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(54) Migration imaging members

(57) Disclosed is a migration imaging member (1) comprising (a) a substrate (2), (b) a softenable layer (6) comprising a softenable material (7) and a photosensitive migration marking material (8), and (c) a transparentizing agent which transparentizes migration marking material in contact therewith contained in at least one layer of the migration imaging member. Also disclosed is a process which comprises (1) providing a migration imaging member (1) comprising (a) a substrate (2), (b) a softenable layer (6) comprising a softenable material (7) and a photosensitive migration marking material (8), and (c) a transparentizing agent which transparentizes migration marking material in contact therewith contained in at least one layer of the migration imaging member; (2) uniformly charging the imaging member; (3) subsequent to step (2), exposing the charged imaging member to activating radiation at a wavelength to which the migration marking material is sensitive; (4) subsequent to step (3), causing the softenable material to soften and enabling a first portion of the migration marking material to migrate through the softenable material toward the substrate in an imagewise pattern while a second portion of the migration marking material remains substantially unmigrated within the softenable layer, wherein subsequent to migration of the first portion of migration marking material, either (a) the first portion of migration marking material contacts the transparentizing agent and the second portion of migration marking material does not contact the transparentizing agent; or (b) the second portion of migration marking material contacts the transparentizing agent and the first portion of migration marking material does not contact the transparentizing agent.

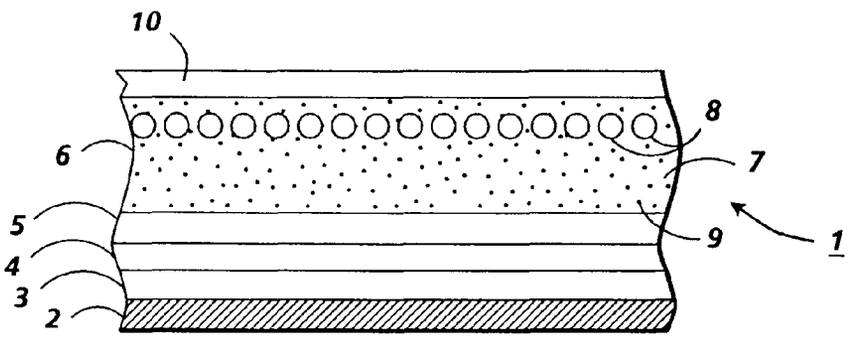

FIG. 1

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Description

The present invention is directed to improved migration imaging members. More specifically, the present invention is directed to migration imaging members with improved optical contrast density.

While known apparatus and processes are suitable for their intended purposes, a need remains for improved migration imaging members. In addition, a need remains for migration imaging members with improved optical contrast density. Further, there is a need for migration imaging members wherein the optical density of the D_{min} areas of the imaged member is decreased without a corresponding decrease in the optical density of the D_{max} areas of the imaged member. Additionally, there is a need for migration imaging members wherein the optical density of the D_{min} areas of the imaged member with respect to ultraviolet light passing through the imaging member is decreased without a corresponding decrease in the optical density of the D_{max} areas of the imaged member with respect to ultraviolet light passing through the imaging member.

It is an object of the present invention to provide migration imaging members with the above noted advantages.

These and other objects of the present invention (or specific embodiments thereof) can be achieved by providing a migration imaging member comprising (a) a substrate, (b) a softenable layer comprising a softenable material and a photosensitive migration marking material, and (c) a transparentizing agent which transparentizes migration marking material in contact therewith contained in at least one layer of the migration imaging member. Another embodiment of the present invention is directed to a process which comprises (1) providing a migration imaging member comprising (a) a substrate, (b) a softenable layer comprising a softenable material and a photosensitive migration marking material, and (c) a transparentizing agent which transparentizes migration marking material in contact therewith contained in at least one layer of the migration imaging member; (2) uniformly charging the imaging member; (3) subsequent to step (2), exposing the charged imaging member to activating radiation at a wavelength to which the migration marking material is sensitive; (4) subsequent to step (3), causing the softenable material to soften and enabling a first portion of the migration marking material to migrate through the softenable material toward the substrate in an imagewise pattern while a second portion of the migration marking material remains substantially unmigrated within the softenable layer, wherein subsequent to migration of the first portion of migration marking material, either (a) the first portion of migration marking material contacts the transparentizing agent and the second portion of migration marking material does not contact the transparentizing agent; or (b) the second portion of migration marking material contacts the transparentizing agent and the first portion of migration marking material does not contact the transparentizing agent.

Other embodiments of the invention are defined in the appended claims.

The present invention will be described further, by way of examples, with reference to the accompanying drawings, in which:-

Figure 1 illustrates schematically one migration imaging member suitable for the present invention, wherein a transparentizing agent is included within one or more layers of the imaging member;

Figures 2 and 3 illustrate schematically infrared-sensitive migration imaging members suitable for the present invention, wherein a transparentizing agent is included within one or more layers of the imaging member; and

Figures 4, 5, 6, 7, 8, 9, and 10 illustrate schematically migration imaging members suitable for the present invention, wherein a transparentizing agent is present in a separate transparentizing layer within the imaging member.

The present invention encompasses migration imaging members containing an agent for transparentizing migration marking material in at least one layer of the migration imaging member. The transparentizing agent is a material that affects migration marking material which comes into contact therewith by reducing the optical density of the softenable layer containing the migration marking material in said areas. Thus, in one embodiment of the present invention, when migration marking material migrates selectively through the softenable layer in imagewise fashion, the migrated marking material contacts the transparentizing agent while the unmigrated marking material does not contact the transparentizing agent (or contacts it to a lesser degree than the migrated marking material contacts it), thereby reducing the optical density of the softenable layer in areas wherein the migration marking material has migrated (i.e., in D_{min} areas). In another embodiment of the present invention, when migration marking material migrates selectively through the softenable layer in imagewise fashion, the unmigrated marking material contacts the transparentizing agent while the migrated marking material does not contact the transparentizing agent (or contacts it to a lesser degree than the unmigrated marking material contacts it), thereby reducing the optical density of the softenable layer in areas wherein the migration marking material has not migrated.

An example of a migration imaging member suitable for the present invention is illustrated schematically in Figure 1. As illustrated schematically in Figure 1, migration imaging member 1 comprises a substrate 2, an optional adhesive layer 3 situated on the substrate 2, an optional charge blocking layer 4 situated on optional adhesive layer 3, an optional charge transport layer 5 situated on optional charge blocking layer 4, and a softenable layer 6 situated on optional charge transport layer 5, said softenable layer 6 comprising softenable material 7, migration marking material 8 situated

at or near the surface of the layer spaced from the substrate, and optional charge transport material 9 dispersed throughout softenable material 7. Optional overcoating layer 10 is situated on the surface of softenable layer 6 spaced from the substrate 2. Any or all of the optional layers and materials can be absent from the imaging member. In addition, any of the optional layers present need not be in the order shown, but can be in any suitable arrangement. The migration imaging member can be in any suitable configuration, such as a web, a foil, a laminate, a strip, a sheet, a coil, a cylinder, a drum, an endless belt, an endless mobius strip, a circular disc, or any other suitable form.

The substrate can be either electrically conductive or electrically insulating. When conductive, the substrate can be opaque, translucent, semitransparent, or transparent, and can be of any suitable conductive material, including copper, brass, nickel, zinc, chromium, stainless steel, conductive plastics and rubbers, aluminum, semitransparent aluminum, steel, cadmium, silver, gold, paper rendered conductive by the inclusion of a suitable material therein or through conditioning in a humid atmosphere to ensure the presence of sufficient water content to render the material conductive, indium, tin, metal oxides, including tin oxide and indium tin oxide, and the like. When insulative, the substrate can be opaque, translucent, semitransparent, or transparent, and can be of any suitable insulative material, such as paper, glass, plastic, polyesters such as Mylar® (available from Du Pont) or Melinex® 442 (available from ICI Americas, Inc.), and the like. In addition, the substrate can comprise an insulative layer with a conductive coating, such as vacuum-deposited metallized plastic, such as titanized or aluminized Mylar® polyester, wherein the metallized surface is in contact with the softenable layer or any other layer situated between the substrate and the softenable layer. The substrate has any effective thickness, typically from about 6 to about 250 microns, and preferably from about 50 to about 200 microns, although the thickness can be outside these ranges.

The softenable layer can comprise one or more layers of softenable materials, which can be any suitable material, typically a plastic or thermoplastic material which is soluble in a solvent or softenable, for example, in a solvent liquid, solvent vapor, heat, or any combinations thereof. When the softenable layer is to be softened or dissolved either during or after imaging, it should be soluble in a solvent that does not attack the migration marking material. By softenable is meant any material that can be rendered by a development step as described herein permeable to migration material migrating through its bulk. This permeability typically is achieved by a development step entailing dissolving, melting, or softening by contact with heat, vapors, partial solvents, as well as combinations thereof. Examples of suitable softenable materials include styrene-acrylic copolymers, such as styrene-hexyl methacrylate copolymers, styrene acrylate copolymers, styrene butylmethacrylate copolymers, styrene butylacrylate ethylacrylate copolymers, styrene ethylacrylate acrylic acid copolymers, and the like, polystyrenes, including polyalphamethyl styrene, alkyd substituted polystyrenes, styrene-olefin copolymers, styrene-vinyltoluene copolymers, polyesters, polyurethanes, polycarbonates, polyterpenes, silicone elastomers, mixtures thereof, copolymers thereof, and the like, as well as any other suitable materials as disclosed, for example, in U.S. Patent 3,975,195 and other U.S. patents directed to migration imaging members which have been incorporated herein by reference. The softenable layer can be of any effective thickness, typically from about 1 to about 30 microns, preferably from about 2 to about 25 microns, and more preferably from about 2 to about 10 microns, although the thickness can be outside these ranges. The softenable layer can be applied to the conductive layer by any suitable coating process. Typical coating processes include draw bar coating, spray coating, extrusion, dip coating, gravure roll coating, wire-wound rod coating, air knife coating and the like.

The softenable layer also contains migration marking material. The migration marking material can be electrically photosensitive, photoconductive, or of any other suitable combination of materials, or possess any other desired physical property and still be suitable for use in the migration imaging members of the present invention. The migration marking materials preferably are particulate, wherein the particles are closely spaced from each other. Preferred migration marking materials generally are spherical in shape and submicron in size. The migration marking material generally is capable of substantial photodischarge upon electrostatic charging and exposure to activating radiation and is substantially absorbing and opaque to activating radiation in the spectral region where the photosensitive migration marking particles photogenerate charges. The migration marking material is generally present as a thin layer or monolayer of particles situated at or near the surface of the softenable layer spaced from the conductive layer. When present as particles, the particles of migration marking material preferably have an average diameter of up to 2 microns, and more preferably of from about 0.1 to about 1 micron. The layer of migration marking particles is situated at or near that surface of the softenable layer spaced from or most distant from the conductive layer. Preferably, the particles are situated at a distance of from about 0.01 to 0.1 micron from the layer surface, and more preferably from about 0.02 to 0.08 micron from the layer surface. Preferably, the particles are situated at a distance of from about 0.005 to about 0.2 micron from each other, and more preferably at a distance of from about 0.05 to about 0.1 micron from each other, the distance being measured between the closest edges of the particles, i.e. from outer diameter to outer diameter. The migration marking material contiguous to the outer surface of the softenable layer is present in any effective amount, preferably from about 5 to about 80 percent by total weight of the softenable layer, and more preferably from about 25 to about 80 percent by total weight of the softenable layer, although the amount can be outside of this range.

Examples of suitable migration marking materials include selenium, alloys of selenium with alloying components such as tellurium, arsenic, antimony, thallium, bismuth, or mixtures thereof, selenium and alloys of selenium doped

with halogens, as disclosed in, for example, U.S. Patent 3,312,548, the disclosure of which is totally incorporated herein by reference, and the like, phthalocyanines, and any other suitable materials as disclosed, for example, in U.S. Patent 3,975,195 and other U.S. patents directed to migration imaging members and incorporated herein by reference.

The migration imaging members can optionally contain a charge transport material. The charge transport material can be any suitable charge transport material either capable of acting as a softenable layer material or capable of being dissolved or dispersed on a molecular scale in the softenable layer material. When a charge transport material is also contained in another layer in the imaging member, preferably there is continuous transport of charge through the entire film structure. The charge transport material is defined as a material which is capable of improving the charge injection process for one sign of charge from the migration marking material into the softenable layer and also of transporting that charge through the softenable layer. The charge transport material can be either a hole transport material (transports positive charges) or an electron transport material (transports negative charges). The sign of the charge used to sensitize the migration imaging member during imaging can be of either polarity. Charge transporting materials are well known in the art. Typical charge transporting materials include the following:

Diamine transport molecules of the type described in U.S. Patent 4,306,008, U.S. Patent 4,304,829, U.S. Patent 4,233,384, U.S. Patent 4,115,116, U.S. Patent 4,299,897, and U.S. Patent 4,081,274, the disclosures of each of which are totally incorporated herein by reference. Typical diamine transport molecules include N,N'-diphenyl-N,N'-bis(3"-methylphenyl)-(1,1'-biphenyl)-4,4'-diamine, N,N'-diphenyl-N,N'-bis(4-methylphenyl)-(1,1'-biphenyl)-4,4'-diamine, N,N'-diphenyl-N,N'-bis(2-methylphenyl)-(1,1'-biphenyl)-4,4'-diamine, N,N'-diphenyl-N,N'-bis(3-ethylphenyl)-(1,1'-biphenyl)-4,4'-diamine, N,N'-diphenyl-N,N'-bis(4-ethylphenyl)-(1,1-biphenyl)-4,4'-diamine, N,N'-diphenyl-N,N'-bis(4-n-butylphenyl)-(1,1'-biphenyl)-4,4'-diamine, N,N'-diphenyl-N,N'-bis(3-chlorophenyl)-(1,1'-biphenyl]-4,4'-diamine, N,N'-diphenyl-N,N'-bis(4-chlorophenyl)-[1,1'-biphenyl]-4,4'-diamine, N,N'-diphenyl-N,N'-bis(phenylmethyl)-[1,1'-biphenyl]-4,4'-diamine, N,N,N',N'-tetraphenyl-[2,2'-dimethyl-1,1'-biphenyll-4,4'-diamine, N,N,N',N'-tetra-(4-methylphenyl)-[2,2'-dimethyl-1,1'-biphenyl]-4,4'-diamine, N,N'-diphenyl-N,N'-bis(4-methylphenyl)-[2,2'-dimethyl-1,1'-biphenyl[1-4,4'-diamine, N,N'-diphenyl-N,N'-bis(2-methylphenyl)-[2,2'-dimethyl-1,1'-biphenyl]-4,4'- diamine, N,N'-diphenyl-N,N'-bis(3-methylphenyl)-[2,2'-dimethyl-1,1'-biphenyl]-4,4'-diamine, N,N'-diphenyl-N,N'-bis(3-methyl phenyl)-pyrenyl-1,6-diamine, and the like.

