(33) eine Oxazolidinylgruppe, die eine einzelne Oxogruppe aufweisen kann,
(34) eine Imidazolidinylgruppe, die 1 bis 2 Substituent(en), ausgewählt aus der Gruppe bestehend aus einer Oxogruppe und einer C_{1-6}-Alkylgruppe, aufweisen kann,
(35) eine Pyrrolidinylgruppe, die eine einzelne Oxogruppe aufweisen kann,
(36) eine Imidazolylgruppe,
(39) eine Piperidylgruppe, die 1 bis 3 Substituenten aufweisen kann, ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkanoylgruppe, einer C_{1-6}-Alkylphenylsulfonylgruppe, einer Oxogruppe, einer Hydroxygruppe und einer Aminogruppe, die 1 bis 2 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkanoylgruppe, einer C_{1-6}-Alkoxycarbonylgruppe und einer C_{1-6}-Alkanoylamino-C_{1-6}-alkanoyl-Gruppe, aufweisen kann,
(61) eine Piperazinylgruppe, die 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer Oxogruppe, einer C_{1-6}-Alkylgruppe, einer C_{1-6}-Alkanoylgruppe und einer C_{1-6}-Alkoxycarbonylgruppe, aufweisen kann, und
(62) eine Morpholinylgruppe.

6. Verbindung gemäss Anspruch 5, worin R^1 (II) eine Phenylgruppe darstellt und an der durch R^1 dargestellten aromatischen Gruppe 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus (1), (4), (10), (17), (18), (21), (28), (29), (30), (33), (34), (35), (36), (39), (61) und (62), wie in Anspruch 5 definiert, als Substituent(en) vorhanden sein kann/können.

7. Verbindung gemäss Anspruch 6, worin R^1 (II) eine Phenylgruppe darstellt und an der durch R^1 dargestellten Phenylgruppe 1 bis 3 Gruppe(n), ausgewählt aus der Gruppe bestehend aus (1), (4), (10), (17), (18), (28), (33), (35), (39) und (61), wie nachfolgend gezeigt, als Substituent(en) vorhanden sein kann/können:

(1) eine C_{1-6}-Alkylgruppe,
(4) eine C_{1-6}-Alkoxygruppe,
(10) eine Hydroxy-C_{1-6}-alkyl-Gruppe,
(17) eine Aminogruppe mit 1 bis 2 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer C_{1-6}-Alkylgruppe, einer Amino-C_{1-6}-alkanoyl-Gruppe, einer C_{1-6}-Alkanoylamino-C_{1-6}-alkanoyl-Gruppe und einer C_{1-6}-Alkoxycarbonylamino-C_{1-6}-alkanoyl-Gruppe, als Substituent(en),
(18) eine C_{1-6}-Alkanoylgruppe,
(28) eine Carbamoylgruppe mit einer einzelnen C_{1-6}-Alkoxy-C_{1-6}-alkyl-Gruppe,
(33) eine Oxazolidinylgruppe, die eine einzelne Oxogruppe aufweisen kann,
(35) eine Pyrrolidinylgruppe, die eine einzelne Oxogruppe aufweisen kann,
(39) eine Piperidylgruppe und
(61) eine Piperazinylgruppe, die 1 bis 2 Gruppe(n), ausgewählt aus der Gruppe bestehend aus einer Oxogruppe, einer C_{1-6}-Alkanoylgruppe und einer C_{1-6}-Alkoxycarbonylgruppe, aufweisen kann.

8. Verbindung gemäss Anspruch 7, worin R^1
eine Phenylgruppe ist, die an der Phenylgruppe eine einzelne C_{1-6}-Alkylgruppe, eine einzelne C_{1-6}-Alkoxygruppe und eine einzelne Aminogruppe mit 1 bis 2 C_{1-6}-Alkylgruppe(n) an der Aminogruppe aufweist;
eine Phenylgruppe ist, die an der Phenylgruppe eine einzelne C_{1-6}-Alkylgruppe, eine einzelne C_{1-6}-Alkoxygruppe und eine einzelne Carbamoylgruppe mit einer einzelnen C_{1-6}-Alkylgruppe, die zwei C_{1-6}-Alkoxygruppen an der C_{1-6}-Alkylgruppe hat, aufweist;
eine Phenylgruppe ist, die an der Phenylgruppe eine einzelne Hydroxy-C_{1-6}-alkyl-Gruppe, eine einzelne C_{1-6}-Alkoxygruppe und eine einzelne Oxazolidinylgruppe mit einer einzelnen Oxogruppe an der Oxazolidinylgruppe aufweist;
eine Phenylgruppe ist, die an der Phenylgruppe eine einzelne C_{1-6}-Alkylgruppe, eine einzelne C_{1-6}-Alkoxygruppe und eine einzelne Pyrrolidinylgruppe aufweist;
eine Phenylgruppe ist, die an der Phenylgruppe eine einzelne C_{1-6}-Alkylgruppe, eine einzelne C_{1-6}-Alkoxygruppe und eine einzelne Piperidylgruppe aufweist;
eine Phenylgruppe ist, die an der Phenylgruppe eine einzelne C_{1-6}-Alkylgruppe, eine einzelne C_{1-6}-Alkoxygruppe und eine einzelne Piperazylgruppe mit einer einzelnen C_{1-6}-Alkanoylgruppe an der Piperazylgruppe aufweist;
eine Phenylgruppe ist, die an der Phenylgruppe eine einzelne C_{1-6}-Alkylgruppe, eine einzelne C_{1-6}-Alkoxygruppe und eine einzelne Piperazylgruppe mit einer einzelnen C_{1-6}-Alkanoylgruppe und einer einzelnen Oxogruppe an der Piperazylgruppe aufweist;
eine Phenylgruppe ist, die an der Phenylgruppe eine einzelne C_{1-6}-Alkylgruppe, eine einzelne C_{1-6}-Alkoxygruppe und eine einzelne Piperazylgruppe mit einer einzelnen C_{1-6}-Alkoxycarbonylgruppe und einer einzelnen Oxogruppe an der Piperazylgruppe aufweist;
eine Phenylgruppe ist, die an der Phenylgruppe eine einzelne C_{1-6}-Alkylgruppe, eine einzelne C_{1-6}-Alkoxygruppe

und eine einzelne N-[(N-C_{1-6}-Alkoxycarbonylamino)-C_{1-6}-alkanoyl]amino-Gruppe aufweist;
eine Phenylgruppe ist, die an der Phenylgruppe eine einzelne C_{1-6}-Alkylgruppe, eine einzelne C_{1-6}-Alkoxygruppe und eine einzelne N-(Amino-C_{1-6}-alkanoyl)amino-Gruppe aufweist;
eine Phenylgruppe ist, die an der Phenylgruppe eine einzelne C_{1-6}-Alkylgruppe, eine einzelne C_{1-6}-Alkoxygruppe und eine einzelne N-[(N-C_{1-6}-Alkanoylamino)-C_{1-6}-alkanoyl]amino-Gruppe aufweist;
eine Phenylgruppe ist, die an der Phenylgruppe eine einzelne C_{1-6}-Alkoxygruppe, eine einzelne C_{1-6}-Alkanoylgruppe und eine einzelne Piperazylgruppe mit einer einzelnen C_{1-6}-Alkoxycarbonylgruppe an der Piperazylgruppe aufweist; oder
eine Phenylgruppe ist, die an der Phenylgruppe eine einzelne C_{1-6}-Alkoxygruppe, eine einzelne Hydroxy-C_{1-6}-alkyl-Gruppe und eine einzelne Piperazylgruppe mit einer einzelnen C_{1-6}-Alkoxycarbonylgruppe an der Piperazylgruppe aufweist.

9. Verbindung gemäss Anspruch 8, ausgewählt aus der Gruppe bestehend aus:

(1) N-Methyl-4-[3-{4-(benzo[b]thiophen-4-yl)piperazin-1-yl}propoxy]-3-methoxy-5-methylanilin;
(2) 4-[3-{4-(Benzo[b]thiophen-4-yl)piperazin-1-yl}propoxy]-N,N-dimethyl-3-methoxy-5-methylanilin;
(3) 4-[3-{4-(Benzo[b]thiophen-4-yl)piperazin-1-yl}propoxy]-N-(2,2-dimethoxyethyl)-3-methoxy-5-methylbenzamid;
(4) 1-(Benzo[b]thiophen-4-yl)-4-[3-{2-methoxy-6-methyl-4-(pyrrolidin-1-yl)phenoxy}propyl]-piperazin;
(5) 1-(Benzo[b]thiophen-4-yl)-4-[3-{2-methoxy-6-methyl-4-(piperidin-1-yl)phenoxy}propyl]-piperazin;
(6) 1-Acetyl-4-{4-[3-(benzo[b]thiophen-4-yl)piperazin-1-yl}propoxy]-3-methoxy-5-methylphenyl}piperazin;
(7) 4-Acetyl-1-{4-[3-{4-(benzo[b]thiophen-4-yl)piperazin-1-yl}propoxy]-3-methoxy-5-methylphenyl}piperazin-2-on;
(8) 4-{4-[3-{4-(Benzo[b]thiophen-4-yl)piperazin-1-yl}propoxy]-3-methoxy-5-methylphenyl}-3-oxo-1-methoxycarbonylpiperazin;
(9) tert-Butyl-N-(N-{4-[3-{4-(benzo[b]thiophen-4-yl)piperazin-1-yl}propoxy]-3-methoxy-5-methylphenyl}carbamoylmethyl)carbamat;
(10) 2-Amino-N-{4-[3-{4-(benzo[b]thiophen-4-yl)piperazin-1-yl}propoxy]-3-methoxy-5-methylphenyl}acetamid;
(11) 2-Acetylamino-N-{4-[3-{4-(benzo[b]thiophen-4-yl)piperazin-1-yl}propoxy]-3-methoxy-5-methylphenyl}acetamid;
(12) 4-{4-[3-{4-(Benzo[b]thiophen-4-yl)piperazin-1-yl}propoxy]-3-formyl-5-methoxyphenyl}-1-methoxycarbonylpiperazin; und
(13) 4-{4-[3-{4-(Benzo[b]thiophen-4-yl)piperazin-1-yl}propoxy]-3-hydroxymethyl-5-methoxyphenyl}-1-methoxycarbonylpiperazin

oder ein Salz davon.

10. Pharmazeutische Zusammensetzung, umfassend eine heterocyclische Verbindung der Formel (1) oder ein Salz davon gemäss irgendeinem der Ansprüche 1 bis 9 als aktiven Bestandteil und einen pharmazeutisch annehmbaren Träger.

11. Pharmazeutische Zusammensetzung gemäss Anspruch 10 zur Behandlung oder Vorbeugung von Störungen des zentralen Nervensystems.