Pyrazoline transport molecules as disclosed in U.S. Patent 4,315,982, U.S. Patent 4,278,746, and U.S. Patent 3,837,851, the disclosures of each of which are totally incorporated herein by reference. Typical pyrazoline transport molecules include 1-[lepidyl-(2)]-3-(p-diethylaminophenyl)-5-(p-diethylaminophenyl)pyrazoline, 1-[quinolyl-(2)]-3-(p-diethylaminophenyl)-5-(p-diethylaminophenyl)pyrazoline, 1-[pyridyl-(2)1-3-(p-diethylaminostyryl)-5-(p-diethylaminophenyl)pyrazoline, 1-[6-methoxypyridyl-(2)]-3-(p-diethylaminostyryl)-5-(p-diethylaminophenyl) pyrazoline, 1-phenyl-3-[p-dimethylaminostyryl]-5-(p-dimethylaminostyryl)pyrazoline, 1-phenyl-3-[p-diethylaminostyryll-5-(p-diethylaminostyryl)pyrazoline, and the like.

Substituted fluorene charge transport molecules as described in U.S. Patent 4,245,021, the disclosure of which is totally incorporated herein by reference. Typical fluorene charge transport molecules include 9-(4'-dimethylaminobenzylidene)fluorene, 9-(4'-methoxybenzylidene)fluorene, 9-(2',4'-dimethoxybenzylidene)fluorene, 2-nitro-9-benzylidene-fluorene,2-nitro-9-(4'-diethylaminobenzylidene)fluorene, and the like.

Oxadiazole transport molecules such as 2,5-bis(4-diethylaminophenyl)-1,3,4-oxadiazole, pyrazoline, imidazole, triazole, and the like. Other typical oxadiazole transport molecules are described, for example, in German Patent 1,058,836, German Patent 1,060,260, and German Patent 1,120,875, the disclosures of each of which are totally incorporated herein by reference.

Hydrazone transport molecules, such as p-diethylamino benzaldehyde(diphenylhydrazone), o-ethoxy-p-diethylaminobenzaldehyde-(diphenylhydrazone), o-methyl-p-diethylaminobenzaldehyde-(diphenylhydrazone), o-methyl-p-dimethylaminobenzaldehyde-(diphenylhydrazone), 1-naphthalenecarbaldehyde 1-methyl-1-phenylhydrazone, 1-naphthalenecarbaldehyde 1,1-phenylhydrazone, 4-methoxynaphthlene-1-carbaldeyde 1-methyl-1-phenylhydrazone, and the like. Other typical hydrazone transport molecules are described, for example in U.S. Patent 4,150,987, U.S. Patent 4,385,106, U.S. Patent 4,338,388, and U.S. Patent 4,387,147, the disclosures of each of which are totally incorporated herein by reference.

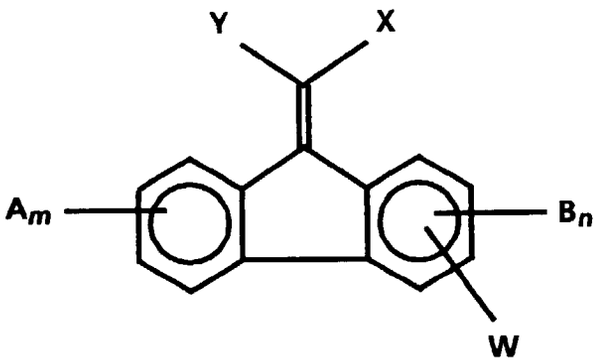
Carbazole phenyl hydrazone transport molecules such as 9-methylcarbazole-3-carbaldehyde-1,1-diphenylhydrazone, 9-ethylcarbazole-3-carbaldehyde-1-methyl-1-phenylhydrazone, 9-ethylcarbazole-3-carbaldehyde-1-ethyl-1-phenylhydrazone, 9-ethylcarbazole-3-carbaldehyde-1-ethyl-1-benzyl-1-phenylhydrazone, 9-ethylcarbazole-3-carbaldehyde-1,1-diphenylhydrazone, and the like. Other typical carbazole phenyl hydrazone transport molecules are described, for example, in U.S. Patent 4,256,821 and U.S. Patent 4,297,426, the disclosures of each of which are totally incorporated herein by reference.

Vinyl-aromatic polymers such as polyvinyl anthracene, polyacenaphthylene; formaldehyde condensation products with various aromatics such as condensates of formaldehyde and 3-bromopyrene; 2,4,7-trinitrofluorenone, and 3,6-dinitro-N-t-butylnaphthalimide as described, for example, in U.S. Patent 3,972,717, the disclosure of which is totally incorporated herein by reference.

Oxadiazole derivatives such as 2,5-bis-(p-diethylaminophenyl)-oxadiazole-1,3,4 described in U.S. Patent 3,895,944, the disclosure of which is totally incorporated herein by reference.

Tri-substituted methanes such as alkyl-bis(N,N-dialkylaminoaryl)methane, cycloalkyl-bis(N,N-dialkylaminoaryl) methane, and cycloalkenyl-bis(N,N-dialkylaminoaryl)methane as described in U.S. Patent 3,820,989, the disclosure of which is totally incorporated herein by reference.

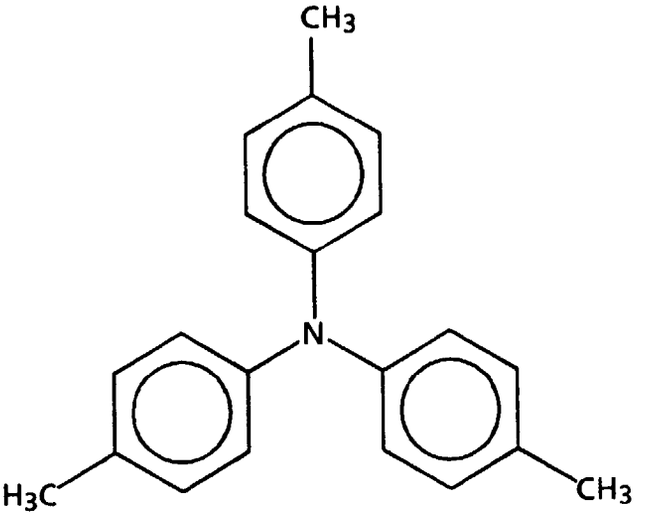
9-Fluorenylidene methane derivatives having the formula



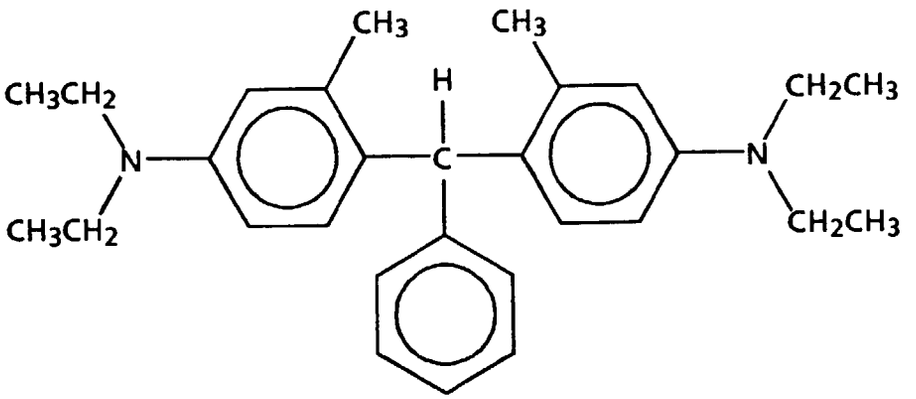
wherein X and Y are cyano groups or alkoxycarbonyl groups; A, B, and W are electron withdrawing groups independently selected from the group consisting of acyl, alkoxycarbonyl, nitro, alkylaminocarbonyl, and derivatives thereof; m is a number of from 0 to 2; and n is the number 0 or 1 as described in U.S. Patent 4,474,865, the disclosure of which is totally incorporated herein by reference. Typical 9-fluorenylidene methane derivatives encompassed by the above formula include (4-n-butoxycarbonyl-9-fluorenylidene)malonontrile, (4-phenethoxycarbonyl-9-fluorenylidene) malonontrile, (4-carbitoxy-9-fluorenylidene)malonontrile, (4-n-butoxycarbonyl-2,7-dinitro-9-fluorenylidene)malonate, and the like.

Other charge transport materials include poly-1-vinylpyrene, poly-9-vinylanthracene, poly-9-(4-pentenyl)-carbazole, poly-9-(5-hexyl)-carbazole, polymethylene pyrene, poly-1-(pyrenyl)-butadiene, polymers such as alkyl, nitro, amino, halogen, and hydroxy substitute polymers such as poly-3-amino carbazole, 1,3-dibromo-poly-N-vinyl carbazole, 3,6-dibromopoly-N-vinyl carbazole, and numerous other transparent organic polymeric or non-polymeric transport materials as described in U.S. Patent 3,870,516, the disclosure of which is totally incorporated herein by reference. Also suitable as charge transport materials are phthalic anhydride, tetrachlorophthalic anhydride, benzil, mellitic anhydride, S-tricyanobenzene, picryl chloride, 2,4-dinitrochlorobenzene, 2,4-dinitrobromobenzene, 4-nitrobiphenyl, 4,4-dinitrophenyl, 2,4,6-trinitroanisole, trichlorotrinitrobenzene, trinitro-O-toluene, 4,6-dichloro-1,3-dinitrobenzene, 4,6-dibromo-1,3-dinitrobenzene, P-dinitrobenzene, chloranil, bromanil, and mixtures thereof, 2,4,7-trinitro-9-fluorenone, 2,4,5,7-tetranitrofluorenone, trinitroanthracene, dinitroacridene, tetracyanopyrene, dinitroanthraquinone, polymers having aromatic or heterocyclic groups with more than one strongly electron withdrawing substituent such as nitro, sulfonate, carboxyl, cyano, or the like, including polyesters, polysiloxanes, polyamides, polyurethanes, and epoxies, as well as block, graft, or random copolymers containing the aromatic moiety, and the like, as well as mixtures thereof, as described in U.S. Patent 4,081,274, the disclosure of which is totally incorporated herein by reference.

Also suitable are charge transport materials such as triarylamines, including tritolyl amine, of the formula

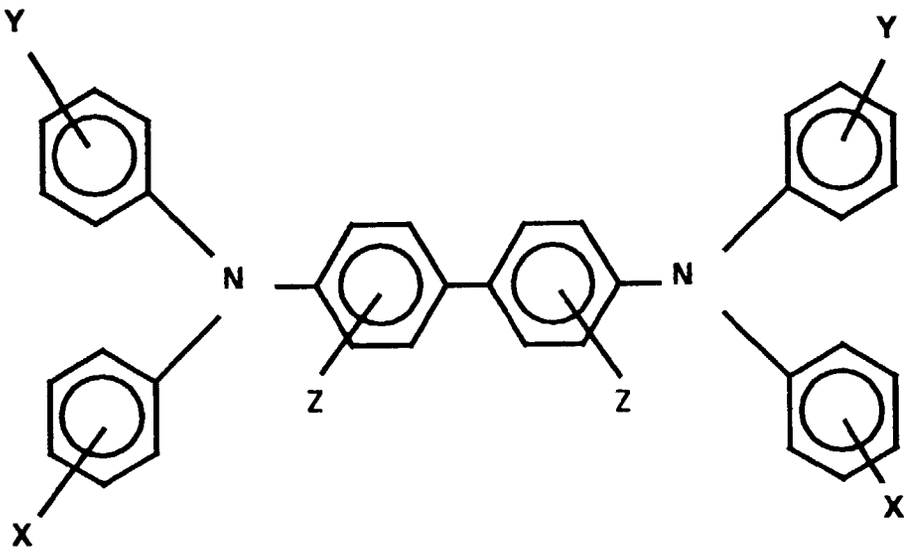


and the like, as disclosed in, for example, U.S. Patent 3,240,597 and U.S. Patent 3,180,730, the disclosures of which are totally incorporated herein by reference, and substituted diarylmethane and triarylmethane compounds, including bis-(4-diethylamino-2-methylphenyl)phenylmethane, of the formula



and the like, as disclosed in, for example, U.S. Patent 4,082,551, U.S. Patent 3,755,310, U.S. Patent 3,647,431, British Patent 984,965, British Patent 980,879, and British Patent 1,141,666, the disclosures of which are totally incorporated herein by reference.

When the charge transport molecules are combined with an insulating binder to form the softenable layer, the amount of charge transport molecule which is used can vary depending upon the particular charge transport material and its compatibility (e.g. solubility) in the continuous insulating film forming binder phase of the softenable matrix layer and the like. Satisfactory results have been obtained using between about 5 percent to about 50 percent by weight charge transport molecule based on the total weight of the softenable layer. A particularly preferred charge transport molecule is one having the general formula



wherein X, Y and Z are selected from the group consisting of hydrogen, an alkyl group having from 1 to about 20 carbon atoms and chlorine, and at least one of X, Y and Z is independently selected to be an alkyl group having from 1 to about 20 carbon atoms or chlorine. If Y and Z are hydrogen, the compound can be named N,N'-diphenyl-N,N'-bis (alkylphenyl)-[1,1'-biphenyl]-4,4'-diamine wherein the alkyl is, for example, methyl, ethyl, propyl, n-butyl, or the like, or the compound can be N,N'-diphenyl-N,N'-bis(chlorophenyl)-[1,1'-biphenyl]-4,4'-diamine. Results can be obtained when the softenable layer contains between about 8 percent to about 40 percent by weight of these diamine compounds based on the total weight of the softenable layer. Optimum results are achieved when the softenable layer contains between about 16 percent to about 32 percent by weight of N,N'-diphenyl-N,N'-bis(3''-methylphenyl)-(1,1'-biphenyl)-4,4'-diamine based on the total weight of the softenable layer.

The charge transport material is present in the softenable material in any effective amount, typically from about 5 to about 50 percent by weight and preferably from about 8 to about 40 percent by weight, although the amount can be outside these ranges. Alternatively, the softenable layer can employ the charge transport material as the softenable material if the charge transport material possesses the necessary film-forming characteristics and otherwise functions as a softenable material. The charge transport material can be incorporated into the softenable layer by any suitable technique. For example, it can be mixed with the softenable layer components by dissolution in a common solvent. If desired, a mixture of solvents for the charge transport material and the softenable layer material can be employed to facilitate mixing and coating. The charge transport molecule and softenable layer mixture can be applied to the substrate by any conventional coating process. Typical coating processes include draw bar coating, spray coating, extrusion, dip coating, gravure roll coating, wire-wound rod coating, air knife coating, and the like.

The optional adhesive layer can include any suitable adhesive material. Typical adhesive materials include copolymers of styrene and an acrylate, polyester resin such as DuPont 49000 (available from E.I. duPont de Nemours Company), copolymer of acrylonitrile and vinylidene chloride, polyvinyl acetate, polyvinyl butyral and the like and mixtures thereof. The adhesive layer can have any thickness, typically from about 0.05 to about 1 micron, although the thickness can be outside of this range. When an adhesive layer is employed, it preferably forms a uniform and continuous layer having a thickness of about 0.5 micron or less to ensure satisfactory discharge during the imaging process. It can also optionally include charge transport molecules.

The optional charge transport layer can comprise any suitable film forming binder material. Typical film forming binder materials include styrene acrylate copolymers, polycarbonates, co-polycarbonates, polyesters, co-polyesters, polyurethanes, polyvinyl acetate, polyvinyl butyral, polystyrenes, alkyd substituted polystyrenes, styrene-olefin copolymers, styrene-co-n-hexylmethacrylate, an 80/20 mole percent copolymer of styrene and hexylmethacrylate having an intrinsic viscosity of 0.179 dl/gm; other copolymers of styrene and hexylmethacrylate, styrene-vinyltoluene copolymers, polyalpha-methylstyrene, mixtures thereof, and copolymers thereof. The above group of materials is not intended to be limiting, but merely illustrative of materials suitable as film forming binder materials in the optional charge transport layer. The film forming binder material typically is substantially electrically insulating and does not adversely chemically react during the imaging process. Although the optional charge transport layer has been described as coated on a substrate, in some embodiments, the charge transport layer itself can have sufficient strength and integrity to be substantially self supporting and can, if desired, be brought into contact with a suitable conductive substrate during the imaging process. As is well known in the art, a uniform deposit of electrostatic charge of suitable polarity can be sub-

stituted for a conductive layer. Alternatively, a uniform deposit of electrostatic charge of suitable polarity on the exposed surface of the charge transport spacing layer can be substituted for a conductive layer to facilitate the application of electrical migration forces to the migration layer. This technique of "double charging" is well known in the art. The charge transport layer is of any effective thickness, typically from about 1 to about 25 microns, and preferably from about 2 to about 20 microns, although the thickness can be outside these ranges.

Charge transport molecules suitable for the charge transport layer are described in detail hereinabove. The specific charge transport molecule utilized in the charge transport layer of any given imaging member can be identical to or different from the charge transport molecule employed in the adjacent softenable layer. Similarly, the concentration of the charge transport molecule utilized in the charge transport spacing layer of any given imaging member can be identical to or different from the concentration of charge transport molecule employed in the adjacent softenable layer. When the charge transport material and film forming binder are combined to form the charge transport spacing layer, the amount of charge transport material used can vary depending upon the particular charge transport material and its compatibility (e.g. solubility) in the continuous insulating film forming binder. Satisfactory results have been obtained using between about 5 percent and about 50 percent based on the total weight of the optional charge transport spacing layer, although the amount can be outside this range. The charge transport material can be incorporated into the charge transport layer by techniques similar to those employed for the softenable layer.

The optional charge blocking layer can be of various suitable materials, provided that the objectives of the present invention are achieved, including aluminum oxide, polyvinyl butyral, silane and the like, as well as mixtures thereof. This layer, which is generally applied by known coating techniques, is of any effective thickness, typically from about 0.05 to about 0.5 micron, and preferably from about 0.05 to about 0.1 micron. Typical coating processes include draw bar coating, spray coating, extrusion, dip coating, gravure roll coating, wire-wound rod coating, air knife coating and the like.

The optional overcoating layer can be substantially electrically insulating, or have any other suitable properties. The overcoating preferably is substantially transparent, at least in the spectral region where electromagnetic radiation is used for imagewise exposure step in the imaging process. The overcoating layer is continuous and preferably of a thickness up to about 1 to 2 microns. More preferably, the overcoating has a thickness of between about 0.1 and about 0.5 micron to minimize residual charge buildup. Overcoating layers greater than about 1 to 2 microns thick can also be used. Typical overcoating materials include acrylic-styrene copolymers, methacrylate polymers, methacrylate copolymers, styrene-butylmethacrylate copolymers, butylmethacrylate resins, vinylchloride copolymers, fluorinated homo or copolymers, high molecular weight polyvinyl acetate, organosilicon polymers and copolymers, polyesters, polycarbonates, polyamides, polyvinyl toluene and the like. The overcoating layer generally protects the softenable layer to provide greater resistance to the adverse effects of abrasion during handling and imaging. The overcoating layer preferably adheres strongly to the softenable layer to minimize damage. The overcoating layer can also have abhesive properties at its outer surface which provide improved resistance to toner filming during toning, transfer, and/or cleaning. The abhesive properties can be inherent in the overcoating layer or can be imparted to the overcoating layer by incorporation of another layer or component of abhesive material. These abhesive materials should not degrade the film forming components of the overcoating and preferably have a surface energy of less than about 20 ergs/cm^2. Typical abhesive materials include fatty acids, salts and esters, fluorocarbons, silicones, and the like. The coatings can be applied by any suitable technique such as draw bar, spray, dip, melt, extrusion or gravure coating. It will be appreciated that these overcoating layers protect the imaging member before imaging, during imaging, after the members have been imaged.

As illustrated schematically in Figure 2, migration imaging member 11 comprises in the order shown a substrate 12, an optional adhesive layer 13 situated on substrate 12, an optional charge blocking layer 14 situated on optional adhesive layer 13, an optional charge transport layer 15 situated on optional charge blocking layer 14, a softenable layer 16 situated on optional charge transport layer 15, said softenable layer 16 comprising softenable material 17, charge transport material 18, and migration marking material 19 situated at or near the surface of the layer spaced from the substrate, and an infrared or red light radiation sensitive layer 20 situated on softenable layer 16 comprising infrared or red light radiation sensitive pigment particles 21 optionally dispersed in polymeric binder 22. Alternatively (not shown), infrared or red light radiation sensitive layer 20 can comprise infrared or red light radiation sensitive pigment particles 21 directly deposited as a layer by, for example, vacuum evaporation techniques or other coating methods. Optional overcoating layer 23 is situated on the surface of imaging member 11 spaced from the substrate 12.

As illustrated schematically in Figure 3, migration imaging member 24 comprises in the order shown a substrate 25, an optional adhesive layer 26 situated on substrate 25, an optional charge blocking layer 27 situated on optional adhesive layer 26, an infrared or red light radiation sensitive layer 28 situated on optional charge blocking layer 27 comprising infrared or red light radiation sensitive pigment particles 29 optionally dispersed in polymeric binder 30, an optional charge transport layer 31 situated on infrared or red light radiation sensitive layer 28, and a softenable layer 32 situated on optional charge transport layer 31, said softenable layer 32 comprising softenable material 33, charge transport material 34, and migration marking material 35 situated at or near the surface of the layer spaced from the

substrate. Optional overcoating layer 36 is situated on the surface of imaging member 24 spaced from the substrate 25.

The infrared or red light sensitive layer generally comprises a pigment sensitive to infrared and/or red light radiation. While the infrared or red light sensitive pigment may exhibit some photosensitivity in the wavelength to which the migration marking material is sensitive, it is preferred that photosensitivity in this wavelength range be minimized so that the migration marking material and the infrared or red light sensitive pigment exhibit absorption peaks in distinct, different wavelength regions. This pigment can be deposited as the sole or major component of the infrared or red light sensitive layer by any suitable technique, such as vacuum evaporation or the like. An infrared or red light sensitive layer of this type can be formed by placing the pigment and the imaging member comprising the substrate and any previously coated layers into an evacuated chamber, followed by heating the infrared or red light sensitive pigment to the point of sublimation. The sublimed material recondenses to form a solid film on the imaging member. Alternatively, the infrared or red light sensitive pigment can be dispersed in a polymeric binder and the dispersion coated onto the imaging member to form a layer. Examples of suitable red light sensitive pigments include perylene pigments such as benzimidazole perylene, dibromoanthranthrone, crystalline trigonal selenium, beta-metal free phthalocyanine, azo pigments, and the like, as well as mixtures thereof. Examples of suitable infrared sensitive pigments include X-metal free phthalocyanine, metal phthalocyanines such as vanadyl phthalocyanine, chloroindium phthalocyanine, titanyl phthalocyanine, chloroaluminum phthalocyanine, copper phthalocyanine, magnesium phthalocyanine, and the like, squaraines, such as hydroxy squaraine, and the like as well as mixtures thereof. Examples of suitable optional polymeric binder materials include polystyrene, styrene-acrylic copolymers, such as styrene-hexylmethacrylate copolymers, styrene-vinyl toluene copolymers, polyesters, such as PE-200, available from Goodyear, polyurethanes, polyvinylcarbazoles, epoxy resins, phenoxy resins, polyamide resins, polycarbonates, polyterpenes, silicone elastomers, polyvinylalcohols, such as Gelvatol 20-90, 9000, 20-60, 6000, 20-30, 3000, 40-20, 40-10, 26-90, and 30-30, available from Monsanto Plastics and Resins Co., St. Louis, MO, polyvinylformals, such as Formvar 12/85, 5/95E, 6/95E, 7/95E, and 15/95E, available from Monsanto Plastics and Resins Co., St. Louis, MO, polyvinylbutyrals, such as Butvar B-72, B-74, B-73, B-76, B-79, B-90, and B-98, available from Monsanto Plastics and Resins Co., St. Louis, MO, Zeneca resin A622, available from Zeneca Colours, Wilmington, DE, and the like as well as mixtures thereof. When the infrared or red light sensitive layer comprises both a polymeric binder and the pigment, the layer typically comprises the binder in an amount of from about 5 to about 95 percent by weight and the pigment in an amount of from about 5 to about 95 percent by weight although the relative amounts can be outside this range. Preferably, the infrared or red light sensitive layer comprises the binder in an amount of from about 40 to about 90 percent by weight and the pigment in an amount of from about 10 to about 60 percent by weight. Optionally, the infrared sensitive layer can contain a charge transport material as described herein when a binder is present; when present, the charge transport material is generally contained in this layer in an amount of from about 5 to about 30 percent by weight of the layer. The optional charge transport material can be incorporated into the infrared or red light radiation sensitive layer by any suitable technique. For example, it can be mixed with the infrared or red light radiation sensitive layer components by dissolution in a common solvent. If desired, a mixture of solvents for the charge transport material and the infrared or red light sensitive layer material can be employed to facilitate mixing and coating. The infrared or red light radiation sensitive layer mixture can be applied to the substrate by any conventional coating process. Typical coating processes include draw bar coating, spray coating, extrusion, dip coating, gravure roll coating, wire-wound rod coating, air knife coating, and the like. An infrared or red light sensitive layer wherein the pigment is present in a binder can be prepared by dissolving the polymer binder in a suitable solvent, dispersing the pigment in the solution by ball milling, coating the dispersion onto the imaging member comprising the substrate and any previously coated layers, and evaporating the solvent to form a solid film. When the infrared or red light sensitive layer is coated directly onto the softenable layer containing migration marking material, preferably the selected solvent is capable of dissolving the polymeric binder for the infrared or red sensitive layer but does not dissolve the softenable polymer in the layer containing the migration marking material. One example of a suitable solvent is isobutanol with a polyvinyl butyral binder in the infrared or red sensitive layer and a styrene/ethyl acrylate/acrylic acid terpolymer softenable material in the layer containing migration marking material. The infrared or red light sensitive layer can be of any effective thickness. Typical thicknesses for infrared or red light sensitive layers comprising a pigment and a binder are from about 0.05 to about 2 microns, and preferably from about 0.1 to about 1.5 microns, although the thickness can be outside these ranges. Typical thicknesses for infrared or red light sensitive layers consisting of a vacuum-deposited layer of pigment are from about 200 to about 2,000 Angstroms, and preferably from about 300 to about 1,000 Angstroms, although the thickness can be outside these ranges.

The transparentizing agent can be contained in any of the migration imaging member layers so that upon migration of the migration marking material through the softenable layer, either the migrated particles or the unmigrated particles are selectively transparentized by the transparentizing agent. For example, in the embodiment illustrated in Figure 1, when the optional adhesive layer 3, optional charge blocking layer 4, and optional charge transport layer 5 are all absent, the transparentizing agent can be contained in part or all of the substrate layer 2. Upon migration of the migration marking material 8 through the softenable layer 6, migrated particles contact the transparentizing agent in substrate 2 and become transparentized, thereby reducing the D_{min} value of the imaging member subsequent to development.