12. Pharmazeutische Zusammensetzung gemäss Anspruch 11 zur Behandlung oder Vorbeugung von Störungen des zentralen Nervensystems, ausgewählt aus der Gruppe bestehend aus Schizophrenie; refraktärer, hartnäckiger oder chronischer Schizophrenie; emotionaler Beeinträchtigung; psychotischer Störung; Stimmungsstörung; bipolarer Typ I-Störung; bipolarer Typ II-Störung; Depression; endogener Depression; bedeutender Depression; Melancholie und refraktärer, Depression; dysthymer Störung, cyclothymer Störung; Panikattacke; Panikstörung; Agoraphobie; sozialer Phobie; Zwangsneurose; posttraumatischer Stressstörung; allgemeiner Angststörung; akuter Stressstörung; Hysterie; Somatisierungsstörung; dissoziativer Störung; Schmerzstörung; Hypochondrie; unnatürlicher Störung; dissoziativer Störung; sexueller Funktionsstörung; Störung des sexuellen Verlangens; Störung der sexuellen Erregung; Erektionsstörung; Anorexia nervosa; Bulimia nervosa; Schlafstörung; Anpassungsstörung; Alkoholmissbrauch; Alkoholvergiftung; Drogenabhängigkeit; Aufputschmittelvergiftung; Narkotismus; Anhedonie; durch ärztliche Behandlung verursachter Anhedonie; psychisch oder mental verursachter Anhedonie; mit Depression verbundener Anhedonie; mit Schizophrenie verbundener Anhedonie; Delirium; kognitiver Beeinträchtigung; mit Alzheimer-Krankheit verbundener kognitiver Beeinträchtigung; Parkinson-Krankheit und anderen neurodegenerativen Krankheiten; durch Alzheimer-Krankheit verursachter kognitiver Beeinträchtigung; Parkinson-Krankheit und

damit verbundenen neurodegenerativen Erkrankungen; kognitiver Beeinträchtigung durch Schizophrenie; durch refraktäre, hartnäckige oder chronische Schizophrenie verursachter kognitiver Beeinträchtigung; Erbrechen; Bewegungskrankheit; Fettleibigkeit; Migräne; Leiden (Schmerz); mentaler Retardierung; autistischer Störung (Autismus); Tourette-Störung; Tic-Störung; Aufmerksamkeitsdefizit-Hyperaktivitätsstörung; Verhaltensstörung und Down-Syndrom.

13. Verfahren zur Herstellung einer pharmazeutischen Zusammensetzung, umfassend das Mischen der heterocyclischen Verbindung der Formel (1) oder eines Salzes davon gemäss irgendeinem der Ansprüche 1 bis 9 mit einem pharmazeutisch annehmbaren Träger.

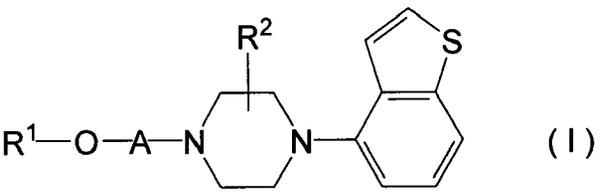
14. Heterocyclische Verbindung der Formel (1) oder ein Salz davon gemäss irgendeinem der Ansprüche 1 bis 9 zur Verwendung als Arzneimittel.

15. Heterocyclische Verbindung der Formel (1) oder ein Salz davon gemäss irgendeinem der Ansprüche 1 bis 9 zur Verwendung als Dopamin D_2-Rezeptor-Teilagonist und/oder Serotonin 5-HT_{2A}-Rezeptor-Antagonist und/oder Adrenalin α_1-Rezeptor-Antagonist und/oder Serotonin-Aufnahmeinhibitor und/oder Serotonin-Wiederaufnahmeinhibitor, die zur Behandlung oder Vorbeugung einer Störung des zentralen Nervensystems wirksam sind.

16. Heterocyclische Verbindung der Formel (1) oder ein Salz davon gemäss irgendeinem der Ansprüche 1 bis 9 zur Verwendung bei der Behandlung oder Vorbeugung von Störungen des zentralen Nervensystems.

17. Verbindung zur Verwendung gemäss Anspruch 16, wobei die Störung des zentralen Nervensystems ausgewählt ist aus der Gruppe bestehend aus Schizophrenie; refraktärer, hartnäckiger oder chronischer Schizophrenie; emotionaler Beeinträchtigung; psychotischer Störung; Stimmungsstörung; bipolarer Typ I-Störung; bipolarer Typ II-Störung; Depression; endogener Depression; bedeutender Depression; Melancholie und refraktärer Depression; dysthymer Störung, cyclothymer Störung; Panikattacke; Panikstörung; Agoraphobie; sozialer Phobie; Zwangsneurose; posttraumatischer Stressstörung; allgemeiner Angststörung; akuter Stressstörung; Hysterie; Somatisierungsstörung; dissoziativer Störung; Schmerzstörung; Hypochondrie; unnatürlicher Störung; dissoziativer Störung; sexueller Funktionsstörung; Störung des sexuellen Verlangens; Störung der sexuellen Erregung; Erektionsstörung; Anorexia nervosa; Bulimia nervosa; Schlafstörung; Anpassungsstörung; Alkoholmissbrauch; Alkoholvergiftung; Drogenabhängigkeit; Aufputschmittelvergiftung; Narkotismus; Anhedonie; durch ärztliche Behandlung verursachter Anhedonie; psychisch oder mental verursachter Anhedonie; mit Depression verbundener Anhedonie; mit Schizophrenie verbundener Anhedonie; Delirium; kognitiver Beeinträchtigung; mit Alzheimer-Krankheit verbundener kognitiver Beeinträchtigung; Parkinson-Krankheit und anderen neurodegenerativen Krankheiten; durch Alzheimer-Krankheit verursachter kognitiver Beeinträchtigung; Parkinson-Krankheit und damit verbundenen neurodegenerativen Erkrankungen; kognitiver Beeinträchtigung durch Schizophrenie; durch hartnäckige, widerspenstige oder chronische Schizophrenie verursachter kognitiver Beeinträchtigung; Erbrechen; Reisekrankheit; Fettleibigkeit; Migräne; Leiden (Schmerz); mentaler Retardierung; autistischer Störung (Autismus); Tourette-Störung; Tic-Störung; Aufmerksamkeitsdefizit-Hyperaktivitätsstörung; Verhaltensstörung und Down-Syndrom.

18. Verfahren zur Herstellung einer heterocyclischen Verbindung der Formel (1):



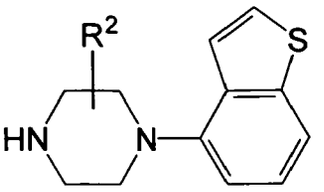
(I)

[worin R^1, R^2 und A die gleichen sind, wie in Anspruch 1 definiert] oder eines Salzes davon,
dadurch gekennzeichnet, dass es die Umsetzung einer Verbindung der Formel:

R^1-O-A-X^1

[worin R^1 und A die gleichen sind wie oben definiert und X^1 ein Halogenatom oder eine Gruppe darstellt, die die gleiche Substitutionsreaktion wie in einem Halogenatom verursacht] oder eines Salzes davon mit einer Verbindung

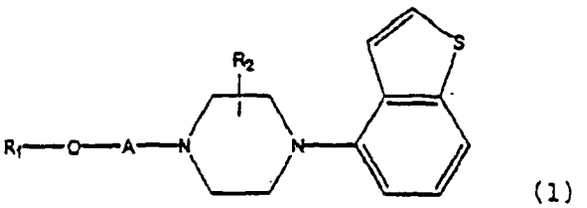
der Formel:



[worin R^2 das gleiche ist wie oben] oder eines Salzes davon umfasst.

Revendications

1. Composé hétérocyclique ou un sel de celui-ci représenté par la formule (1) : [Formule 1]



où R^2 représente un atome d'hydrogène ou un groupe alkyle C_{1-6} ;
A représente un groupe C_{1-6} alkylène ou un groupe C_{2-6} alcénylène ; et
R^1 représente un groupe aromatique choisi parmi un groupe phényle, un groupe naphthyle, un groupe dihydroindényle et un groupe tétrahydronaphthyle ;
où au moins un groupe choisi parmi le groupe constitué des groupes (1) à (66) ci-dessous peut être présent en tant que substituant sur le groupe aromatique représenté par R^1 :

(1) un groupe alkyle C_{1-6},
(2) un groupe C_{2-6} alcényle,
(3) un groupe alkyle C_{1-6} à substitution halogène,
(4) un groupe alcoxy C_{1-6},
(5) un groupe aryloxy,
(6) un groupe C_{1-6} alkylthio,
(7) un groupe alcoxy C_{1-6} à substitution halogène,
(8) un groupe hydroxy,
(9) un groupe hydroxy protégé,
(10) un groupe hydroxy alkyle C_{1-6},
(11) un groupe hydroxy alkyle C_{1-6} protégé,
(12) un atome d'halogène,
(13) un groupe cyano,
(14) un groupe aryle
(15) un groupe nitro,
(16) un groupe amino,
(17) un groupe amino ayant un ou plusieurs groupes choisis parmi le groupe constitué d'un groupe alkyle C_{1-6}, un groupe alcanoyle C_{1-6}, un groupe alcoxy C_{1-6}carbonyle, un groupe C_{1-6} alkylsulfonyle, un groupe carbamoyle, un groupe C_{1-6} alkyl carbamoyle, un groupe amino alcanoyle C_{1-6}, un groupe C_{1-6} alcanoylamino alcanoyle C_{1-6} et un groupe alcoxy C_{1-6} carbonylamino alcanoyle C_{1-6} en tant que substituants,
(18) un groupe alcanoyle C_{1-6},
(19) un groupe arylsulfonyle qui peut avoir un ou plusieurs groupes alkyle C_{1-6} sur le groupe aryle,
(20) un groupe carboxyle,

(21) un groupe alcoxy C_{1-6}carbonyle,
(22) un groupe alkyle C_{1-6},
(23) un groupe alcoxycarbonyle alkyle C_{1-6},
(24) un groupe alcanoylamino alcanoyle C_{1-6},
(25) un groupe carboxy C_{2-6} alcényle,
(26) un groupe alcoxycarbonyle C_{2-6} alcényle,
(27) un groupe carbamoyle C_{2-6} alcényle qui peut avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6} et un groupe alkyle C_{1-6} à substitution halogène en tant que substituants,
(28) un groupe carbamoyle qui peut avoir un ou plusieurs groupes choisis parmi le groupe constitué des groupes (i) à (lxxviii) ci-dessous en tant que substituants :