When one or more of the optional layers is present, the transparentizing agent can be present in one or more of these layers so that upon migration of the migration marking material 8 through the softenable layer 6, migrated particles contact the transparentizing agent in one or more of the optional layers and become transparentized, thereby reducing the D_{min} value of the imaging member subsequent to development. Further, in the embodiment illustrated in Figure 2, when the optional adhesive layer 13, optional charge blocking layer 14, and optional charge transport layer 15 are all absent, the transparentizing agent can be contained in part or all of the substrate layer 12. Upon migration of the migration marking material 19 through the softenable layer 16, migrated particles contact the transparentizing agent in substrate 12 and become transparentized, thereby reducing the D_{min} value of the imaging member subsequent to development. When one or more of the optional layers is present, the transparentizing agent can be present in one or more of these layers so that upon migration of the migration marking material 19 through the softenable layer 16, migrated particles contact the transparentizing agent in one or more of the optional layers and become transparentized, thereby reducing the D_{min} value of the imaging member subsequent to development. Additionally, in the embodiment illustrated in Figure 3, when the optional adhesive layer 26, optional charge blocking layer 27, and optional charge transport layer 31 are all absent, the transparentizing agent can be contained in part or all of the infrared or red light sensitive layer 28. Upon migration of the migration marking material 35 through the softenable layer 32, migrated particles contact the transparentizing agent in infrared or red light sensitive layer 28 and become transparentized, thereby reducing the D_{min} value of the imaging member subsequent to development. When one or more of the optional layers is present, the transparentizing agent can be present in one or more of these layers, such as charge transport layer 31, so that upon migration of the migration marking material 35 through the softenable layer 32, migrated particles contact the transparentizing agent in one or more of the optional layers and become transparentized, thereby reducing the D_{min} value of the imaging member subsequent to development.

The transparentizing agent can also be present in the softenable layer itself. For example, in the embodiment illustrated in Figure 1, the transparentizing agent can be present in softenable layer 6; in the embodiment illustrated in Figure 2, the transparentizing agent can be present in softenable layer 16; in the embodiment illustrated in Figure 3, the transparentizing agent can be present in softenable layer 32. When present in the softenable layer, the transparentizing agent can be contained throughout the softenable layer without being uniformly distributed therein. For example, the transparentizing agent can be situated or concentrated near the bottom of the softenable layer (i.e., that part of the softenable layer in closest proximity to the substrate) so that subsequent to image formation and development, migrated migration marking particles contact the transparentizing agent and become transparentized, while unmigrated migration marking particles contact the transparentizing agent either not at all or in a manner such that the concentration of transparentizing agent contacting the unmigrated marking particles is less than the concentration of transparentizing agent contacting the migrated marking particles. Further, the transparentizing agent can be situated or concentrated near the top of the softenable layer (i.e., that part of the softenable layer spaced from the substrate) so that subsequent to image formation and development, unmigrated migration marking particles contact the transparentizing agent and become transparentized, while migrated migration marking particles contact the transparentizing agent either not at all or in a manner such that the concentration of transparentizing agent contacting the migrated marking particles is less than the concentration of transparentizing agent contacting the unmigrated marking particles. The concentration of transparentizing agent within the softenable layer can be varied according to depth within the layer by any suitable method, such as by applying the softenable layer by a series of solvent coating steps, wherein the concentration of transparentizing agent dispersed with the softenable material and solvent is varied to increase or decrease the concentration of transparentizing agent as successive coatings are applied. Thereafter, the migration marking material is applied to the softenable layer by any suitable or desired method, such as solvent coating, evaporation coating, or the like.

The transparentizing agent can further be present in a separate layer or coating within the migration imaging member structure. For example, as illustrated schematically in Figure 4, migration imaging member 40 comprises a substrate 41, an optional adhesive layer 42 situated on the substrate 41, an optional charge blocking layer 43 situated on optional adhesive layer 42, an optional charge transport layer 44 situated on optional charge blocking layer 43, a transparentizing layer 45 situated on optional charge transport layer 44, and a softenable layer 46 situated on transparentizing layer 45, said softenable layer 46 comprising softenable material 47, migration marking material 48 situated at or near the surface of the layer spaced from the substrate, and optional charge transport material 49 dispersed throughout softenable material 47. Optional overcoating layer 50 is situated on the surface of softenable layer 46 spaced from the substrate 41. Any or all of the optional layers and materials can be absent from the imaging member. In addition, any of the optional layers present need not be in the order shown, but can be in any suitable arrangement. For example, if the optional adhesive layer 42, optional charge blocking layer 43, and optional charge transport layer 44 are absent, transparentizing layer 46 is coated directly onto substrate 41 and is situated between and in contact with substrate 41 and softenable layer 46.

Similarly, in the embodiment illustrated in Figure 5, migration imaging member 51 comprises in the order shown a substrate 52, an optional adhesive layer 53 situated on substrate 52, an optional charge blocking layer 54 situated

on optional adhesive layer 53, an optional charge transport layer 55 situated on optional charge blocking layer 54, a transparentizing layer 56 situated on optional charge transport layer 55, a softenable layer 57 situated on transparentizing layer 56, said softenable layer 57 comprising softenable material 58, charge transport material 59, and migration marking material 60 situated at or near the surface of the layer spaced from the substrate, and an infrared or red light radiation sensitive layer 61 situated on softenable layer 57 comprising infrared or red light radiation sensitive pigment particles 62 optionally dispersed in polymeric binder 63. Alternatively (not shown), infrared or red light radiation sensitive layer 61 can comprise infrared or red light radiation sensitive pigment particles 62 directly deposited as a layer by, for example, vacuum evaporation techniques or other coating methods. Optional overcoating layer 64 is situated on the surface of imaging member 51 spaced from the substrate 52. Any or all of the optional layers and materials can be absent from the imaging member. In addition, any of the optional layers present need not be in the order shown, but can be in any suitable arrangement. For example, if the optional adhesive layer 53, optional charge blocking layer 54, and optional charge transport layer 55 are absent, transparentizing layer 56 is coated directly onto substrate 52 and is situated between and in contact with substrate 52 and softenable layer 57.

Similarly, as illustrated schematically in Figure 6, migration imaging member 65 comprises in the order shown a substrate 66, an optional adhesive layer 67 situated on substrate 66, an optional charge blocking layer 68 situated on optional adhesive layer 67, an infrared or red light radiation sensitive layer 69 situated on optional charge blocking layer 68 comprising infrared or red light radiation sensitive pigment particles 70 optionally dispersed in polymeric binder 71, an optional charge transport layer 72 situated on infrared or red light radiation sensitive layer 69, a transparentizing layer 73 situated on optional charge transport layer 72, and a softenable layer 74 situated on transparentizing layer 73, said softenable layer 74 comprising softenable material 75, charge transport material 76, and migration marking material 77 situated at or near the surface of the layer spaced from the substrate. Optional overcoating layer 78 is situated on the surface of imaging member 65 spaced from the substrate 66. Any or all of the optional layers and materials can be absent from the imaging member. In addition, any of the optional layers present need not be in the order shown, but can be in any suitable arrangement. For example, if the optional adhesive layer 67, optional charge blocking layer 68, and optional charge transport layer 72 are absent, transparentizing layer 73 is coated directly onto infrared or red light sensitive layer 69 and is situated between and in contact with infrared or red light sensitive layer 69 and softenable layer 74.

In the embodiments illustrated in Figures 4, 5, and 6, the transparentizing layer is situated below the softenable layer (i.e., is situated between the softenable layer and the substrate), so that subsequent to image formation and development, migrated migration marking particles contact the transparentizing agent in the transparentizing layer and become transparentized, while unmigrated migration marking particles do not contact the transparentizing agent in the transparentizing layer and thus are not transparentized. The transparentizing agent can also be situated above the softenable layer (i.e., situated so that the softenable layer is between the transparentizing layer and the substrate). For example, as illustrated schematically in Figure 7, migration imaging member 79 comprises a substrate 80, an optional adhesive layer 81 situated on the substrate 80, an optional charge blocking layer 82 situated on optional adhesive layer 81, an optional charge transport layer 83 situated on optional charge blocking layer 82, a softenable layer 84 situated on optional charge transport layer 83, said softenable layer 84 comprising softenable material 85, migration marking material 86 situated at or near the surface of the layer spaced from the substrate, and optional charge transport material 87 dispersed throughout softenable material 85, and a transparentizing layer 88 situated on softenable layer 84. Optional overcoating layer 89 is situated on the surface of transparentizing layer 88 spaced from the substrate 80. Any or all of the optional layers and materials can be absent from the imaging member. In addition, any of the optional layers present need not be in the order shown, but can be in any suitable arrangement.

Similarly, in the embodiment illustrated in Figure 8, migration imaging member 90 comprises in the order shown a substrate 91, an optional adhesive layer 92 situated on substrate 91, an optional charge blocking layer 93 situated on optional adhesive layer 92, an optional charge transport layer 94 situated on optional charge blocking layer 93, a softenable layer 95 situated on optional charge transport layer 94, said softenable layer 95 comprising softenable material 96, charge transport material 97, and migration marking material 98 situated at or near the surface of the layer spaced from the substrate, a transparentizing layer situated on softenable layer 95, and an infrared or red light radiation sensitive layer 100 situated on transparentizing layer 99 comprising infrared or red light radiation sensitive pigment particles 101 optionally dispersed in polymeric binder 102. Alternatively (not shown), infrared or red light radiation sensitive layer 100 can comprise infrared or red light radiation sensitive pigment particles 101 directly deposited as a layer by, for example, vacuum evaporation techniques or other coating methods. Optional overcoating layer 103 is situated on the surface of imaging member 90 spaced from the substrate 91. Any or all of the optional layers and materials can be absent from the imaging member. In addition, any of the optional layers present need not be in the order shown, but can be in any suitable arrangement.

Similarly, as illustrated schematically in Figure 9, migration imaging member 104 comprises in the order shown a substrate 105, an optional adhesive layer 106 situated on substrate 105, an optional charge blocking layer 107 situated on optional adhesive layer 106, an infrared or red light radiation sensitive layer 108 situated on optional charge blocking

layer 107 comprising infrared or red light radiation sensitive pigment particles 109 optionally dispersed in polymeric binder 110, an optional charge transport layer 111 situated on infrared or red light radiation sensitive layer 108, a softenable layer 112 situated on optional charge transport layer 111, said softenable layer 112 comprising softenable material 113, charge transport material 114, and migration marking material 115 situated at or near the surface of the layer spaced from the substrate, and transparentizing layer 116 situated on softenable layer 112. Optional overcoating layer 117 is situated on the surface of imaging member 104 spaced from the substrate 105. Any or all of the optional layers and materials can be absent from the imaging member. In addition, any of the optional layers present need not be in the order shown, but can be in any suitable arrangement.

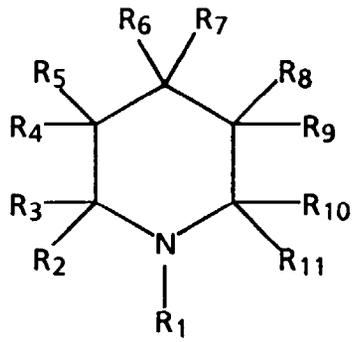
In embodiments of the present invention wherein two or more softenable layers, each containing a migration marking material, are present in the migration imaging member, the transparentizing agent can be present within one or both of the softenable layers as illustrated schematically in Figures 1 through 3. Additionally, the transparentizing agent can be present as a separate layer as illustrated in Figures 4 through 9. Further, the transparentizing agent can be present as a separate layer situated between the two softenable layers, as illustrated schematically in Figure 10. As illustrated schematically in Figure 10, migration imaging member 118 comprises in the order shown a substrate 119, an optional adhesive layer 120 situated on substrate 119, an optional charge blocking layer 121 situated on optional adhesive layer 120, an optional charge transport layer 122 situated on optional charge blocking layer 121, a first softenable layer 123 situated on optional charge transport layer 122, said first softenable layer 123 comprising first softenable material 124, optional first charge transport material 125, and first migration marking material 126 situated at or near the surface of the first softenable layer spaced from the substrate, a transparentizing layer 127 situated on first softenable layer 123, and a second softenable layer 128 situated on transparentizing layer 127 comprising second softenable material 129, optional second charge transport material 130, and second migration marking material 131 situated at or near the surface of second softenable layer 128 in contact with transparentizing layer 127. Alternatively (not shown), second migration marking material can be situated at or near the surface of second softenable layer 128 spaced from substrate 119, or can be dispersed uniformly within second softenable layer 128. Optional overcoating layer 132 is situated on the surface of the imaging member spaced from the substrate 119. Further (not shown), an infrared or red light sensitive layer can be situated within the migration imaging member having two softenable layers in configurations as illustrated, for example, in Figures 2, 3, 5, 6, 8, and 9.

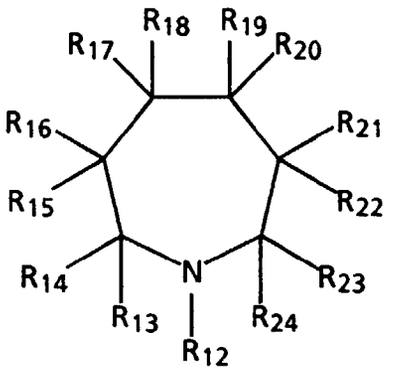
The transparentizing layer as illustrated in Figures 4 through 10 can be applied to the imaging member by any desired or suitable method. For example, a layer of softenable material (either the same as or different from the softenable material employed in the softenable layer) can be prepared by admixing the softenable material and the transparentizing agent and applying the mixture to the imaging member by any desired method, such as draw bar coating, spray coating, extrusion, dip coating, gravure roll coating, wire-wound rod coating, air knife coating and the like. Alternatively, the transparentizing agent can be coated directly onto the underlying layer in the migration imaging member, with no need for a binder or matrix, by dissolving or dispersing the transparentizing agent into a solvent, coating the solution or dispersion onto the underlying layer, and allowing the solvent to evaporate. For transparentizing agents suitable for evaporation coating techniques, the transparentizing agent can be vacuum evaporated onto the underlying layer of the migration imaging member. When the transparentizing agent is incorporated into another layer of the migration imaging member, or when the transparentizing agent is admixed with a binder and/or any additional materials to form a separate transparentizing layer within the migration imaging member, the transparentizing agent preferably is present within the layer in an amount of from about 1 to about 50 percent by weight, and more preferably 5 to about 20 percent by weight, although the amount can be outside these ranges. When the transparentizing agent is present in a separate transparentizing layer, preferably the layer is of a thickness of from about 2 to about 4 microns, although the thickness can be outside this range.