(i) un groupe alkyle C_{1-6},
(ii) un groupe alcoxy,
(iii) un groupe hydroxy alkyle C_{1-6},
(iv) un groupe alcoxy C_{1-6} alkyle C_{1-6},
(v) un groupe aryloxy alkyle C_{1-6},
(vi) un groupe alkyle C_{1-6} à substitution halogène,
(vii) un groupe amino alkyle C_{1-6} qui peut avoir un ou plusieurs groupes choisis parmi le groupe constitué d'un groupe alkyle C_{1-6}, un groupe alcanoyle C_{1-6}, un groupe aroyle et un groupe carbamoyle,
(viii) un groupe cyclo C_3-C_8 alkyle qui peut avoir un ou plusieurs groupes choisis parmi le groupe constitué d'un groupe alkyle C_{1-6}, un groupe hydroxy, un groupe alcoxy C_{1-6}carbonyle et un groupe phényle alcoxy C_{1-6} en tant que substituants,
(ix) un groupe alkyle C_{1-6} substitué par un cycloalkyle C_3-C_8,
(x) un groupe C_{2-6} alcényle,
(xi) un groupe carbamoyle alkyle C_{1-6} qui peut avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe phényle qui peut avoir un ou plusieurs groupes alkyle C_{1-6} et un ou plusieurs groupes phényle qui peuvent avoir un ou plusieurs groupes alcoxy C_{1-6} en tant que substituants,
(xii) un groupe alcoxycarbonyl alkyle C_{1-6} C_{1-6},
(xiii) un groupe furyl alkyle C_{1-6} (qui peut avoir un ou plusieurs groupes alkyle en tant que substituants sur le groupe furyle),
(xiv) un groupe tétrahydrofuryl alkyle C_{1-6},
(xv) un groupe 1,3-dioxolanyl alkyle C_{1-6},
(xvi) un groupe tétrahydropyranyl alkyle C_{1-6},
(xvii) un groupe pyrrolyl alkyle C_{1-6} (qui peut avoir un ou plusieurs groupes alkyle C_{1-6} en tant que substituants sur le pyrrolyle),
(xviii) un groupe alkyle C_{1-6} substitué par un groupe dihydropyrazolyle qui peut avoir un plusieurs groupes oxo,
(xix) un groupe pyrazolyl alkyle C_{1-6} (qui peut avoir un ou plusieurs groupes alkyle C_{1-6} en tant que substituants sur le groupe pyrazolyle),
(xx) un groupe imidazolyl alkyle C_{1-6},
(xxi) un groupe pyridyl alkyle C_{1-6},
(xxii) un groupe pyrazinyl alkyle C_{1-6} (qui peut avoir un ou plusieurs groupes alkyle C_{1-6} en tant que substituants sur le groupe pyrazinyle),
(xxiii) un groupe pyrrolidinyl alkyle C_{1-6} (qui peut avoir un ou plusieurs groupes choisis parmi un ou plusieurs groupes oxo et un groupe alkyle C_{1-6} en tant que substituants sur le groupe pyrrolidinyle),
(xxiv) un groupe pipéridyl alkyle C_{1-6} (qui peut avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe benzoyle et un groupe alcanoyle C_{1-6} en tant que substituants sur le groupe pipéridyle),
(xxv) un groupe pipérazinyl alkyle C_{1-6} (qui peut avoir un ou plusieurs groupes alkyle C_{1-6} en tant que substituants sur le groupe pipérazinyle),
(xxvi) un groupe morpholinyl alkyle C_{1-6},
(xxvii) un groupe thiényl alkyle C_{1-6} (qui peut avoir un ou plusieurs groupes alkyle C_{1-6} en tant que substituants sur le groupe thiényle),
(xxviii) un groupe thiazolyl alkyle C_{1-6},
(xxix) un groupe dihydrobenzofuryl alkyle C_{1-6},
(xxx) un groupe benzopyranyl alkyle C_{1-6} (qui peut avoir un ou plusieurs groupes oxo en tant que substituants sur le groupe benzopyranyle),

(xxxi) un groupe benzimidazolyl alkyle C_{1-6},
(xxxii) un groupe indolyl alkyle C_{1-6} qui peut avoir un ou plusieurs groupes alcoxy C_{1-6}carbonyle sur le groupe alkyle C_{1-6}),
(xxxiii) un groupe imidazolyl alkyle C_{1-6} qui peut avoir un ou plusieurs substituants choisis parmi le groupe consistant en un groupe carbamoyle et un groupe alcoxy C_{1-6}carbonyle sur le groupe alkyle C_{1-6},
(xxxiv) un groupe pyridyle qui peut avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alcoxy C_{1-6} et un groupe alkylthio C_{1-6} alkyle C_{1-6} en tant que substituants,
(xxxv) un groupe pyrrolidinyle qui peut avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alcoxy C_{1-6}carbonyle, un groupe alcanoyle C_{1-6} et un groupe aroyle en tant que substituants,
(xxxvi) un groupe pipéridyle qui peut avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alcoxy C_{1-6}carbonyle, un groupe alcanoyle C_{1-6} et un groupe aroyle qui peuvent avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6} et un atome d'halogène en tant que substituants,
(xxxvii) un groupe tétrahydrofuryle qui peut avoir un ou plusieurs groupes oxo,
(xxxviii) un groupe hexahydroazépinyle qui peut avoir un ou plusieurs groupes oxo,
(xxxix) un groupe pyrazolyle qui peut avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe aryle et un groupe furyle en tant que substituants,
(xl) un groupe thiazolyle,
(xli) un groupe thiadiazolyle qui peut avoir un ou plusieurs groupes alkyle C_{1-6},
(xlii) un groupe isoxazolyle qui peut avoir un ou plusieurs groupes alkyle C_{1-6},
(xliii) un groupe indazolyle,
(xliv) un groupe indolyle,
(xlv) un groupe tétrahydrobenzothiazolyle,
(xlvi) un groupe tétrahydroquinolyle qui peut avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alcoxy C_{1-6}, un atome d'halogène et un groupe oxo en tant que substituants,
(xlvii) un groupe quinolyle qui peut avoir un ou plusieurs groupes alkyle C_{1-6},
(xlviii) un groupe benzodioxolyl alkyle C_{1-6},
(xlix) un groupe aryle qui peut avoir un ou plusieurs groupes en tant que substituants, choisis parmi le groupe consistant en
un atome d'halogène ; un groupe alkyle C_{1-6} ; un groupe alcoxy C_{1-6} ; un groupe alkyle C_{1-6} substitué par un atome d'halogène ; un groupe alcoxy C_{1-6} à substitution halogène ; un groupe C_{2-6} alcényle ; un groupe amino qui peut avoir un groupe choisi parmi le groupe consistant en un groupe alcanoyle C_{1-6}, un groupe alkyle C_{1-6} sulfonyle, un groupe alkyle C_{1-6} et un groupe aryle ; un groupe sulfamoyle ; un groupe alkylthio C_{1-6} ; un groupe alcanoyle C_{1-6} ; un groupe alcoxy C_{1-6}carbonyle ; un groupe pyrrolyle ; un groupe C_{2-6} alcynyle ; un groupe cyano ; un groupe nitro, un groupe aryloxy ; un groupe aryl C_{1-6} alkoxy ; un groupe hydroxy ; un groupe hydroxy alkyle C_{1-6} ; un groupe carbamoyle qui peut avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6} et un groupe aryle ; un groupe pyrazolyle ; un groupe pyrrolidinyle qui peut avoir un ou plusieurs groupes oxo ; un groupe oxazolyle ; un groupe imidazolyle qui peut avoir un ou plusieurs groupes alkyle C_{1-6} ; un groupe dihydrofuryle qui peut avoir un ou plusieurs groupes oxo ; un groupe thiazolidinyl alkyle C_{1-6} qui peut avoir un ou plusieurs groupes oxo ; un groupe imidazolyl alcanoyle C_{1-6} et un groupe pipéridinylcarbonyle,
(l) un groupe cyano alkyle C_{1-6},
(li) un groupe dihydroquinolyle qui peut avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6} et un groupe oxo,
(lii) un groupe C_{1-6} alkylamino à substitution halogène,
(liii) un groupe alkylthio C_{1-6} alkyle C_{1-6},
(liv) un groupe amidino qui peut avoir un ou plusieurs groupes alkyle C_{1-6},
(lv) un groupe amidino alkyle C_{1-6},
(lvi) un groupe C_{1-6} alcényloxy alkyle C_{1-6},
(lvii) un groupe arylamino qui peut avoir un ou plusieurs substituants choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alcoxy C_{1-6}, un groupe alkyle C_{1-6} à substitution halogène et un groupe alcoxy C_{1-6} à substitution halogène, sur le groupe aryle,
(lviii) un groupe aryl C_{2-6} alcényle,
(lix) un groupe pyridyliamino qui peut avoir un ou plusieurs groupes alkyle C_{1-6},
(lx) un groupe aryl alkyle C_{1-6} (qui peut avoir sur le groupe aryle et/ou le groupe alkyle C_{1-6} un ou plusieurs groupes choisis parmi le groupe consistant en un atome d'halogène, un groupe alkyle C_{1-6}, un groupe

alkyle C_{1-6} à substitution halogène, un groupe alcoxy C_{1-6} à substitution halogène, un groupe alcoxy C_{1-6}, un groupe carbamoyle et un groupe alcoxy C_{1-6}carbonyle en tant que substituants),
(lxi) un groupe alcanoyle C_{2-6},
(lxii) un groupe aryloxy alkyle C_{1-6} (qui peut avoir en tant que substituants sur le groupe aryle un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alcoxy C_{1-6}; un groupe carbamoyle qui peut avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alcoxy C_{1-6} et un groupe alkyle C_{1-6} ; et un groupe pyrrolidinyle qui peut avoir un ou plusieurs groupes oxo),
(lxiii) un groupe isoxazolidinyle qui peut avoir un ou plusieurs groupes oxo,
(lxiv) un groupe dihydroindényle,
(lxv) un groupe aryl alcoxy C_{1-6} alkyle C_{1-6},
(lxvi) un groupe tétrahydropyranyle,
(lxvii) un groupe azétidinyle qui peut avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alcanoyle C_{1-6} et un groupe aroyle,
(lxviii) un groupe azétidinyl alkyle C_{1-6} qui peut avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alcanoyle C_{1-6} et un groupe aroyle,
(lxix) un groupe tétrazolyle,
(lxx) un groupe indolinyle qui peut avoir un ou plusieurs groupes oxo,
(lxxi) un groupe triazolyle qui peut avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6} et un groupe C_{1-6} alkylthio,
(lxxii) un groupe imidazolyle qui peut avoir un ou plusieurs groupes carbamoyle,
(lxxiii) un groupe oxazolyle qui peut avoir un ou plusieurs groupes alkyle C_{1-6},
(lxxiv) un groupe isothiazolyle qui peut avoir un ou plusieurs groupes alkyle C_{1-6},
(lxxv) un groupe benzimidazolyle,
(lxxvi) un groupe dihydrobenzothiazolyle qui peut avoir un ou plusieurs groupes oxo,
(lxxvii) un groupe thiényle qui peut avoir un ou plusieurs groupes alcoxy C_{1-6}carbonyle, et
(lxxviii) un groupe oxazolyl alkyle C_{1-6} qui peut avoir un ou plusieurs groupes alkyle C_{1-6},