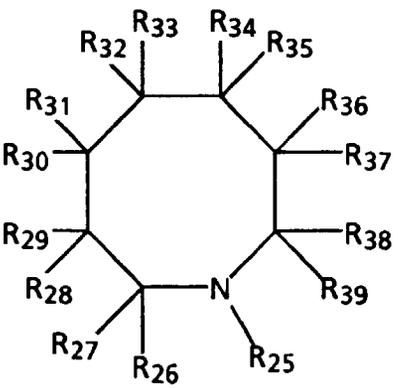
The transparentizing agent preferably is a monomeric material. In some instances, oligomeric materials (i.e., molecules having up to about four repeating monomer units) can also be employed as the transparentizing agent. Some polymeric materials may also be suitable if they contain some functional groups similar to those contained in suitable monomeric or oligomeric materials. While not being limited to any particular theory, it is believed that the transparentizing agent may chelate with the migration marking material, thereby rendering it transparent, or may enhance the ability of the migration marking material to agglomerate, or may oxidize the migration marking material, thereby rendering it transparent.

Examples of transparentizing agents suitable for the present invention include the following:

I. Azacyclic and azaheterocyclic compounds, including (A) piperidines and piperidine derivatives, including those of the general formulae:





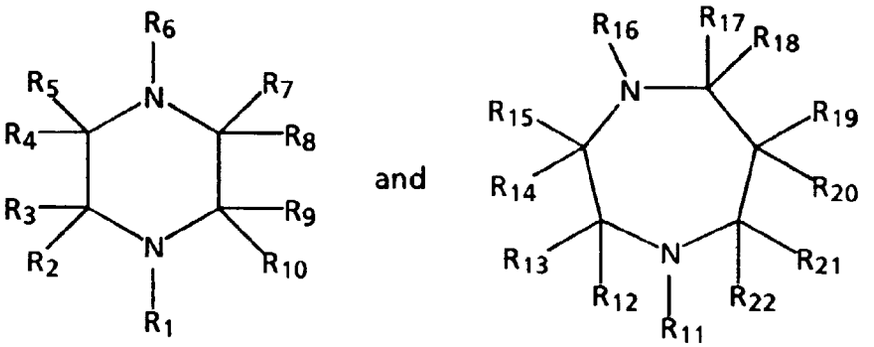


wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, R_{14}, R_{15}, R_{16}, R_{17}, R_{18}, R_{19}, R_{20}, R_{21}, R_{22}, R_{23}, R_{24}, R_{25}, R_{26}, R_{27}, R_{28}, R_{29}, R_{30}, R_{31}, R_{32}, R_{33}, R_{34}, R_{35}, R_{36}, R_{37}, R_{38}, and R_{39} each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl

groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, R_{14}, R_{15}, R_{16}, R_{17}, R_{18}, R_{19}, R_{20}, R_{21}, R_{22}, R_{23}, R_{24}, R_{25}, R_{26}, R_{27}, R_{28}, R_{29}, R_{30}, R_{31}, R_{32}, R_{33}, R_{34}, R_{35}, R_{36}, R_{37}, R_{38}, and R_{39} can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula $xH_nY_n^-$, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

Examples of suitable piperadine compounds and derivatives include (1) homopiperidine, (2) piperidinethiocyanate, (3) (±)-2-piperidinemethanol, (4) 3-piperidinemethanol, (5) 2-piperidineethanol, (6) 4-piperidineethanol, (7) 4-piperidine monohydrate hydrochloride, (8) 1-aminopiperidine, (9) 1-(2-aminoethyl)piperidine,(10) 4-(aminomethyl)piperidine, (11) 3-piperidino-1,2-propanediol, (12) 1-piperidine propionic acid, (13) 1-methyl-4-(methylamino)piperidine, (14) 1-acetyl-3-methylpiperidine, (15) 4'-piperidinoacetophenone, (16) 4-phenylpiperidine, (17) 4-piperidinopiperidine, (18) 4-benzylpiperidine, (19) 4-(4-methylpiperidino)pyridine, (20) 4-piperidone ethylene ketal, (21) bis(pentamethylene)urea, (22) 1-benzyl-4-hydroxypiperidine, (23) 1-benzoyl-4-piperidone, (24) 1,1'-methylenebis(3-methylpiperidine), (25) 4,4'-trimethylenedipiperidine, (26) 4,4'-trimethylenebis(1-menthylpiperidine), (27) 4,4'-trimethylenebis(1-piperidinepropionitrile), (28) 4,4'-trimethylenebis(1-piperidineethanol), (29) 2,2,6,6-tetramethylpiperidine, (30) 4-amino-2,2,6,6-tetramethylpiperidine, (31) 4-(dimethylamino)-1,2,2,6,6-pentamethylpiperidine, (32) N,N'-bis(2,2,6,6-tetramethyl-4-piperidinyl)-1,6-hexanediamine, (33) tripiperidinophosphine oxide, (34) tropane, (35) tropinehydrate, (36) tropinone, (37) 8-hydroxytropinone, (38) 2-piperidine carboxylic acid, (39) 2-piperidone, (40) 4,4'-trimethylene bis (1-piperidine carboxamide), (41) 4-methyl-2-(piperidinomethyl) phenol, (42) 1-methyl-4-piperidinyl bis (chlorophenoxy) acetate, (43) 2-(hexamethylene imino) ethyl chloride monohydrochloride, (44) 3-(hexahydro-1H-azepin-1-yl)-3'-nitropropiophenone hydrochloride, (45) imipramine hydrochloride [5-(3-dimethyl aminopropyl)-10,11-dihydro 5H-dibenz-(b,f) azepine hydrochloride], (46) carbamezepine [5H-dibenzo (b,f)-azepine-5-carboxamide], (47) 5,6,11,12-tetrahydro dibenz [b,f] azocine hydrochloride, (48) quinuclidine hydrochloride, (49) 3-quinuclidinol hydrochloride, (50) 3-quinuclidinone hydrochloride, (51) 2-methylene-3-quinuclidinone dihydrate hydrochloride, (52) 3-amino quinuclidine dihydrochloride, (53) 3-chloro quinuclidine hydrochloride, (54) quinidine sulfate dihydrate, (55) quinine monohydrochloride dihydrate, (56) quinine sulfate monohydrate, (57) hydroquinidine hydrochloride, (58) hydroquinine hydrobromide dihydrate, and the like;

(B) piperazines and piperazine derivatives, including those of the general formulae

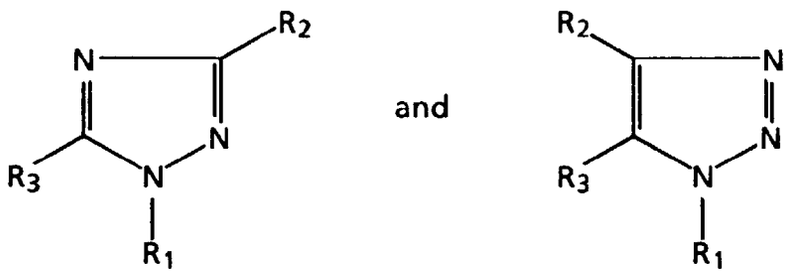


wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, R_{14}, R_{15}, R_{16}, R_{17}, R_{18}, R_{19}, R_{20}, R_{21}, and R_{22} each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl

groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups,'ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, R_{14}, R_{15}, R_{16}, R_{17}, R_{18}, R_{19}, R_{20}, R_{21} and R_{22} can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula $xH_nY_n^-$, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

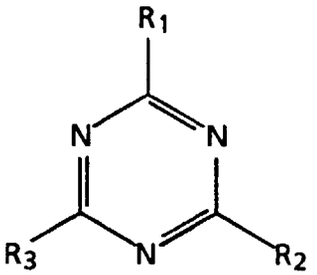
Examples of suitable piperazine compounds and derivatives include (1) piperazine and piperazine hexahydrate, (2) homopiperazine, (3) 1-methylpiperazine, (4) 2-methylpiperazine, (5) 1-acetylpiperazine, (6) 1-(2-hydroxyethyl)piperazin, (7) 1-(2-aminoethyl)piperazine, (8) tert-butyl 1-piperazinecarboxylate, (9) N-isopropyl-1-piperazineacetamide, (10) 1-(2-methoxyphenyl)piperazine, (11) 1-(2-pyridyl)piperazine, (12) 1-benzylpiperazine, (13) 1-cinnamylpiperazine, (14) 1-(4-chlorobenzhydryl)piperazine, (15) 2,6-dimethylpiperazine, (16) 1-amino-4-methylpiperazine, (17) 1-amino-4-(2-hydroxyethyl)piperazine, (18) 1,4-bis(2-hydroxyethyl)piperazine, (19) 1,4-bis(3-aminopropyl)piperazine, (20) tert-butyl-4-benzyl-1-piperazinecarboxylate, (21) 1-piperonyl piperazine, (22) bis(4-methyl-1-homopiperazinyltho-carbonyl)disulfide, (23) 1-amino-4-methyl piperazine dihydrochloride monohydrate, (24) 1-(3-chloropropyl)-piperazine dihydrochloride monohydrate, (25) 1-(2,3-xylyl) piperazine monohydrochloride, (26) 1,1-dimethyl-4-phenyl piperazineium iodide, and the like;

(C) cyclic compounds wherein the ring contains three nitrogen atoms, including (1) 1,4,7-triazacyclononane,(2) 1,5,9-triazacyclododecane,(3) triazoles and triazole derivatives, including those of the general formulae



wherein R_1, R_2, and R_3 each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21

carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, and R_3 can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula $xH_nY_n^-$, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof, such as (a) 1,2,3-triazole,(b) 4-amino-1,2,4-triazole, (c) 3-amino-5-methylthio-lH-1,2,4-triazole, (d) benzotriazole, (e) 1-aminobenzotriazole, (f) 1-cyanobenzotriazole, (g) 5-methyl-1H-benzotriazole, (h) 1H-benzotriazole-1-ylmethyl isocyanide, (i) 2-[3-(2H-benzotriazole-2-yl)-4-hydroxyphenyl]ethyl methacrylate, (j) 1,2,4-triazole, (k) 1,2,4-triazole sodium derivative, (l) 3-amino-1,2,4-triazole, (m) 3,5-diamino-1,2,4-triazole, (n) 3-amino-5-mercapto-1,2,4-triazole, (o) 3-amino-1,2,4-triazole-5-carboxylic acid hemihydrate, (p) 4-amino-3-hydrazino-5-mercapto-1,2,4-triazole, (q) 1,2,3-triazole-4,5-dicarboxylic acid monohydrate, (r) nitron [4,5-dihydro-2,4-diphenyl-5-(phenylimino)-1H-1,2,4-triazolium hydroxide inner salt], (s) 1-hydroxybenzotriazole hydrate, and the like; (4) triazines and triazine derivatives, including those of the general formulae



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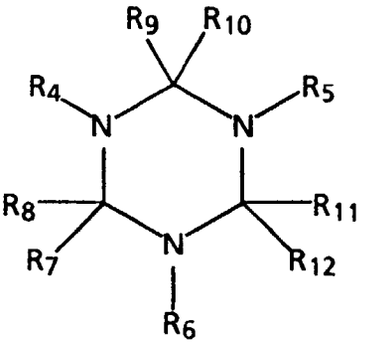
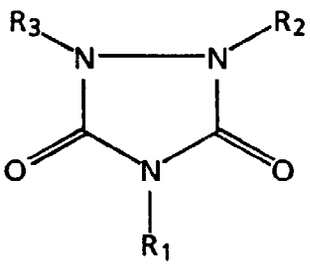


wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, and R_{12} each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, and R_{12} can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester

groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula $xH_nY_n^-$, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof, such as (a) 1,3,5-triazine, (b) cyanuric acid, (c) trithiocyanuric acid, (d) 2,4-bis (methylthio)-6-chloro-1,3,5-triazine, (e) 2-chloro-4,6-dimethoxy-1,3,5-triazine, (f) 2-chloro-4,6-diamino-1,3,5-triazine, (g) trichloromelamine, (h) cyanuric chloride, (i) 2,4,6-tris (perfluoroheptyl)-1,3,5-triazine, (j) hexahydro-2,4,6-trimethyl-1,3,5-triazine trihydrate, (k) 1,3,5-trimethylhexahydro-1,3,5-triazine, (l) 1,3,5-triethylhexahydro-1,3,5-triazine, (m) 1,3,5-triclohexylhexahydro-1,3,5-triazine, (n) 1,3,5-tribenzylhexahydro-1,3,5-triazine, (o) trichloroisocyanuric acid, (p) tris (2,3-dibromopropylisocyanurate), (q) cyanuric acid compound with melamine, and the like; (5) urazoles and urazole derivatives, including those of the general formulae



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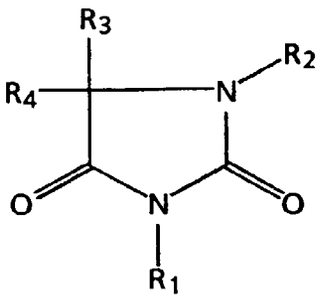
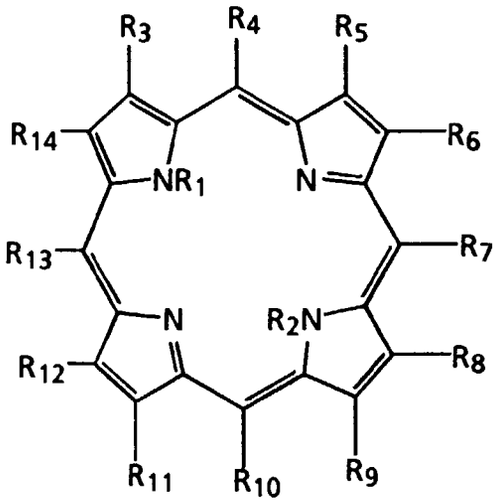