(29) un groupe amino alkyle C_{1-6} qui peut avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alkyle C_{1-6} à substitution halogène, un groupe alcoxy C_{1-6}carbonyle, un groupe alcanoyle C_{1-6}, un groupe aryle, un groupe aryle alkyle C_{1-6}, un groupe aroyle et un groupe alkyle à substitution amino (qui peut avoir un ou plusieurs groupes alkyle C_{1-6} en tant que substituants sur le groupe amino) sur le groupe amino,
(30) un groupe alkyle C_{1-6} substitué par un groupe carbamoyle qui peut avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6} et un groupe alkyle C_{1-6} à substitution halogène,
(31) un groupe thiocarbamoyle qui peut avoir un ou plusieurs groupes alkyle C_{1-6},
(32) un groupe sulfamoyle,
(33) un groupe oxazolidinyle qui peut avoir un ou plusieurs groupes oxo,
(34) un groupe imidazolidinyle qui peut avoir un ou plusieurs substituants choisis parmi le groupe consistant en un groupe oxo et un groupe alkyle C_{1-6},
(35) un groupe pyrrolidinyle qui peut avoir un ou plusieurs groupes oxo,
(36) un groupe imidazolyle,
(37) un groupe triazolyle,
(38) un groupe isoxazolyle,
(39) un groupe pipéridyle qui peut avoir un ou plusieurs substituants choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alcanoyle C_{1-6}, un groupe C_{1-6} arylsulfonyle, un groupe oxo, un groupe hydroxy, et un groupe amino qui peut avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alcanoyle C_{1-6}, un groupe alcoxy C_{1-6}carbonyle et un groupe alcanoyleamino alcanoyle C_{1-6},
(40) un groupe pipéridylcarbonyle qui peut avoir un ou plusieurs substituants choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe hydroxy, un groupe hydroxy alkyle C_{1-6}, un groupe alcanoyle C_{1-6}, un groupe carboxy alkyle C_{1-6}, un groupe alkyle carbamoyle alkyle C_{1-6}, un groupe carbamoyle, un groupe alcoxy C_{1-6}, un groupe carboxy, un groupe alcoxy C_{1-6}carbonyle, un groupe amino (sur lequel 1 à 2 groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alcanoyle C_{1-6}, un groupe alcoxy C_{1-6}carbonyle et un groupe aroyle peut être présent), un groupe pipéridyle (sur lequel un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alcanoyle C_{1-6}, un groupe alcoxy C_{1-6}carbonyle et un groupe aroyle peuvent être présents), un groupe pipérazinyle (sur lequel un groupe un ou plusieurs groupes alkyle C_{1-6} peuvent être présents en tant que substituants),
un groupe 1,4-dioxa-8-azaspiro[4.5] décyle, un groupe morpholinyle, un groupe hexahydro-1,4-diazépinyle (sur

lequel un ou plusieurs groupes alkyle C_{1-6} peuvent être présents en tant que substituants), un groupe pyridyle, un groupe pyridyloxy , un groupe pyridyl alcoxy C_{1-6}, un groupe tétrahydroquinolyl (sur lequel un ou plusieurs groupes oxo peuvent être présents), un groupe benzodioxolyle, un groupe aryle alcoxy C_{1-6} (qui peut avoir un ou plusieurs groupes choisis parmi le groupe consistant en un atome d'halogène, un groupe alkyle C_{1-6}, un groupe alcoxy C_{1-6} et un groupe alcoxy C_{1-6} à substitution halogène sur le groupe aryle), un groupe aryle (sur lequel un ou plusieurs groupes choisis parmi le groupe consistant en un atome d'halogène, un groupe alcoxy C_{1-6}, un groupe hydroxy peuvent être présents), un groupe aryloxy (qui peut avoir sur le groupe aryle un ou plusieurs groupes choisis parmi le groupe consistant en un groupe cyano, un atome d'halogène, un groupe alkyle C_{1-6}, un groupe alcoxy C_{1-6} et un groupe alkyle C_{1-6} substitué par un atome d'halogène), un groupe aryle alkyle C_{1-6} (qui peut avoir sur le groupe aryle un ou plusieurs groupes choisis parmi le groupe consistant en un atome d'halogène, un groupe alkyle C_{1-6}, un groupe alcoxy C_{1-6} et un un groupe alkyle C_{1-6} substitué par un atome d'halogène), et un groupe aroyle (qui peut avoir sur le groupe aryle un ou plusieurs groupes choisis parmi le groupe consistant en un atome d'halogène et un groupe alcoxy C_{1-6}),

(41) un groupe pyrrolidinylcarbonyle qui peut avoir un groupe en tant que substituant, choisi parmi le groupe consistant en un groupe hydroxy alkyle C_{1-6}, un groupe carbamoyle, un groupe hydroxy, un groupe amino (qui peut avoir sur le groupe amino un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alcanoyle C_{1-6} et un groupe aroyle), un groupe morpholinyl alkyle C_{1-6}, un groupe pyrrolidinyl alkyle C_{1-6}, un groupe pipéridyle alkyle C_{1-6}, un groupe pipérazinyl alkyle C_{1-6} (qui peut avoir un ou plusieurs groupes alkyle C_{1-6} en tant que substituants sur le groupe pipérazinyle), un groupe amino alkyle C_{1-6} (qui peut avoir un ou plusieurs groupes alkyle C_{1-6} en tant que substituants sur le groupe amino), un groupe aryloxy (qui peut avoir un ou plusieurs groupes alcoxy C_{1-6} à substitution halogène sur le groupe aryle), un groupe aryloxy alkyle C_{1-6} (qui peut avoir un ou plusieurs groupes alcoxy C_{1-6} à substitution halogène sur le groupe aryle) et un groupe tétrahydroquinolyle (sur lequel un ou plusieurs groupes oxo peuvent être présents),

(42) un groupe pipérazinylcarbonyle qui peut avoir un ou plusieurs groupes en tant que substituants, choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe cyclo C_3-C_8 alkyle, un groupe alcanoyle C_{1-6}, un groupe hydroxy alkyle C_{1-6}, un groupe alcoxy C_{1-6} alkyle C_{1-6}, un groupe alcoxy C_{1-6}carbonyle, un groupe amino alkyle C_{1-6} (qui peut avoir un ou plusieurs groupes alkyle C_{1-6} en tant que substituants sur le groupe amino), un groupe pipéridyl alkyle C_{1-6} (qui peut avoir un ou plusieurs groupes alkyle C_{1-6} en tant que substituants sur le groupe pipéridyle), un groupe morpholinyl alkyle C_{1-6}, un groupe pyrrolidinyl alkyle C_{1-6}, un groupe 1,3-dioxolanyl alkyle C_{1-6}, un groupe tétrahydrofuryl alkyle C_{1-6}, un groupe pyridyl alkyle C_{1-6} (qui peut avoir un ou plusieurs groupes phényle en tant que substituants sur le groupe alkyle C_{1-6}), un groupe imidazolyl alkyle C_{1-6}, un groupe furyl alkyle C_{1-6}, un groupe pyrrolidinylcarbonyl alkyle C_{1-6}, un groupe pipéridyle qui peut avoir un ou plusieurs groupes alkyle C_{1-6} en tant que substituants ; un groupe pyridyle (qui peut avoir sur le groupe pyridyle un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe cyano et un groupe alkyle C_{1-6} à substitution halogène en tant que substituants), un groupe thiéno[2,3-b]pyridyle, un groupe aryle (sur lequel un ou plusieurs groupes choisis parmi le groupe consistant en un atome d'halogène et un groupe alkyle C_{1-6} peuvent être présents), un groupe aroyle, un groupe furyl carbonyle, un groupe aryl alcoxy C_{1-6}carbonyle et un groupe oxo,

(43) un groupe hexahydroazépinylcarbonyle,

(44) un groupe hexahydro-1,4-diazépinylcarbonyle qui peut avoir un ou plusieurs substituants choisis parmi le groupe consistant en un groupe alkyle C_{1-6} et un groupe pyridyle,

(45) un groupe dihydropyrrolylcarbonyle qui peut avoir un ou plusieurs groupes alkyle C_{1-6},

(46) un groupe thiomorpholinylcarbonyle,

(47) un groupe morpholinylcarbonyle qui peut avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe pipéridyl alkyle C_{1-6} et un groupe aryle,

(48) un groupe thiazolidinyl carbonyle qui peut avoir un ou plusieurs groupes aryle qui peuvent avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe alcoxy C_{1-6} et un groupe cyano,

(49) un groupe azabicyclo[3.2.2]nonylcarbonye,

(50) un groupe 8-azabicyclo[3.2.1]octylcarbonyle qui peut avoir un ou plusieurs groupes aryloxy à substitution halogène ou non,

(51) un groupe indolinylcarbonyle,

(52) un groupe tétrahydroquinolylcarbonyle,

(53) un groupe tétrahydropyrido[3.4-b]indolylcarbonyle,

(54) un groupe morpholinyl alkyle C_{1-6},

(55) un groupe pipérazinyl alkyle C_{1-6} qui peut avoir un ou plusieurs groupes alkyle C_{1-6} sur le groupe pipérazinyle,

(56) un groupe morpholinylcarbonyl alkyle C_{1-6},

(57) un groupe pipérazinylcarbonyl alkyle C_{1-6} qui peut avoir un ou plusieurs groupes alkyle C_{1-6} sur le groupe

pipérazinyle,
(58) un groupe oxo,
(59) un groupe amino alcoxy C_{1-6} (qui peut avoir un ou plusieurs groupes alkyle C_{1-6} sur le groupe amino),
(60) un groupe alcoxy C_{1-6} alcoxy C_{1-6},
(61) un groupe pipérazinyle qui peut avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe oxo, un groupe alkyle C_{1-6}, un groupe alcanoyle C_{1-6} et un groupe alcoxy C_{1-6}carbonyle,
(62) un groupe morpholinyle,
(63) un groupe 1,3,8-triazaspiro[4,5]décanylcarbonyle qui peut avoir un ou plusieurs groupes choisis parmi le groupe consistant en un groupe oxo et un groupe aryle,
(64) un groupe tétrahydropyridylcarbonyle qui peut avoir un ou plusieurs groupes pyridyle,
(65) un groupe imidazolidinylcarbonyle qui peut avoir un ou plusieurs groupes thioxo, et
(66) un groupe 1,4-dioxa-8-azaspiro [4.5]décanyle.

2. Composé selon la revendication 1,
dans lequel, sur le groupe aromatique représenté par R^1, 1 à 5 groupes choisis parmi le groupe constitué des groupes (1) à (66) ci-dessous peuvent être présents en tant que substituants :

(1) un groupe alkyle C_{1-6},
(2) un groupe C_{2-6} alcényle,
(3) un groupe alkyle C_{1-6} à substitution halogène,
(4) un groupe alcoxy C_{1-6},
(5) un groupe phénoxy,
(6) un groupe C_{1-6} alkylthio,
(7) un groupe alcoxy C_{1-6} à substitution halogène,
(8) un groupe hydroxy,
(9) un groupe phényl alcoxy C_{1-6},
(10) un groupe hydroxy alkyle C_{1-6},
(11) un groupe alcoxy C_{1-6} alkyle C_{1-6},
(12) un atome d'halogène,
(13) un groupe cyano,
(14) un groupe phényle,
(15) un groupe nitro,
(16) un groupe amino,
(17) un groupe amino ayant 1 à 2 groupes choisis parmi le groupe constitué d'un groupe alkyle C_{1-6}, un groupe alcanoyle C_{1-6}, un groupe alcoxy C_{1-6}carbonyle, un groupe C_{1-6} alkylsulfonyle, un groupe carbamoyle, un groupe C_{1-6} alkyl carbamoyle, un groupe amino alcanoyle C_{1-6}, un groupe C_{1-6} alcanoylamino alcanoyle C_{1-6} et un groupe alcoxy C_{1-6} carbonylamino alcanoyle C_{1-6} en tant que substituant,
(18) un groupe alcanoyle C_{1-6},
(19) un groupe phénylsulfonyle qui peut avoir un seul groupe alkyle C_{1-6} sur le groupe phényle,
(20) un groupe carboxyle,
(21) un groupe alcoxy C_{1-6}carbonyle,
(22) un groupe alkyle C_{1-6},
(23) un groupe alcoxycarbonyle alkyle C_{1-6},
(24) un groupe alcanoylamino alcanoyle C_{1-6},
(25) un groupe carboxy C_{2-6} alcényle,
(26) un groupe alcoxycarbonyle C_{2-6} alcényle,
(27) un groupe carbamoyle C_{2-6} alcényle qui peut avoir 1 à 2 groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6} et un groupe alkyle C_{1-6} substitué par 1 à 3 atomes d'halogène en tant que substituants,
(28) un groupe carbamoyle qui peut avoir 1 à 2 groupes choisis parmi le groupe constitué des groupes (i) à (lxxviii) ci-dessous en tant que substituants :

(i) un groupe alkyle C_{1-6},
(ii) un groupe alcoxy C_{1-6},
(iii) un groupe hydroxy alkyle C_{1-6};
(iv) un groupe alcoxy C_{1-6} alkyle C_{1-6},
(v) un groupe phénoxy alkyle C_{1-6},
(vi) un groupe alkyle C_{1-6} à substitution halogène,
(vii) un groupe amino alkyle C_{1-6} qui peut avoir 1 à 2 groupes choisis parmi le groupe constitué d'un groupe

alkyle C_{1-6}, un groupe alcanoyle C_{1-6}, un groupe benzoyle et un groupe carbamoyle,
(viii) un groupe cyclo C_3-C_8 alkyle qui peut avoir 1 à 3 groupes choisis parmi le groupe constitué d'un groupe alkyle C_{1-6}, un groupe hydroxy, un groupe alcoxy C_{1-6}carbonyle et un groupe phényle alcoxy C_{1-6} en tant que substituants,
(ix) un groupe cyclo C_3-C_8 alkyle substitué alkyle C_{1-6},
(x) un groupe C_{2-6} alcényle,
(xi) un groupe alkyle C_{1-6} qui peut avoir 1 à 2 groupes carbamoyle qui peuvent avoir 1 à 2 groupes en tant que substituant choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe phényle qui peut avoir un seul groupe alkyle C_{1-6} et un groupe phényle qui peut avoir un seul groupe alcoxy C_{1-6} en tant que substituant,
(xii) un groupe alkyle C_{1-6} ayant 1 à 2 groupes alcoxy C_{1-6}carbonyle,
(xiii) un groupe furyl alkyle C_{1-6} (qui peut avoir 1 à 2 groupes alkyle en tant que substituants sur le groupe furyle),
(xiv) un groupe tétrahydrofuryl alkyle C_{1-6},
(xv) un groupe 1,3-dioxolanyl alkyle C_{1-6},
(xvi) un groupe tétrahydropyranyl alkyle C_{1-6},
(xvii) un groupe pyrrolyl alkyle C_{1-6} (qui peut avoir 1 à 2 groupes alkyle C_{1-6} en tant que substituants sur le pyrrolyle),
(xviii) un groupe alkyle C_{1-6} substitué par un groupe dihydropyrazolyle qui peut avoir un seul groupe oxo,
(xix) un groupe pyrazolyl alkyle C_{1-6} (qui peut avoir 1 à 3 groupes alkyle C_{1-6} en tant que substituants sur le groupe pyrazolyle),
(xx) un groupe imidazolyl alkyle C_{1-6},
(xxi) un groupe pyridyl alkyle C_{1-6},
(xxii) un groupe pyrazinyl alkyle C_{1-6} (qui peut avoir 1 à 3 groupes (de préférence 1) alkyle en tant que substituants sur le groupe pyrazinyle),
(xxiii) un groupe pyrrolidinyl alkyle C_{1-6} (qui peut avoir 1 à 2 choisis parmi le groupe consistant en un groupe oxo et un groupe alkyle C_{1-6} en tant que substituants sur le groupe pyrrolidinyle),
(xxiv) un groupe pipéridyl alkyle C_{1-6} (qui peut avoir 1 à 3 groupes choisis parmi le groupe consistant en un groupe benzoyle et un groupe alcanoyle C_{1-6} en tant que substituants sur le groupe pipéridyle),
(xxv) un groupe pipérazinyl alkyle C_{1-6} (qui peut avoir 1 à 3 groupes alkyle C_{1-6} en tant que substituants sur le groupe pipérazinyle),
(xxvi) un groupe morpholinyl alkyle C_{1-6},
(xxvii) un groupe thiényl alkyle C_{1-6} (qui peut avoir 1 à 3 groupes alkyle C_{1-6} en tant que substituants sur le groupe thiényle),
(xxviii) un groupe thiazolyl alkyle C_{1-6},
(xxix) un groupe dihydrobenzofuryl alkyle C_{1-6},
(xxx) un groupe benzopyranyl alkyle C_{1-6} (qui peut avoir un seul groupe oxo en tant que substituants sur le groupe benzopyranyle),
(xxxi) un groupe benzimidazolyl alkyle C_{1-6},
(xxxii) un groupe indolyl alkyle C_{1-6} qui peut avoir 1 à 3 groupes alcoxy C_{1-6}carbonyle sur le groupe alkyle C_{1-6}),
(xxxiii) un groupe imidazolyl alkyle C_{1-6} qui peut avoir 1 à 3 substituants choisis parmi le groupe consistant en un groupe carbamoyle et un groupe alcoxy C_{1-6}carbonyle sur le groupe alkyle C_{1-6},
(xxxiv) un groupe pyridyle qui peut avoir 1 à 3 groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alcoxy C_{1-6} et un groupe alkylthio C_{1-6} alkyle C_{1-6} en tant que substituants,
(xxxv) un groupe pyrrolidinyl qui peut avoir 1 à 3 groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alcoxy C_{1-6}carbonyle, un groupe alcanoyle C_{1-6} et un groupe aroyle en tant que substituants,
(xxxvi) un groupe pipéridyle qui peut avoir 1 à 3 groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alcoxy C_{1-6}carbonyle, un groupe alcanoyle C_{1-6} et un groupe benzoyle qui peuvent avoir 1 à 3 groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6} et un atome d'halogène en tant que substituants sur le groupe phényle),
(xxxvii) un groupe tétrahydrofuryle qui peut avoir un seul groupe oxo,
(xxxviii) un groupe hexahydroazépinyle qui peut avoir un seul groupe oxo,
(xxxix) un groupe pyrazolyle qui peut avoir 1 à 3 groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe phényle et un groupe furyle en tant que substituants,
(xl) un groupe thiazolyle,
(xli) un groupe thiadiazolyle qui peut avoir 1 à 3 groupes alkyle C_{1-6},

(xlii) un groupe isoxazolyle qui peut avoir 1 à 3 groupes alkyle C_{1-6},
(xliii) un groupe indazolyle,
(xliv) un groupe indolyle,
(xlv) un groupe tétrahydrobenzothiazolyle,
(xlvi) un groupe tétrahydroquinolyle qui peut avoir 1 à 3 groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alcoxy C_{1-6}, un atome d'halogène et un groupe oxo en tant que substituants,
(xlvii) un groupe quinolyle qui peut avoir 1 à 3 groupes alkyle C_{1-6},
(xlviii) un groupe benzodioxolyl alkyle C_{1-6},
(xlix) un groupe phényle ou un groupe naphtyle qui peut avoir 1 à 3 groupes en tant que substituants, choisis parmi le groupe consistant en un atome d'halogène ; un groupe alkyle C_{1-6} ; un groupe alcoxy C_{1-6} ; un groupe alkyle C_{1-6} substitué par un atome d'halogène ; un groupe alcoxy C_{1-6} substitué par un atome d'halogène ; un groupe C_{2-6} alcényle ; un groupe amino qui peut avoir 1 à 2 groupes choisis parmi le groupe consistant en un groupe alcanoyle C_{1-6}, un groupe alkyle C_{1-6} sulfonyle, un groupe alkyle C_{1-6} et un groupe aryle ; un groupe sulfamoyle ; un groupe alkylthio C_{1-6} ; un groupe alcanoyle C_{1-6} ; un groupe alcoxy C_{1-6}carbonyle ; un groupe pyrrolyle ; un groupe C_{2-6} alcynyle ; un groupe cyano ; un groupe nitro, un groupe aryloxy ; un groupe phényl alkoxy C_{1-6} ; un groupe hydroxy ; un groupe hydroxy alkyle C_{1-6} ; un groupe carbamoyle qui peut avoir 1 à 2 groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6} et un groupe phényle ; un groupe pyrazolyle ; un groupe pyrrolidinyle qui peut avoir un seul groupe oxo ; un groupe oxazolyle ; un groupe imidazolyle qui peut avoir 1 à 3 groupes alkyle C_{1-6} ; un groupe dihydrofuryle qui peut faire seul groupe oxo ; un groupe thiazolidmyl alkyle C_{1-6} qui peut avoir deux groupes oxo ; un groupe imidazolyl alcanoyle C_{1-6} et un groupe pipéridinylcarbonyle,
(l) un groupe cyano alkyle C_{1-6},
(li) un groupe dihydroquinolyle qui peut avoir 1 à 3 groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6} et un groupe oxo,
(lii) un groupe C_{1-6} alkylamino à substitution halogène,
(liii) un groupe alkylthio C_{1-6} alkyle C_{1-6},
(liv) un groupe amidino qui peut avoir un ou plusieurs groupes alkyle C_{1-6},
(lv) un groupe amidino alkyle C_{1-6},
(lvi) un groupe C_{2-6} alcényloxy alkyle C_{1-6},
(lvii) un groupe phénylamino qui peut avoir 1 à 3 substituants choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alcoxy C_{1-6}, un groupe alkyle C_{1-6} substitué à substitution halogène et un groupe alcoxy C_{1-6} à substitution halogène, sur le groupe aryle,
(lviii) un groupe phényl C_{2-6} alcényle,
(lix) Un groupe pyridyiamino qui peut avoir 1 à 3 groupes alkyle C_{1-6},
(lx) un groupe phényl alkyle C_{1-6} (qui peut avoir en tant que substituants sur le groupe phényle et/ou le groupe alkyle C_{1-6} 1 à 3 groupes choisis parmi le groupe consistant en un atome d'halogène, un groupe alkyle C_{1-6}, un groupe alkyle C_{1-6} à substitution halogène, un groupe alcoxy C_{1-6} à substitution halogène, un groupe alcoxy C_{1-6}, un groupe carbamoyle et un groupe alcoxy C_{1-6}carbonyle en tant que substituants),
(lxi) un groupe alcanoyle C_{2-6},
(lxii) un groupe phényloxy alkyle C_{1-6} (qui peut avoir 1 à 3 groupes choisis parmi le groupe consistant en un groupe alcoxy C_{1-6}; un groupe N-alcoxy C_{1-6} -N-C_{1-6} alkylcarbamoyle et un groupe oxopyrrolidinyle entend que substituants sur le groupe phényle),
(lxiii) un groupe isoxazolidinyle qui peut avoir un seul groupe oxo,
(lxiv) un groupe dihydroindényle,
(lxv) un groupe phényl alcoxy C_{1-6} alkyle C_{1-6},
(lxvi) un groupe tétrahydropyranyle,
(lxvii) un groupe azétidinyle qui peut avoir 1 à 3 groupes choisis parmi le groupe consistant en un groupe alcanoyle C_{1-6} et un groupe benzoyle,
(lxviii) un groupe azétidinyl alkyle C_{1-6} qui peut avoir 1 à 3 groupes choisis parmi le groupe consistant en un groupe alcanoyle C_{1-6} et un groupe benzoyle,
(lxix) un groupe tétrazolyle,
(lxx) un groupe indolinyle qui peut avoir un seul groupe oxo,
(lxxi) un groupe triazolyle qui peut avoir 1 à 3 groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6} et un groupe C_{1-6} alkylthio,
(lxxii) un groupe imidazolyle qui peut avoir 1 à 3 groupes carbamoyle,
(lxxiii) un groupe oxazolyle qui peut avoir 1 à 3 groupes alkyle C_{1-6},
(lxxiv) un groupe isothiazolyle qui peut avoir 1 à 3 groupes alkyle C_{1-6},
(lxxv) un groupe benzimidazolyle,