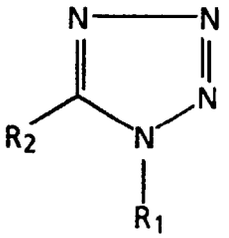
wherein R_1, R_2, R_3, and R_4 each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, and R_4 can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula $xH_nY_n^-$, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof, such as (a) urazole, (b) 1-methyl urazole, (c) 4-phenyl urazole, (d) D,L-5-(4-hydroxyphenyl)-5-phenyl hydantoin, (e) β-tetralone hydantoin, and the like;

(D) cyclic compounds wherein the ring contains four nitrogen atoms, including (1) cyclen (1,4,7,10-tetraazacyclododecane), (2) 1,4,8,11-tetraazacyclotetradecane, (3) 1,4,8,11-tetramethyl-1,4,8,11-tetraazacyclotetradecane , (4) 1,4,8,11-tetraazacyclotetradecane-5,7-dione, (5) 1,4,8,12-tetraazacyclopentadecane, (6) porphines and porphine derivatives, including those of the general formula



wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, and R_{14} each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, and R_{14} can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula $xH_nY_n^-$, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof. Examples of suitable porphines and porphine derivatives include (a) 2,3,7,8,12,13,17,18-octaethyl-21H,23H-porphine, (b) dimethyl 3,7,12,17-tetramethyl-21H,23H-porphine-2,18-dipropionate, (c) dimethyl 7,12-diacetyl-3,8,13,17-tetramethyl-21H,23H-porphine-2,18-dipropionate, (d) 8,3-divinyl-3,7,12,17-tetramethyl-21H,23H-porphine-2,18-dipropionic acid, disodium salt, (e) 5,10,15,20-tetraphenyl-21H,23H-porphine, (f) 5,10,1 5,20-tetrakis (4-methoxyphenyl)-21H,23H-porphine, (g) 5,10,15-20-tetrakis[4-(trimethylamino)phenyl]-21H,23H-porphine tetra-p-tosylate salt, (h) 5,10,15,20-tetra(4-pyridyl)-21H,23H-porphine, (i) 5,10,15,20-tetrakis(1-methyl-4-pyridyl)-21H,23H-porphine, tetra-p-tosylate salt), and the like; (7) tetrazoles and tetrazole derivatives, including those of

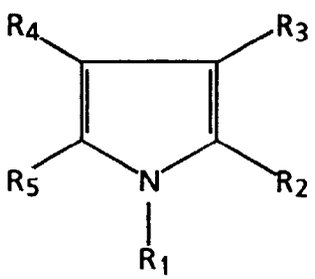
the general formula



wherein R1 and R2 each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R1 and R2 can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula $xH_nY_n^-$, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof, including (a) 1,5-pentamethylenetetrazole, (b) 1-H-tetrazole, (c) 5-amino tetrazole monohydrate, (d) 2,3,5-triphenyl-2H-tetrazolium chloride, (e) 2-(4-iodophenyl)-5-(4-nitrophenyl)-3-phenyltetrazolium chloride, (f) 1,2,3,3-tetramethyl-3H-indolinium iodide, and the like;

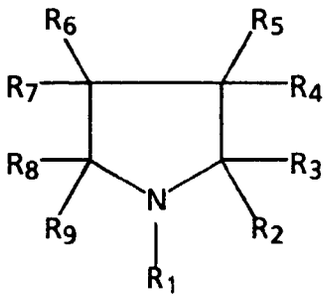
(E) cyclic compounds wherein the ring contains six nitrogen atoms, including (1) hexacyclen trisulfate, (2) hexamethylhexacyclen [1,4,7,10,13,16-hexamethyl-1,4,7,10,13-16-hexaazacyclooctadecane], and the like;

(F) pyrrole compounds, including those of the general formula



wherein R_1, R_2, R_3, R_4, and R_5 each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1

to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, R_4, and R_5 can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula $xH_nY_n^-$, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof; and (G) pyrrolidine comDounds, including those of the general formula

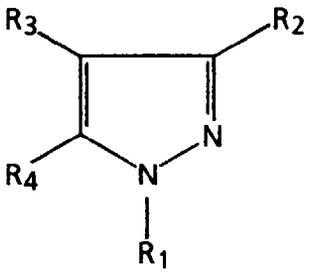


wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, and R_9 each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, and R_9 can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other

variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula $xH_nY_n^-$, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between pyrrole or pyrrolidine and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

Examples of suitable pyrrole and pyrrolidine compounds include (1) pyrrole-2-carboxaldehyde, (2) L-proline amide, (3) 3-pyrrolidino-1,2-propane diol, (4) 1-(pyrrolidino carbonylmethyl) piperazine, (5) 4-pyrrolidinopyridine, (6) 3-indolylacetonitrile, (7) 6-nitroindoline, (8) 7-azaindole, (9) indazole, (10) 2-acetyl-pyrrole, (11) 2-acetyl-1-methylpyrrole, (12) 3-acetyl-1-methylpyrrole, (13) 3-acetyl-2,4-dimethylpyrrole, (14) pyrrole-2-carboxylic acid, (15) 3-carboxy-1,4-dimethyl-2-pyrroleacetic acid, (16) proline, (17) 2-pyrrolidone-5-carboxylic acid, (18) 4-hydroxy-L-proline, (19) 1,1'-ethylene bis (5-oxo-3-pyrrolidine carboxylic acid), (20) kainic acid monohydrate (2-carboxy-4-isopropenyl-3-pyrrolidine acetic acid monohydrate), (21) 1-amino pyrrolidine hydrochloride, (22) 2-(2-chloroethyl)-1-methyl pyrrolidine hydrochloride, (23) 1-(2-chloroethyl) pyrrolidine hydrochloride, (24) tremorine dihydrochloride [1,1'-(2-butynylene) dipyrrolidine hydrochloride],(25) L-proline methyl ester hydrochloride, (26) ammonium pyrrolidine dithiocarbamate, (27) pyrrolidone hydrotribromide, (28) 1-(4-chlorobenzyl)-2-(1-pyrrolidinyl methyl) benzimidazole hydrochloride, (29) billverdin dihydrochloride, (30) indole, (31) 4,5,6,7-tetrahydroindole, (32) 3-indolemethanol hydrate, (33) 3-indole ethanol (tryptophol), (34) indole-3-carboxaldehyde, (35) 3-indolylacetate (3-acetoxyindole), (36) indole-3-acetamide, (37) indole-3-carboxylic acid, (38) indole-3-acetic acid, (39) 3-Indole propionic acid, (40) 3-indole acrylic acid, (41) 3-indole glyoxylic acid, (42) indole-3-pyruvic acid, (43) D,L-3-indolelactic acid, (44) 3-indole butyric acid, (45) N-acetyl-L-tryptophanamide,(46) N-(3-indolylacetyl)-L-alanine, (47) N-(3-indolyl acetyl)-L-valine, (48) N-(3-indolyl acetyl)-L-isoleucine, (49) N-(3-indolyl acetyl)-L-leucine, (50) N-(3-indolyl acetyl)-D,L-aspartic acid, (51) N-(3-indolyl acetyl)-L-phenylalanine, (52) 4-hydroxyindole (4-Indolol), (53) indole-4-carboxylic acid, (54) 4-indolyl acetate, (55) 4-methyl indole, (56) 5-hydroxy indole (5-indolol), (57) 5-hydroxy indole-3-acetic acid, (58) 5-hydroxy-2-indole carboxylic acid, (59) N-acetyl-5-hydroxytryptamine, (60) indole-5-carboxylic acid, (61) 5-methyl indole, (62) 5-methoxy indole, (63) indole-2-carboxylic acid, (64) D,L-indolene-2-carboxylic acid, (65) indole-2,3-dione (isatin), (66) 2-methyl indole, (67) 2,3,3-trimethyl indolenine, (68) tryptamine hydrochloride, (69) 5-methyl tryptamine hydrochloride, (70) serotonin hydrochloride hemihydrate (5-hydroxy tryptamine hydrochloride hemihydrate), (71) norharman hydrochloride monohydrate, (72) harmane hydrochloride monohydrate, (73) harmine hydrochloride hydrate, (74) harmaline hydrochloride dihydrate, (75) harmol hydrochloride dihydrate, (76) harmalol hydrochloride dihydrate, (77) 3,6-diamino acridine hydrochloride, (78) S-(3-indolyl) isothiuronium iodide, (79) yohimbine hydrochloride, and the like.

(H) pyrazoles and pyrazole derivatives, including those of the general formula

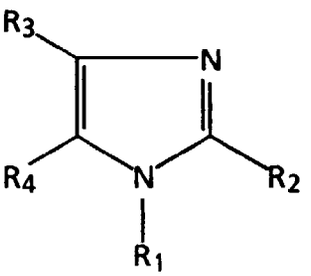


wherein R_1, R_2, R_3, and R_4 each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, and R_4 can be

joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula xH_nY_n-, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

Examples of suitable pyrazole compounds include (1) pyrazole, (2) 3-amino pyrazole, (3) 5-amino-1-ethylpyrazole, (4) 3-amino-4-carbethoxypyrazole, (5) 3-amino-5-methylpyrazole, (6) 3-amino-5-phenylpyrazole, (7) ethyl 4-pyrazole carboxylate, (8) diethyl 3,5-pyrazolecarboxylate, (9) 1,1'-(1-ethylpropylidene)bis 1H-pyrazole, (10) 4-bromopyrazole, (11)4-bromo-3-methyl pyrazole, (12) 3,5-dimethyl pyrazole, (13) 4-bromo-3,5-dimethyl pyrazole, (14) 3,5-dimethyl pyrazole-1-carboxamide, (15) 3,5-dimethylpyrazole-1-methanol, (16) 3-methyl-1-vinylpyrazole, (17) 4-benzoyl-3-methyl-1-phenyl-2-pyrazolin-5-one, (18) 1-nitropyrazole, (19) 4-pyrazole carboxylic acid, (20) 3,5-pyrazole dicarboxylic acid monohydrate, (21) 3-amino-5-hydroxypyrazole, (22) 3-amino-4-pyrazole carbonitrile, (23) 3-amino-4-pyrzaolecarboxylic acid, (24) 4-methyl pyrazole hydrochloride, (25) 3,4-diamino-5-hydroxy pyrazole sulfate, (26) (3,5-dimethyl pyrazole-1-carboxamidine nitrate), (27) 3-amino-4-pyrazole carboxamide hemisulfate, (28) acid salt of 6-amino indazole hydrochloride, (29) 4-hydroxypyrazolo [3,4-d] pyrimidine, (30) 4-mercapto-1H-pyrazolo-[3,4-d]-pyrimidine, (31) indazole, (32) 5-aminoindazole, (33) 6-aminoindazole, (34) 3-indazolinone, (35) N'-(6-indazolyl) sulfanilamide, (36) 4,5-dihydro-3-(4-pyridinyl)-2H-benz[g] indazole methane sulfonate, and the like;

(I) Imidazoles and imidazole derivatives, including those of the general formula

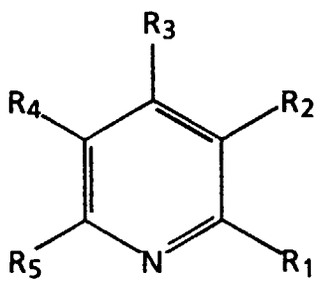


wherein R_1, R_2, R_3, and R_4 each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, and R_4 can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible,

such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula $xH_nY_n^-$, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

Examples of suitable imidazole compounds include (1) imidazole, (2) 4-methylimidazole, (3) 2-ethylimidazole, (4) 2-propylimidazole, (5) 1-butylimidazole, (6) 2-undecylimidazole, (7) histamine, (8) 1-(3-aminopropyl) imidazole, (9) 1-acetylimidazole, (10) 2-methyl-1-vinylimidazole, (11) 2-ethyl-4-methylimidazole, (12) 1-benzyl-2-methylimidazole, (13) 1-methylbenzimidazole, (14) 1-ethyl-3-methyl-1,H-imidazolinium chloride, (15) 2-(aminomethyl) benzimidazole dihydrochloride hydrate, (16) 2,6-diamino-8-purinol hemisulfate monohydrate, (17) purin-6-yl-trimethyl ammonium chloride, (18) 4-methyl-5-imidazole methanol hydrochloride, (19) N,N'-bis[3-(4,5-dihydro-1H-imidazol-2-yl)phenyl]urea dipropanoate, (20) 1-(p-tosyl)-3,4,4-trimethyl-2-imidazolinium iodide, (21) 1-ethyl-3-methyl-1H-imidazolinium chloride, (22) 2-amino imidazole sulfate, (23) 4-amino-5-imidazole carboxamide hydrochloride, (24) 2-hydrazino-2-imidazoline hydrobromide, (25) imidazole hydrochloride, (26) 4-imidazole acetic acid hydrochloride, (27) 2-benzyl-2-imidazoline hydrochloride, (28) propyl-1-(1-phenyl ethyl imidazole-5-carboxylate hydrochloride, (29) 2,6-diamino purine sulfate hydrate, (30) 1-tallow amido ethyl-3-methyl-2-heptadecyl imidazolinium methyl sulfate, (31) isostearyl ethyl imidonium ethyl sulfate, (32) methyl (1) tallow amido ethyl-2-tallow imidazolinium methyl sulfate, (33) isostearyl benzyl imidonium chloride, (34) methyl (1) hydrogenated tallow amido ethyl (2) hydrogenated tallow imidazolinium methyl sulfate, (35) 1-methyl-1-oleyl amido ethyl-2-oleyl-imidazolinium methyl sulfate, (36) cocohydroxyethyl polyethyleneglycol imidazolinium chloride phosphate, (37) 1-methyl uric acid, (38) guanine, (39) guanosine hydrate, (40) xanthine, (41) 1-methylxanthine, (42) 3-methyl xanthine, (43) 3-isobutyl-1-methyl xanthine, (44) hypoxanthine, (45) xanthosine dihydrate, (46) 6-thioxanthene, (47) purine, (48) 6-amino purine (adenine), (49) 6-methoxy purine hemihydrate, (50) 6-mercaptopurine monohydrate, (51) 2-amino-6-chloropurine, (52) 2-amino-6,8-dihydroxy purine, (53) theophylline (3,7 dihydro-1,3-di methyl-1H-purine-2,6-dione), (54) kinetin (6-furfuryl amino purine), (55) 1-methyl adenine, (56) 3-methyl adenine, (57) (-)adenosine, (58) (-)-inosine, (59) 6-mercaptopurine riboside, (60) 6-amino purine hydrochloride hemihydrate, (61) 6-amino purine sulfate, (62) 2,6-diamino-8-purinol hemisulfate monohydrate, (63) benzimidazole, (64) 2-aminobenzimidazole, (65) 2-amino-5,6-dimethlybenzimidazole, (66) 5-benzimidazole carboxylic acid, (67) 2,4,5-trimethyl benzimidazole, (68) 2-guanidinobenzimidazole, (69) 2-hydroxybenzimidazole, (70) 4-(2-keto-1-benzimidazolinyl) piperidine, (71) 2-imidazolidine thione, (72) 2-imidazolidone, (73) hydantoin, (74) 1-methyl hydantoin, (75) creatinine, (76) 2-thiohydrantoin, (77) 5-hydantoin acetic acid, (78) 5-ureidohydantoin (allantoin), (79) 5,5-dimethyl hydantoin, (80) 2-imidazolidone-4-carboxylic acid, and the like;