(lxxvi) un groupe dihydrobenzothiazolyle qui peut avoir un seul groupe oxo,
(lxxvii) un groupe thiényle qui peut avoir 1 à 3 groupes alcoxy C_{1-6}carbonyle, et
(lxxviii) un groupe oxazolyl alkyle C_{1-6} qui peut avoir 1 à 3 groupes alkyle C_{1-6},

(29) un groupe amino alkyle C_{1-6} qui peut avoir 1 à 2 groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alkyle C_{1-6} à substitution halogène, un groupe alcoxy C_{1-6}carbonyle, un groupe alcanoyle C_{1-6}, un groupe phényle, un groupe phényl alkyle C_{1-6}, un groupe benzoyle et un groupe alkyle C_{1-6} à substitution amino (qui peut avoir 1 à 2 groupes alkyle C_{1-6} en tant que substituants sur le groupe amino) sur le groupe amino,
(30) un groupe alkyle C_{1-6} substitué par un seul groupe carbamoyle qui peut avoir 1 à 2 groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6} et un groupe alkyle C_{1-6} à substitution halogène,
(31) un groupe thiocarbamoyle qui peut avoir 1 à 2 groupes alkyle C_{1-6},
(32) un groupe sulfamoyle,
(33) un groupe oxazolidinyle qui peut avoir un seul groupe oxo,
(34) un groupe imidazolidinyle qui peut avoir 1 à 2 substituants choisis parmi le groupe consistant en un groupe oxo et un groupe alkyle C_{1-6},
(35) un groupe pyrrolidinyle qui peut avoir un seul groupe oxo,
(36) un groupe imidazolyle,
(37) un groupe triazolyle,
(38) un groupe isoxazolyle,
(39) un groupe pipéridyle qui peut avoir 1 à 3 substituants choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alcanoyle C_{1-6}, un groupe alkyle C_{1-6} phénylsulfonyle, un groupe oxo, un groupe hydroxy, et un groupe amino qui peut avoir 1 à 2 groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alcanoyle C_{1-6}, un groupe alcoxy C_{1-6}carbonyle et un groupe alcanoyleamino alcanoyle C_{1-6},
(40) un groupe pipéridylcarbonyle qui peut avoir 1 à 3 substituants choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe hydroxy, un groupe hydroxy alkyle C_{1-6}, un groupe alcanoyle C_{1-6}, un groupe carboxy alkyle C_{1-6}, un groupe alkyle carbamoyle alkyle C_{1-6}, un groupe carbamoyle, un groupe alcoxy C_{1-6}, un groupe carboxy, un groupe alcoxy C_{1-6}carbonyle, un groupe amino (sur lequel 1 à 2 groupes choisis parmi le groupe consistant en un groupe alkyle $C_{1-6,}$ un groupe alcanoyle C_{1-6}, un groupe alcoxy C_{1-6}carbonyle et un groupe benzoyle peuvent être présents), un groupe pipéridyle (sur lequel 1 à 3 groupes choisis parmi le groupe consistant en un groupe alcanoyle C_{1-6}, un groupe alcoxy C_{1-6}carbonyle et un groupe benzoyle peuvent être présents), un groupe pipérazinyle (sur lequel un groupe 1 à 3 groupes alkyle C_{1-6} peuvent être présents en tant que substituants),
un groupe 1,4-dioxa-8-azaspiro[4.5] décyle, un groupe morpholinyle, un groupe hexahydro-1,4-diazépinyle (sur lequel un seul groupe alkyle C_{1-6} peuvent être présents en tant que substituants), un groupe pyridyle , un groupe pyridyloxy, un groupe pyridyl alcoxy C_{1-6}, un groupe tétrahydroquinolyle (sur lequel un seul groupe oxo peut être présent), un groupe benzodioxolyle, un groupe phényle alcoxy C_{1-6} (qui peut avoir sur le groupe phényle 1 à 3 groupes choisis parmi le groupe consistant en un atome d'halogène, un groupe alkyle C_{1-6}, un groupe alcoxy C_{1-6} et un groupe alcoxy C_{1-6} à substitution halogène), un groupe phényle (sur lequel 1 à 3 groupes choisis parmi le groupe consistant en un atome d'halogène, un groupe alcoxy C_{1-6}, un groupe hydroxy peuvent être présents), un groupe phényloxy (qui peut avoir sur le groupe phényle 1 à 3 groupes choisis parmi le groupe consistant en un groupe cyano, un atome d'halogène, un groupe alkyle C_{1-6}, un groupe alcoxy C_{1-6} et un groupe alkyle C_{1-6} substitué par un atome d'halogène), un groupe phényl alkyle C_{1-6} (sur le groupe phényle, 1 à 3 groupes choisis parmi le groupe consistant en un atome d'halogène, un groupe alkyle C_{1-6}, un groupe alcoxy C_{1-6} et un un groupe alkyle C_{1-6} substitué par un atome d'halogène peuvent être présents), et un groupe benzoyle (qui peut avoir 1 à 3 groupes choisis parmi le groupe consistant en un atome d'halogène et un groupe alcoxy C_{1-6} sur le groupe phényle),
(41) un groupe pyrrolidinylcarbonyle qui peut avoir 1 à 3 groupes en tant que substituants choisis parmi le groupe consistant en un groupe hydroxy alkyle C_{1-6}, un groupe carbamoyle, un groupe hydroxy, un groupe amino (qui peut avoir 1 à 2 groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alcanoyle C_{1-6} et un groupe benzoyle sur le groupe amino), un groupe morpholinyl alkyle C_{1-6}, un groupe pyrrolidinyl alkyle C_{1-6}, un groupe pipéridyle alkyle C_{1-6}, un groupe pipérazinyl alkyle C_{1-6} (qui peut avoir un seul groupe alkyle C_{1-6} en tant que substituant sur le groupe pipérazinyle), un groupe amino alkyle C_{1-6} (qui peut avoir 1 à 2 groupes alkyle C_{1-6} en tant que substituants sur le groupe amino), un groupe phényloxy (qui peut avoir 1 à 3 groupes alcoxy C_{1-6} à substitution halogène sur le groupe phényle), un groupe phényloxy alkyle C_{1-6} (qui peut avoir 1 à 3 groupes alcoxy C_{1-6} à substitution halogène sur le groupe phényle) et un groupe tétrahydroquinolyle (sur lequel un groupe oxo peut être présent),
(42) un groupe pipérazinylcarbonyle qui peut avoir 1 à 3 groupes en tant que substituants, choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe cyclo C_3-C_8 alkyle, un groupe alcanoyle C_{1-6}, un groupe

hydroxy alkyle C_{1-6}, un groupe alcoxy C_{1-6} alkyle C_{1-6}, un groupe alcoxy C_{1-6}carbonyle, un groupe amino alkyle C_{1-6} (qui peut avoir 1 à 2 groupes alkyle C_{1-6} en tant que substituants sur le groupe amino), un groupe pipéridyl alkyle C_{1-6} (qui peut avoir 1 à 2 groupes alkyle, C_{1-6} en tant que substituants sur le groupe pipéridyle), un groupe morpholinyl alkyle, C_{1-6}, un groupe pyrrolidinyl alkyle C_{1-6}, un groupe 1,3-dioxoranyl alkyle C_{1-6}, un groupe tétrahydrofuryl alkyle C_{1-6}, un groupe pyridyl alkyle C_{1-6} (qui peut avoir 1 à 2 groupes phényle en tant que substituants sur le groupe alkyle C_{1-6}), un groupe imidazolyl alkyle C_{1-6}, un groupe furyl alkyle C_{1-6}, un groupe pyrrolidinylcarbonyl alkyle C_{1-6}, un groupe pipéridyle qui peut avoir 1 à 2 groupes alkyle C_{1-6} en tant que substituants ; un groupe pyridyle (qui peut avoir 1 à 3 groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe cyano et un groupe alkyle C_{1-6} à substitution halogène en tant que substituants sur le groupe pyridyle), un groupe thiéno[2,3-b]pyridyle, un groupe phényle (sur lequel 1 à 3 groupes choisis parmi le groupe consistant en un atome d'halogène et un groupe alkyle C_{1-6} peuvent être présents), un groupe benzoyle, un groupe furyl carbonyle, un groupe phényl alcoxy C_{1-6}carbonyle et un groupe oxo,
(43) un groupe hexahydroazépinylcarbonyle,
(44) un groupe hexahydro-1,4-diazépinylcarbonyle qui peut avoir 1 à 3 substituants choisis parmi le groupe consistant en un groupe alkyle C_{1-6} et un groupe pyridyle,
(45) un groupe dihydropyrrolylcarbonyle qui peut avoir 1 à 3 groupes alkyle C_{1-6},
(46) un groupe thiomorpholinylcarbonyle,
(47) un groupe morpholinylcarbonyle qui peut avoir 1 à 3 groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe pipéridyl alkyle C_{1-6} et un groupe phényle,
(48) un groupe thiazolidinyl carbonyle qui peut avoir 1 à 3 groupes aryle qui peuvent avoir 1 à 3 groupes choisis parmi le groupe consistant en un groupe alcoxy C_{1-6} et un groupe cyano,
(49) un groupe azabicyclo[3.2.2]nonylcarbonyle,
(50) un groupe 8-azabicyclo[3.2.1]octylcarbonyle qui peut avoir 1 à 3 groupes phényloxy à substitution halogène ou non,
(51) un groupe indolinylcarbonyle,
(52) un groupe tétrahydroquinolylcarbonyle,
(53) un groupe tétrahydropyrido[3.4-b]indolylcarbonyle,
(54) un groupe morpholinyl alkyle C_{1-6},
(55) un groupe pipérazinyl alkyle C_{1-6} qui peut avoir 1 à 3 groupes alkyle C_{1-6} sur le groupe pipérazinyle,
(56) un groupe morpholinylcarbonyl alkyle C_{1-6},
(57) un groupe pipérazinylcarbonyl alkyle C_{1-6} qui peut avoir 1 à 3 groupes alkyle C_{1-6} sur le groupe pipérazinyle,
(58) un groupe oxo,
(59) un groupe amino alcoxy C_{1-6} (qui peut avoir 1 à 2 groupes alkyle C_{1-6} sur le groupe amino),
(60) un groupe alcoxy C_{1-6} alcoxy C_{1-6},
(61) un groupe pipérazinyle qui peut avoir 1 à 3 groupes choisis parmi le groupe consistant en un groupe oxo, un groupe alkyle C_{1-6}, un groupe alcanoyle C_{1-6} et un groupe alcoxy C_{1-6}carbonyle,
(62) un groupe morpholinyle,
(63) un groupe 1,3,8-triazaspiro[4,5]décanylcarbonyle qui peut avoir 1 à 3 groupes choisis parmi le groupe consistant en un groupe oxo et un groupe phényle,
(64) un groupe tétrahydropyridylcarbonyle qui peut avoir 1 à 3 groupes pyridyle,
(65) un groupe imidazolidinylcarbonyle qui peut avoir un seul groupe thioxo,
et
(66) un groupe 1,4-dioxa-8-azaspiro [4.5]décanyle.

3. Composé selon la revendication 1 ou 2, dans lequel A est un groupe C_{1-6} alkylène.

4. Composé selon la revendication 3, dans lequel R^1 représente un groupe phényle ; et
sur le groupe phényle représenté par R^1, 1 à 5 groupes choisis parmi le groupe consistant en (1) à (66) définis dans la revendication 2 peuvent être présents en tant que substituants.

5. Composé selon la revendication 4, dans lequel R_1 représente un groupe phényle ; et
sur le groupe phényle représenté par R^1, 1 à 5 groupes choisis parmi le groupe consistant en (1), (4), (10), (17), (18), (21), (28), (29), (30), (33), (34), (35), (36), (39), (61) et (62) représentés ci-dessous peuvent être présents en tant que substituants

(1) un C_{1-6} groupe alkyle,
(4) un groupe alcoxy C_{1-6},
(10) un groupe hydroxy alkyle C_{1-6},

(17) un groupe amino ayant 1 à 2 groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alcanoyle C_{1-6}, un groupe alcoxy C_{1-6}carbonyle, un groupe C_{1-6} alkyl sulfonyle, un groupe carbamoyle, un groupe alkyle C_{1-6} carbamoyle, un groupe amino alcanoyle C_{1-6}, un groupe alcanoyle C_{1-6} amino alcanoyle C_{1-6} et un groupe alcoxy C_{1-6}carbonyle amino alcanoyle C_{1-6}, en tant que substituants,
(18) un groupe alcanoyle C_{1-6},
(21) un groupe alcoxy C_{1-6}carbonyle,
(28) un groupe carbamoyle qui peut avoir 1 à 2 groupes choisis parmi le groupe constitué des groupes (i), (ii), (iv), (xii) et (xxi) ci-dessous en temps que substituants

(i) un groupe alkyle C_{1-6},
(ii) un groupe alcoxy C_{1-6},
(iv) un groupe alcoxy C_{1-6} alkyle C_{1-6},
(xii) un groupe alkyle C_{1-6} ayant 1 à 2 groupes alcoxy C_{1-6}carbonyle,
(xxi) un groupe pyridyl alkyle C_{1-6},

(29) un groupe amino alkyle C_{1-6} qui peut avoir, sur le groupe amino, 1 à 2 groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alkyle C_{1-6} à substitution halogène, un groupe alcoxy C_{1-6}carbonyle, un groupe alcanoyle C_{1-6}, un groupe phényle, un groupe phényl alkyle C_{1-6}, un groupe benzoyle et un groupe alkyle C_{1-6} à substitution amino (qui peut avoir 1 à 2 groupes alkyle C_{1-6} en tant que substituants sur le groupe amino),
(30) un groupe alkyle C_{1-6} substitué par un seul groupe carbamoyle qui peut avoir 1 à 2 groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6} et un groupe alkyle C_{1-6} à substitution halogène,
(33) un groupe oxazolidinyle qui peut avoir un seul groupe oxo,
(34) un groupe imidazolidinyle qui peut avoir 1 à 2 substituants choisis parmi le groupe consistant en un groupe oxo et un groupe alkyle C_{1-6},
(35) un groupe pyrrolidinyle qui peut avoir un seul groupe oxo,
(36) un groupe imidazolyle,
(39) un groupe pipéridyle qui peut avoir 1 à 3 substituants choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alcanoyle C_{1-6}, un groupe alkyle C_{1-6} phénylsulfonyle, un groupe oxo, un groupe hydroxy, et un groupe amino qui peut avoir 1 à 2 groupes choisis parmi le groupe consistant en un groupe alkyle C_{1-6}, un groupe alcanoyle C_{1-6}, un groupe alcoxy C_{1-6}carbonyle et un groupe alcanoyleamino alcanoyle C_{1-6},
(61) un groupe pipérazinyle qui peut avoir 1 à 3 groupes choisis parmi le groupe consistant en un groupe oxo, un groupe alkyle C_{1-6}, un groupe alcanoyle C_{1-6} et un groupe alcoxy C_{1-6}carbonyle, et
(62) un groupe morpholinyle.

6. Composé selon la revendication 5, où R^1 représente (II) un groupe phényle, et, sur le groupe aromatique représenté par R^1, 1 à 3 groupes choisis parmi le groupe consistant en (1), (4), (10), (17), (18), (21), (28), (29) , (30), (33), (34), (35), (36), (39) , (61) et (62) définis dans la revendication 5 peuvent être présents en tant que substituants.

7. Composé selon la revendication 6, dans lequel R1 représente (II) un groupe phényle, et, sur le groupe phényle représenté par R^1, 1 à 3 groupes choisis parmi le groupe consistant en (1), (4), (10), (17), (18) (21), (28), (33), (35), (39), et (61) représentés ci-dessous peuvent être présents en tant que substituants :

(1) un C_{1-6} groupe alkyle,
(4) un groupe alcoxy C_{1-6},
(10) un groupe hydroxy alkyle C_{1-6},
(17) un groupe amino ayant 1 à 2 groupes choisis dans le groupe consistant en un groupe alkyle C_{1-6}, un groupe amino alcanoyle C_{1-6}, un groupe alcanoyle C_{1-6} amino alcanoyle C_{1-6} et un groupe alcoxy C_{1-6} carbonylamino alcanoyle C_{1-6}, en tant que substituants,
(18) un groupe alcanoyle C_{1-6},
(28) un groupe carbamoyle ayant un seul groupe alcoxy C_{1-6} alkyle C_{1-6},
(33) un groupe oxazolidinyle qui peut avoir un seul groupe oxo,
(35) un groupe pyrrolidinyle qui peut avoir un seul groupe oxo,
(39) un groupe pipéridyle, et
(61) un groupe pipérazinyle qui peut avoir 1 à 2 groupes choisis parmi le groupe consistant en un groupe oxo, un groupe alcanoyle C_{1-6} et un groupe alcoxy C_{1-6}carbonyle.

8. Composé selon la revendication 7, dans lequel R^1 est un groupe phényle ayant, sur le groupe phényle, un seul

groupe alkyle C_{1-6}, un seul groupe alcoxy C_{1-6} et un seul groupe amino ayant 1 ou 2 groupes alkyle C_{1-6} sur le groupe amino ;
un groupe phényle ayant, sur le groupe phényle, un seul groupe alkyle C_{1-6}, un seul groupe alcoxy C_{1-6} et un seul groupe carbamoyle ayant un seul groupe alkyle C_{1-6}, qui a deux groupes alcoxy C_{1-6} sur le groupe alkyle C_{1-6};
un groupe phényle ayant, sur le groupe phényle, un seul groupe hydroxy alkyle C_{1-6}, un seul groupe alcoxy C_{1-6} et un seul groupe oxazolidinyle ayant un seul groupe oxo sur le groupe oxazolidinyle ;
un groupe phényle ayant, sur le groupe phényle, un seul groupe alkyle C_{1-6}, un seul groupe alcoxy C_{1-6} et un seul groupe pyrrolidinyle ;
un groupe phényle ayant, sur le groupe phényle, un seul groupe alkyle C_{1-6}, un seul groupe alcoxy C_{1-6} et un seul groupe pipéridyle ;
un groupe phényle ayant, sur le groupe phényle, un seul groupe alkyle C_{1-6}, un seul groupe alcoxy C_{1-6} et un seul groupe pipérazyle ayant un seul groupe alcanoyle C_{1-6} sur le groupe pipérazyle ;
un groupe phényle ayant, sur le groupe phényle, un seul groupe alkyle C_{1-6}, un seul groupe alcoxy C_{1-6} et un seul groupe pipérazyle ayant un seul groupe alcanoyle C_{1-6} et un seul groupe oxo sur le groupe pipérazyle ;
un groupe phényle ayant, sur le groupe phényle, un seul groupe alkyle C_{1-6}, un seul groupe alcoxy C_{1-6} et un seul groupe pipérazyle ayant un seul groupe alcoxy C_{1-6}carbonyle et un seul groupe oxo sur le groupe pipérazyle ;
un groupe phényle ayant, sur le groupe phényle, un seul groupe alkyle C_{1-6}, un seul groupe alcoxy C_{1-6} et un seul groupe N-[(N-alcoxy C_{1-6} carbonylamino) alcanoyle C_{1-6}] amino ;
un groupe phényle ayant, sur le groupe phényle, un seul groupe alkyle C_{1-6}, un seul groupe alcoxy C_{1-6} et un seul groupe N-(C_{1-6} amino alcanoyl) amino ;
un groupe phényle ayant, sur le groupe phényle, un seul groupe alkyle C_{1-6}, un seul groupe alcoxy C_{1-6} et un seul groupe N-[(N- alcanoyl C_{1-6} amino) alcanoyle C_{1-6}] amino;
un groupe phényle ayant, sur le groupe phényle, un seul groupe alcoxy C_{1-6}, un seul groupe alcanoyle C_{1-6} et un seul groupe pipérazyle ayant un seul groupe alcoxy C_{1-6}carbonyle sur le groupe pipérazyle ; ou
un groupe phényle ayant, sur le groupe phényle, un seul groupe alcoxy C_{1-6}, un seul groupe hydroxy alkyle C_{1-6} et un seul groupe pipérazyle ayant un seul groupe alcoxy C_{1-6}carbonyle sur le groupe pipérazyle.

9. Composé selon la revendication 8 choisi parmi le groupe consistant en :

(1) N-méthyl-4-[3-{4-(benzo [b] thiophèn-4-yl)pipérazin-l-yl}propoxy] -3-méthoxy-5-méthylaniline;
(2) 4-[3-{4-(Benzo[b]thiophèn-4-yl)pipérazin-1-yl}propoxy]-N,N-diméthyl-3-méthoxy-5-méthylaniline;
(3) 4-[3-{4-(Benzo [b] thiophèn-4-yl)pipérazin-1-yl}propoxy]-N-(2,2-diméthoxyéthyl)-3-méthoxy-5-méthylbenzamide;
(4) 1-(Benzo [b] thiophèn-4-yl)-4-[3-{2-méthoaxy-6-méthyl-4-(pyrrolidin-1-yl) phénoxy}propyl]pipérazine ;
(5) 1-(Benzo [b] thiophèn-4-yl) -4-[3-{2-méthoxy-6-méthyl-4-(pipéridin-1-yl) phénoxy}propyl]pipérazine;
(6) 1-Acétyl-4-{4-[3-{4-(Benzo[b]thiophèn-4-yl)pipérazin-1-yl}propoxy]-3-méthoxy-5-méthylphényllpipérazine;
(7) 4-Acétyl-1-{4-[3-{4-(benzo [b] thiophèn-4-yl)pipérazin-l-yl}propoxy]-3-méthoxy-5-méthylphényl}pipérazin-2-one;
(8) 4-{4-[3-{4-(Benzo[b]thiophèn-4-yl)pipérazin-1-yl}propoxy]-3-méthoxy-5-méthylphényl}-3-oxo-1-méthoxy-carbonylpipérazine ;
(9) Tert-Butyl N-(N-{4-[3-{4-(benzo[b]thiophèn-4-yl)pipérazin-1-yl}propoxy]-3-méthoxy-5-méthylphényl} carbamoylméthyl) carbamate ;
(10) 2-Amino-N-{4- [3-{4- (benzo [b] thiophèn-4-yl)pipérazin-1-yl}propoxy]-3-méthoxy-5-méthylphényl} acétamide ;
(11) 2-Acétylamino-N- {4-[3-{4-(benzo[b]thiophèn-4-yl)pipérazin-1-yl}propoxy]-3-méthoxy-5-méthylphényl} acétamide;
(12) 4-{4-[3-{4-(Benzo[b]thiophèn-4-yl)pipérazin-1-yl}propoxy]-3-formyl-5-méthoxyphényl}-1-méthoxycarbonylpipérazine; et
(13) 4-{4-[3-{4-(Benzo[b]thiophèn-4-yl)pipérazin-1-yl}propoxy]-3-hydroxyméthyl-5-méthoxyphényll-1-méthoxycarbonylpipérazine,

ou un sel de ces derniers.