(J) pyridines and pyridine derivatives, including those of the general formula

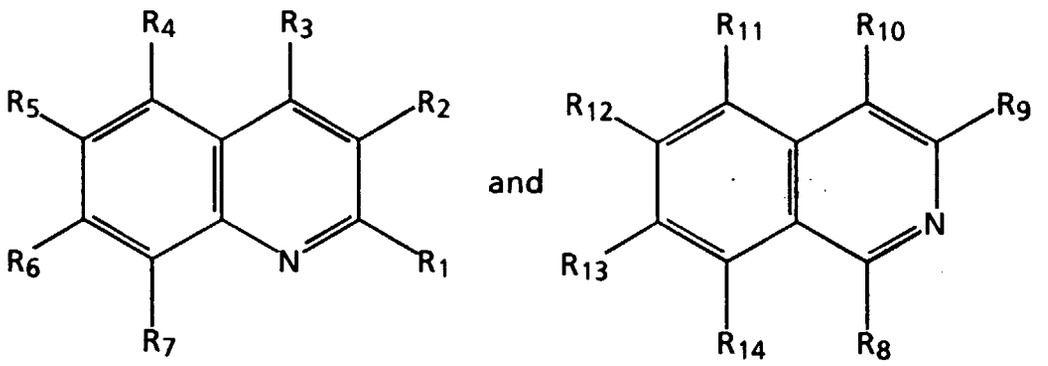


wherein R_1, R_2, R_3, R_4, and R_5 each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, R_4, and R_5 can be

joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula xH_nY_n-, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

Examples of suitable pyridine compounds include (1) N,N-bis (2-hydroxyethyl) isonicotinamide, (2) 1,2-bis(4-pyridyl) ethylene, (3) 2-(2-piperidinoethyl) pyridine, (4) 1,2-bis (4-pyridyl)ethane, (5) 4,4'-trimethylene pyridine, (6) aldrithiol-2, (7) aldrithiol-4, (8) 1,3-bis (3-pyridylmethyl)-2-thiourea, (9) 2,2':6',2''-terpyridine, (10) 2-[N,N-bis(triflouromethylsulfonyl)amino]pyridine, (11) 2,3-pyridine dicarboxylic acid, (12) 2,4-pyridine dicarboxylic acid monohydrate, (13) 2,5-pyridine dicarboxylic acid, (14) 2,6-pyridine dicarboxylic acid, (15) 3,4-pyridine dicarboxylic acid, (16) 3,5-pyridine dicarboxylic acid, (17) 2,6-pyridine dicarboxaldehyde, (18) 3,4-pyridine carboxamide, (19) 3,4-pyridine carboximide, (20) 2,3-pyridine carboxylic anhydride, (21) 3,4-pyridine carboxylic anhydride, (22) 2,6-pyridine methanol, (23) 2-pyridine ethane sulfonic acid, (24) 4-pyridine ethane sulfonic acid, (25) 3-pyridine sulfonic acid, (26) pyridoxic acid, (27) trans-3-(3-pyridyl) acrylic acid, (28) 2-pyridyl hydroxymethane sulfonic acid, (29) 3-pyridyl hydroxymethane sulfonic acid, (30) 6-methyl-2,3-pyridine dicarboxylic acid, (31) isonicotinic acid, (32) pyridine hydrobromide, (33) pyridine hydrochloride, (34) 2-(chloromethyl) pyridine hydrochloride, (35) 2-pyridylacetic acid hydrochloride, (36) nicotinoyl chloride hydrochloride, (37) 2-hydrazinopyridine dihydrochloride, (38) 2-(2-methyl aminoethyl) pyridine dihydrochloride, (39) 1-methyl-1,2,3,6-tetrahydropyridine hydrochloride, (40) 2,6-dihydroxypyridine hydrochloride, (41) 3-hydroxy-2(hydroxymethyl) pyridine hydrochloride, (42) pyridoxine hydrochloride, (43) pyridoxal hydrochloride, (44) pyridoxal 5-phosphate monohydrate, (45) 3-amino-2,6-dimethoxy pyridine hydrochloride, (46) pyridoxamine dihydrochloride monohydrate, (47) iproniazid phosphate (isonicotinic acid 2-isopropyl hydrazide phosphate), (48) tripelennamine hydrochloride, (49) pyridinium bromide perbromide, (50) pyridinium 3-nitrobenzenesulfonate, (51) 1-ethyl-3-hydroxy pyridinium bromide, (52) 1-ethyl-4-(methoxy carbonyl) pyridinium iodide, (53) 1-heptyl-4-(4-pyridyl) pyridinium bromide, (54) 1-dodecyl pyridinium chloride, (55) 1-hexadecyl pyridinium chloride monohydrate, (56) 1-hexadecyl pyridinium bromide monohydrate, (57) 1-(carboxymethyl) pyridinium chloride, (58) 1-(carboxymethyl) pyridinium chloride hydrazide, (59) 1-(3-nitrobenzyloxymethyl) pyridinium chloride, (60) 1-(3-sulfopropyl) pyridinium hydroxide, (61) N-(lauroyl colamino formyl methyl) pyridinium chloride, (62) N-(stearoyl colamine formyl methyl) pyridinium chloride, (63) 2-chloro-1-methyl pyridinium iodide, (64) 2-pyridine aldoxime-1-methyl methane sulfonate, (65) 2-pyridine aldoxime-1-methyl chloride, (66) 2-[4-(dimethyl amino) styryl]1-ethylpyridinium iodide, (67) 1-benzyl-3-hydroxy pyridinium chloride, (68) 1,4 dimethyl pyridinium iodide, (69) 1-ethyl-4-phenyl pyridinium iodide, (70) 4-phenyl-1-propyl pyridinium iodide, (71) 1-docosyl-4-(4 hydroxystyryl) pyridinium bromide, (72) 1,1'-dimethyl-4-4'-bipyridinium dichloride, (73) 1,1'-diethyl-4-4'-bipyridinium dibromide, (74) 1,1'-dibenzyl-4,4'-bipyridinium dichloride, (75) 1,1'-diheptyl-4,4'-bipyridinium dibromide, (76) 1,7-phenanthroline, (77) 1,10-phenanthroline, (78) 5-chloro-1,10-phenanthroline, (79) 4,5-dihydro-3-(4-pyridinyl)-2H-benz[g] indazole methane sulfonate, and the like;

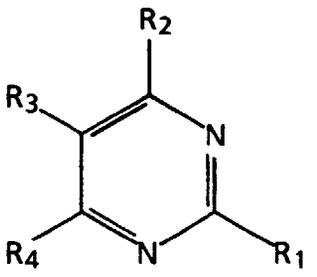
(K) quinolines and quinoline derivatives, and isoquinolines and isoquinoline derivatives, including those of the general formulae



wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, and R_{14} each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, and R_{14} can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula xH_nY_n-, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

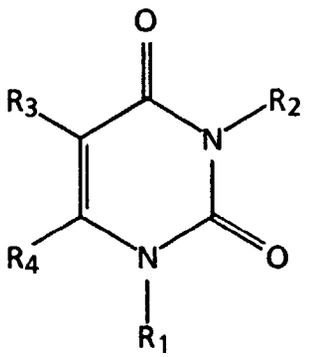
Examples of suitable quinoline and isoquinoline compounds include (1) 1,2,3,4-tetrahydro quinoline, (2) 6-ethoxy-1,2,3,4-tetrahydro-2,2,4-trimethyl quinoline, (3) 2-cyanoquinoline, (4) 1-cyanoisoquinoline, (5) 3-cyanoisoquinoline, (6) 3-amino quinoline, (7) 8-aminoquinoline, (8) 7,8-benzoquinoline, (9) 8-hydroxy quinoline, (10) 8-hydroxyquinoline, aluminium salt, (11) 8-hydroxyquinaldine, (12) 3,4,5,6,7,8-hexahydro 2 (1H)-quinolinone, (13) julolidine, (14) quinoxaline, (15) ethyl-2-quinoxalinecarboxylate, (16) quinoline, (17) 2-hydroxyquinoline, (18) 4-hydroxy quinoline, (19) 5-hydroxy quinoline, (20) 5-amino quinoline, (21) 6-amino quinoline, (22) 2-quinoline carboxylic acid, (23) 3-quinoline carboxylic acid, (24) 4-quinoline carboxylic acid, (25) 4-quinoline carboxaldehyde, (26) 2-quinoline thiol, (27) 2,4-quinoline diol, ((28) quinaldine, (29) 4-aminoquinaldine, (30) 2,6-dimethyl quinoline, (31) 2,7-dimethyl quinoline, (32) 4-methoxy-2-quinoline carboxylic acid, (33) methyl-2-phenyl-4-quinoline carboxylate, (34) 2-(N-butyl carbamoyl)-1,2,3,4-tetrahydroisoquinoline, (35) 1-hydroxyisoquinoline, (36) 1-isoquinoline carboxylic acid, (37) 3-isoquinoline carboxylic acid, (38) 1,5-isoquinoline diol, (39) 8-hydroxyquinoline hemisulfate hemihydrate, (40) 5-amino-8-hydroxy quinoline dihydrochloride, (41) 2-(chloromethyl) quinoline monohydrochloride, (42) 8-hydroxyquinoline-5-sulfonic acid monohydrate, (43) 8-ethoxy-5-quinoline sulfonic acid sodium salt hydrate, (44) 1,2,3,4-tetrahydroisoquinoline hydrochloride, (45) 1,2,3,4-tetrahydro-3-isoquinoline carboxylic acid hydrochloride, (46) 6,7-dimethoxy-1,2,3,4-tetrahydro isoquinoline hydrochloride, (47) 1-methyl-6,7-dihydroxy-1,2,3,4-tetrahydro isoquinoline hydrobromide, (48) primaquine diphosphate [8-(4-amino-1-methyl butyl amino)-6-methoxy quinoline diphosphate], (49) pentaquine phosphate, (50) dibucaine hydrochloride [2-butoxy-N-(2-diethyl amino ethyl)-4-quinoline carboxamide hydrochloride], (51) 9-aminoacridine hydrochloride hemihydrate, (52) 3, 6-diamino acridine hemisulfate, (53) 2-quinoline thiol hydrochloride, (54) (-) sparteine sulfate pentahydrate, (55) papaverine hydrochloride, (56) (+)-emetine dihydrochloride hydrate, (57) 1,10-phenanthroline monohydrochloride monohydrate, (58) neocuproine hydrochloride trihydrate, and the like;

(L) pyrimidines and pyrimidine derivatives, including those of the general formula

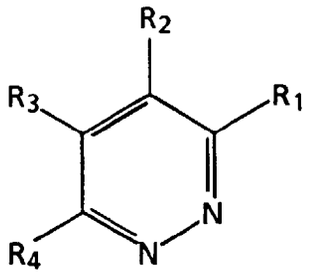


wherein R_1, R_2, R_3, and R_4 each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, and R_4 can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula xH_nY_n-, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