10. Composition pharmaceutique comprenant un composé hétérocyclique selon la formule (1) ou un de ses sels selon l'une quelconque des revendications 1 à 9, en tant qu'un ingrédient actif et un support pharmaceutiquement acceptable.

11. Composition pharmaceutique selon la revendication 10 destinée à traiter ou prévenir des troubles du système

nerveux central.

12. Composition pharmaceutique selon la revendication 11 destinée à traiter ou prévenir des troubles du système nerveux central choisis parmi le groupe consistant en schizophrénie ; schizophrénie réfractaire non traitable ou chronique ; troubles émotionnels ; troubles psychiques, troubles de l'humeur ; troubles bipolaires de type I ; troubles bipolaires de type II ; dépression ; dépression endogène ; dépression majeure ; dépression mélancolique et réfractaire ; trouble dysthymique ; trouble cyclothymique ; attaque de panique ; panique ; agoraphobie ; phobie sociale ; trouble obsessionnel compulsif ; trouble de stress post-traumatique ; anxiété généralisée ; trouble de l'anxiété aigue ; hystérie ; somatisation ; trouble de conversion ; trouble de la douleur ; hypocondrie ; trouble factice ; trouble dissociatif ; dysfonctionnement sexuel ; perturbation du désir sexuel ; perturbation de l'excitation sexuelle ; dysfonctionnement érectile ; anorexie mentale ; boulimie; trouble du sommeil ; trouble d'adaptation ; alcoolisme ; ivresse alcoolique ; toxicodépendance; intoxication aux stimulants ; narcotisme ; anhédonie ; anhédonie iatrogène ; anhédonie due à une cause psychique ou mentale ; anhédonie associée à la dépression ; anhédonie associée à la schizophrénie ; délire ; troubles cognitifs ; troubles cognitifs associés à la maladie d'Alzheimer, à la maladie de Parkinson et à d'autres maladies neurodégénératives ; troubles cognitifs causés par la maladie d'Alzheimer, la maladie de Parkinson et les maladies neurodégénératives associées ; troubles cognitifs et schizophrénies ; dysfonctionnement cognitif causé par une schizophrénie réfractaire, non traitable ou chronique ; vomissements ; cinétose ; obésité ; migraine ; douleurs (maux) ; déficience intellectuelle ; trouble global du développement (autisme) ; maladie de Gilles de la Tourette ; tics trouble déficitaire de l'attention avec hyperactivité ; trouble de la conduite ; et syndrome de Down.

13. Procédé de production d'une composition pharmaceutique consistant à mélanger un composé hétérocyclique selon la formule (1) ou un sel de celui-ci selon l'une quelconque des revendications 1 à 9 avec un support pharmaceutiquement acceptable.

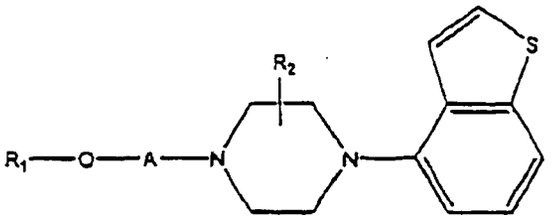
14. Composé hétérocyclique de formule (1) ou sel de celui-ci selon l'une quelconque des revendications 1 à 9 à utiliser comme médicament.

15. Composé hétérocyclique de formule (1) ou sel de celui-ci selon l'une quelconque des revendications 1 à 9 à utiliser comme un agoniste partiel du récepteur D_2de la dopamine et/ou un antagoniste du récepteur 5-HT_{2A} de la sérotonine et/ou un antagoniste du récepteur α_1 de l'adrénaline et/ou un inhibiteur du captage de la sérotonine et/ou un inhibiteur du recaptage de la sérotonine, efficace pour le traitement ou la prévention d'un trouble du système nerveux central.

16. Composé hétérocyclique de formule (1) ou sel de celui-ci selon l'une quelconque des revendications 1 à 9 à utiliser pour traiter ou prévenir un trouble du système nerveux central.

17. La composé destiné à être utilisé selon la revendication 16, où le trouble du système nerveux central est choisi parmi le groupe consistant en
schizophrénie ; schizophrénie réfractaire non traitable ou chronique ; troubles émotionnels ; troubles psychiques, troubles de l'humeur ; troubles bipolaires de type I ; troubles bipolaires de type II ; dépression ; dépression endogène ; dépression majeure ; dépression mélancolique et réfractaire ; trouble dysthymique ; trouble cyclothymique ; attaque de panique ; panique ; agoraphobie ; phobie sociale ; trouble obsessionnel compulsif ; trouble de stress post-traumatique ; anxiété généralisée ; trouble de l'anxiété aigue ; hystérie ; somatisation ; trouble de conversion ; trouble de la douleur ; hypocondrie ; trouble factice ; trouble dissociatif ; dysfonctionnement sexuel ; perturbation du désir sexuel ; perturbation de l'excitation sexuelle ; dysfonctionnement érectile ; anorexie mentale ; boulimie; trouble du sommeil ; trouble d'adaptation ; alcoolisme ; ivresse alcoolique ; toxicodépendance; intoxication aux stimulants ; narcotisme ; anhédonie ; anhédonie iatrogène ; anhédonie due à une cause psychique ou mentale ; anhédonie associée à la dépression ; anhédonie associée à la schizophrénie ; délire ; troubles cognitifs ; troubles cognitifs associés à la maladie d'Alzheimer, à la maladie de Parkinson et à d'autres maladies neurodégénératives ; troubles cognitifs causés par la maladie d'Alzheimer, la maladie de Parkinson et les maladies neurodégénératives associées ; troubles cognitifs et schizophrénies ; dysfonctionnement cognitif causé par une schizophrénie réfractaire, non traitable ou chronique ; vomissements ; cinétose ; obésité ; migraine ; douleurs (maux) ; déficience intellectuelle ; trouble global du développement (autisme) ; maladie de Gilles de la Tourette ; tics ; trouble déficitaire de l'attention avec hyperactivité ; trouble de la conduite ; et syndrome de Down.

18. Procédé de production d'un composé hétérocyclique représenté par la formule (1) :

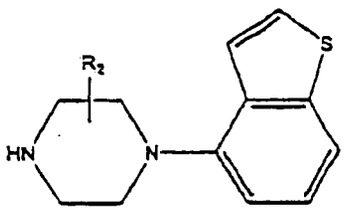


(1)

[où R_1, R_2 et A sont les mêmes que définis dans la revendication 1] ou un sel de celui-ci, **caractérisé en ce qu'**il comprend une réaction d'un composé représenté par la formule :

$$R_1\text{-O-A-}X_1$$

[où R_1 et A sont les mêmes que définis ci-dessus, et X_1 représente un atome d'halogène ou un groupe qui provoque une réaction de substitution comme avec un atome d'halogène] ou un sel de celui-ci avec un composé représenté par la formule :



[où R_2 est le même que définis ci-dessus] ou un sel de celui-ci.

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 2004026B69 A1 **[0003]**
- WO 2004026864 A1 **[0004]**
- WO 2005019215 A1 **[0005] [0006]**

Non-patent literature cited in the description

- **Michio Toru.** *Psychiatry,* 2004, vol. 46, 855-864 **[0253]**
- **Tetsuro Kikuchi ; Hirose Takeshi.** *Brain Science,* 2004, vol. 25, 579-583 **[0253]**
- **Harrison, T. S. ; Perry, C.M.** *Drugs,* 2004, vol. 64, 1715-1736 **[0253]**
- **Jun Ishigooka ; Ken Inada.** *Japanese Journal of Clinical Psychopharmacology,* 2001, vol. 4, 1653-1664 **[0254]**
- **Mitsukuni Murasaki.** *Japanese Journal of Clinical Psychopharmacology,* 1998, vol. 1, 5-22 **[0254] [0255]**
- **Meltzer, H. Y. et al.** *Prog. Neuro-Psychopharmacol. Biol. Psychiatry,* 2003, vol. 27, 1159-1172 **[0254]**
- **Svensson, T. H.** *Prog. Neuro-Psychopharmacol. Biol. Psychiatry,* 2003, vol. 27, 1145-1158 **[0257]**
- **Michio Toru.** *Seishin-Igaku,* 2004, vol. 46, 855-864 **[0277]**
- **Tetsuro Kikuchi ; Tsuyoshi Hirose.** *Nou-no-Kagaku,* 2003, vol. 25, 579-583 **[0277]**
- **Harrison, T.S. ; Perry, C.M.** *Drugs,* 2004, vol. 64, 1715-1736 **[0277]**
- **Jun Ishigooka ; Ken Inada.** *Rinsho-Seishin-Yakuri,* 2001, vol. 4, 1653-1664 **[0278]**
- **Mitsukuni Murasaki.** *Rinsho-Seishin-Yakuri,* 1998, vol. 1, 5-22 **[0278] [0279]**
- **Puller, I.A. et al.** *Eur. J. Pharmacol.,* 2000, vol. 407, 39-46 **[0278]**
- **Meltzer, H.Y. et al.** *Prog. Neuro-Psychopharmacol. Biol. Psychiatry,* 2003, vol. 27, 1159-1172 **[0278]**
- **Svensson, T.H.** *Prog. Neuro-Psychopharmacol. Biol. Psychiatry,* 2003, vol. 27, 1145-1158 **[0281]**
- **Kohler C ; Hall H ; Ogren SO ; Gawell L.** Specific in vitro and in vivo binding of 3H-raclopride. A potent substituted benzamide drug with high affinity for dopamine D-2 receptors in the rat brain. *Biochem. Pharmacol.,* 1985, vol. 34, 2251-2259 **[0366]**
- **Leysen JE ; Niemegeers CJE ; Van Nueten JM ; Laduron PM.** [3H] Ketanserin (R 41 468), a selective 3H-ligand for serotonin 2 receptor binding sites. *Mol. Pharmacol.,* 1982, vol. 21, 301-314 **[0370]**
- **Groβ G ; Hanft G ; Kolassa N.** Urapidil and some analogues with hypotensive properties show high affinities for 5-hydroxytryptamine (5-HT) binding sites of the 5-HT1A subtype and for α1-adrenoceptor binding sites. *Naunyn-Schmiedeberg's Arch Pharmacol.,* 1987, vol. 336, 597-601 **[0375]**