Examples of suitable pyrimidines include (1) pyrimidine, (2) 2 chloropyrimidine, (3) 4-phenylpyrimidine, (4) 5-bromopyrimidine, (5) 2,4-dichloropyrimidine, (6) 4,6-dichloropyrimidine, (7) 2,4-dichloro-6-methylpyrimidine, (8) 6-chloro-2,4-dimethoxypyrimidine, (9) 2-amino-4,6-dimethoxypyrimidine, (10) 2,4,6-trichloropyrimidine, (11) 2,4,5,6-tetrachloropyrimidine, (12) 1,3,4,6,7,8-hexahydro-1-methyl-2H-pyrimido [1,2-a] pyrimidine, (13) 1,3,4,6,7,8-hexahydro-2H-pyrimido [1,2-a] pyrimidine, (14) hexetidine, (15) tert-butyl S-(4,6-dimethylpyrimidin-2-yl) thiocarbonate, (16) 4-methoxybenzyl-S(4,6-dimethylpyrimidin-2-yl) thiocarbonate, (17) 2-amino pyrimidine, (18) 2-amino-4-methyl pyrimidine, (19) 2-amino-5-nitropyrimidine, (20) 2-amino-5-bromopyrimidine, (21) 2-amino-4-chloro-6-methyl pyrimidine, (22) 2-amino-4,6-dimethyl pyrimidine, (23) 2-amino-4-hydroxy-6-methyl pyrimidine, (24) 2-amino-4,6-dichloropyrimidine, (25) 2-amino-5-bromo-6-methyl-4-pyrimidinol, (26) 4-aminopyrimidine, (27) 4,5-diamino pyrimidine, (28) 4-amino-2,6-dimethyl pyrimidine, (29) 2,4-diamino-6-hydroxypyrimidine, (30) 2,6-diamino-4-chloro pyrimidine, (31) 4,6-diamino-2-mercaptopyrimidine hemihydrate, (32) 2,4,6-triamino pyrimidine, (33) 5-nitroso-2,4,6-triamino pyrimidine, (34) 4,6-dihydroxy pyrimidine, (35) 4,6-dihydroxy-2-amino pyrimidine, (36) 4,6-dihydroxy-2-methyl pyrimidine, (37) 4,6-dihydroxy-5-nitropyrimidine, (38) 2,4-dihydroxy-5-methyl pyrimidine, (39) 2,4-dihydroxy-6-methyl pyrimidine, (40) 2,4-dihydroxy-5,6-dimethyl pyrimidine, (41) 2,6-dihydroxy pyrimidine-5-carboxylic acid hydrate, (42) 2,6-dihydroxy-4-amino pyrimidine, (43) 2,4,5-trihydroxy pyrimidine, (44) 2-thiouracil [4-hydroxy-2-mercaptopyrimidine], (45) 6-amino-5-nitroso-2-thiouracil, (46) folic acid dihydrate, (47) folinic acid, calcium salt hydrate, (48) 2-hydroxypyrimidine hydrochloride, (49) 2-hydroxy-4-methyl pyrimidine hydrochloride, (50) 4,6-dimethyl-2-hydroxypyrimidine hydrochloride, (51) 2-mercapto-4-methyl pyrimidine hydrochloride, (52) 4,6-diamino pyrimidine hemisulfate monohydrate, (53) 4,5,6-triamino pyrimidine sulfate hydrate, (54) 4,5-diamino-6-hydroxy pyrimidine sulfate, (55) 2,4-diamino-6-mercapto pyrimidine hemisulfate, (56) 2,4-diamino-6-hydroxy pyrimidine hemisulfate hydrate, (57) 6-hydroxy-2,4,5-triamino pyrimidine sulfate, (58) 5,6-diamino-2,4-dihydroxy pyrimidine sulfate, (59) N^4-(2-amino-4-pyrimidinyl) sulfanilamide monohydrochloride, (60) 2,4,5,6-tetraamino pyrimidine sulfate, (61) pyrimidine diones, including those of the general formula



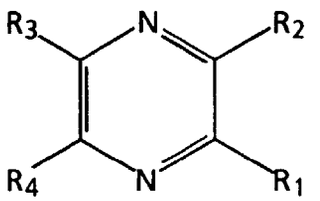
wherein R_1, R_2, R_3, and R_4 each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, and R_4 can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula xH_nY_n-, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof, such as (a) 2,4 (1H,3H)-pyrimidine dione (uracil), (b) 5-amino uracil, (c) 5-nitrouracil, (d) 5-iodouracil, (e) 5-(hydroxymethyl) uracil hydrate, (f) 5,6-dihydrouracil, (g) 6-amino-1-methyl uracil, (h) 5,6-diamino-1,3-dimethyl uracil hydrate, (i) uridine, (j) 5-methyl uridine, (k) 5-iodouridine, (l) thimidine, and the like; (62) thiouracils, such as (a) 5-methyl-2-thiouracil, (b) 4-thiouridine, (c) 2-thiocytidine dihydrate, and the like; (63) orotic acid compounds, such as (a) orotic acid monohydrate, (b) L-hydroorotic acid, (c) 5-aminoorotic acid, (d) methylorotate (orotic acid methyl ester), and the like; (64) pyrimidine trione compounds, such as (a) barbituric acid, (b) 5-nitrobarbituric acid trihydrate, (c) violuric acid monohydrate, (d) alloxan monohydrate [2,4,5,6-(1H,3H)-pyrimidine-tetrone], (65) 4,5,6-triamino-2(1H)-pyrimidinethione sulfate, (66) (-)-cyclocytidine hydrochloride, (67) cytosine arabinoside hydrochloride, and the like; (M) pyradizines and pyridazine derivatives, including those of the general formula



wherein R_1, R_2, R_3, and R_4 each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, and R_4 can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula xH_nY_n-, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

Examples of suitable pyridazines include (1) pyridazine, (2) phthalazine, (3) 4,5-dihydro-6-methyl-3(2H)-pyridazinone monohydrate, (4) 3,6-dichloropyridazine, (5) 3,4,5-trichloropyridazine, (6) 3,6-dichloro-4-methylpyridazine, (7) 3-chloro-6-methoxypyridazine, and the like;

(N) pyrazines and pyrazine derivatives, including those of the general formula

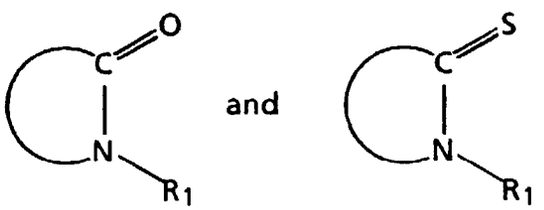


wherein R_1, R_2, R_3, and R_4 each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably

with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, and R_4 can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula $xH_nY_n^-$, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

Examples of suitable pyrazines include (1) pyrazine, (2) acetylpyrazine, (3) aminopyrazine, (4) 2,6-dichloropyrazine, (5) 2,3,5-trimethylpyrazine, (6) tetramethylpyrazine, (7) 5-methyl-2-pyrazine carboxylic acid, (8) pyrazine amide, (9) 2,3-pyrazine dicarboxamide, (10) 4-pyridazine carboxylic acid, (11) 2,3-pyrazine dicarboxylic acid, (12) lumazine monohydrate, (13) xanthopterin monohydrate, (14) 2-quinoxazoline carboxylic acid, (15) 2-quinoxalinol, (16) 2,3-dihydroxy quinoxaline, (17) phenazine methosulfate, and the like;

(O) lactams and lactam derivatives, and thiolactams and thiolactam derivatives, including those of the general formulae

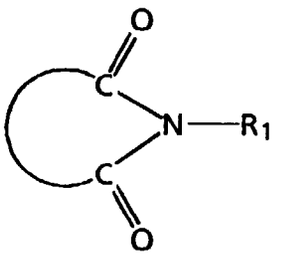


wherein R_1 can be selected from (but is not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, and wherein the curved portion of the structure represents a hydrocarbon chain or a substituted hydrocarbon chain, preferably of from about 2 to about 10 carbon atoms, wherein two or more substituents can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, substituted arylalkyl groups, and substituted hydrocarbon chain can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are

associated with a compound of the general formula xH_nY_n-, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

Examples of suitable lactams and thiolactams include (1) 2-azetidinone (β-propiolactam), (2) 2-pyrrolidinone, (3) pyrrolidone hydrotribromide, (4) δ-valerolactam, (5) ε-caprolactam, (6) amino-ε-caprolactam, (7) N-methyl caprolactam, (8) 2-azacyclooctanone, (9) 2-azacyclononanone, (10) ω-thiocaprolactam, (11) N-vinylcaprolactam, (12) (±)-2-azabicyclo[2.2.1]hept-5-en-3-one, and the like;

(P) imides and imide derivatives, including those of the general formula

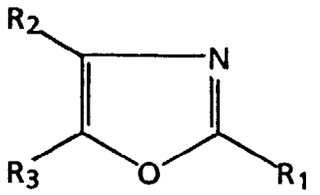
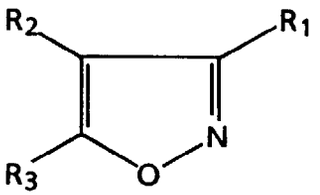
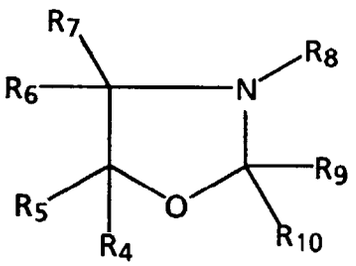
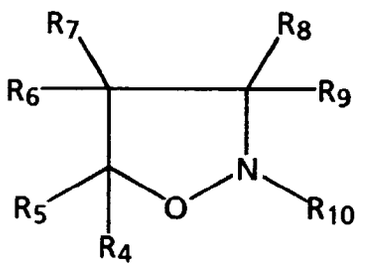
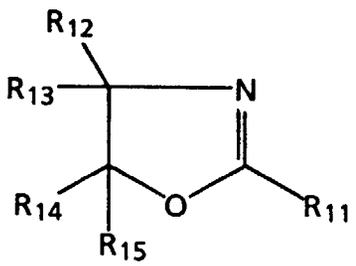
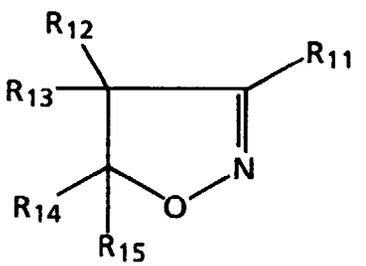


wherein R_1 can be selected from (but is not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, and wherein the curved portion of the structure represents a hydrocarbon chain or a substituted hydrocarbon chain, preferably of from about 1 to about 20 carbon atoms, wherein two or more substituents can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, substituted arylalkyl groups, and substituted hydrocarbon chain can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula xH_nY_n-, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

Examples of suitable imide compounds include (1) maleimide, (2) N-ethylmaleimide, (3) N-butylmaleimide, (4) N-cyclohexylmaleimide, (5) N-phenylmaleimide, (6) N-benzylmaleimide, (7) N-hydroxymaleimide, (8) succinimide, (9) N-methylsuccinimide, (10) (S)-(-)-2-hydroxy-N-methylsuccinimide, (11) N-hydroxysuccinimide, (12) succinimidyl 2,2,2-trichloroethyl carbonate, (13) 2-dodecyl-N-(2,2,6,6-tetramethyl-4-ppiperidinyl) succinimide, (14) 2-dodecyl-N-(1,2,2,6,6-pentamethyl-4-piperdinyl) succinimide, (15) N-(1-acetyl-2,2,6,6-tetramethyl-4-piperidinyl)-2-dodecyl succinimide, (16) a-methyl-a-propylsuccinimide, (17) α-methyl-α-phenylsuccinimide, (18) N-vinylphthalimide, (19) N-ethylphthalimide, (20) N-(trimethylsilylmethyl)phthalimide, (21) N-(2-bromoethyl)phthalimide, (22) N-(3-bromopropyl) phthalimide, (23) N-(4-bromobutyl)phthalimide, (24) phthalimidoacetaldehyde diethyl acetal, (25) diethyl (phthalimidomethyl)phosphonate, (26) N-benzylphthalimide, (27) phthalimide, DBU (1,8-diazabicyclo [5.4.0]undec-7-ene) salt, (28) phthalimide, DBN (1,5-diazabicyclo [4.3.0]non-5-ene), and the like;

II. Oxa-aza-cyclic compounds, including (A) oxazoles and oxazole derivatives, and isoxazoles and isoxazole deriva-

tives, including those of the general formulae

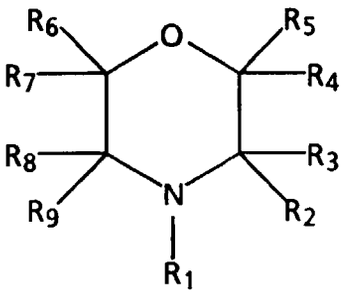







wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, R_{14}, and R_{15} each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, R_{14}, and R_{15} can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula xH_nY_n-, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction),

and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

Examples of suitable oxazole and isoxazole compounds include (1) 3-amino-5-methyl isoxazole, (2) 5-amino-3-methyl isoxazole, (3) 3,5-dimethyl-4-nitroisoxazole, (4) 1,2-benzisoxazole, (5) 2,1-benzisoxazole (Anthranil), (6) cycloserine [4-amino-3-isoxazolidinone], (7) 4-benzyl-2-methyl-2-oxazoline, (8) 2-methyl-5-phenyl-2-oxazoline-4-methanol, (9) benzoxazole, (10) 2-methylbenzoxazole, (11) 2-chlorobenzoxazole, (12) 2-chloro-3-ethylbenzeneoxazolium tetrafluoroborate, (13) 2-oxazolidone, (14) 3-methyl-2-oxazolidinone, (15) 5-chloromethyl-2-oxazolidinone, (16) 4-isopropyl-2-oxazolidinone, (17) 3-acetyl-2-oxazolidinone, (18) 5,5-dimethyl oxazolidine-2,4-dione, (19) 3-ethyl-2-thioxo-4-oxazolidinone, (20) 4-methyl-5-phenyl-2-oxazolidinone, (21) 4-benzyl-2-oxazolidinone, (22) 2-benzoisoxazolinone, (23) muscimol hydrate [5-(aminomethyl)-3-isoxazolol hydrate], (24) 5-methyl-3-phenyl isoxazole-4-carboxylic acid, (25) 2-methyl-5-phenyl-2-oxazoline-4-methanol, (26) sulfamethoxazole [4-amino-N-(5-methyl-3-isoxazolyl) benzene sulfonamide], (27) sulfisoxazole [4-amino-N-(3,4-dimethyl-5-isoxazolyl) benzene sulfonamide], (28) N'-(4,5-dimethyloxazol-2-yl) sulfanilamide, (29) cycloserine [4-amino-3-isoxazolidinone], (30) chlorzoxazone [5-chloro-2-benzoxazolone], (31) 3,3'-dimethyl oxacarbocyanine iodide, (32) 2-ethyl-5-phenyl isoxazolium-3'-sulfonate, (33) 2-chloro-3-ethylbenzoxazolium tetrafluoroborate, (34) 2-tert-butyl-5-methyl isoxazolium perchlorate, (35) 5-phenyl-2-(4-pyridyl) oxazole hydrochloride hydrate, (36) 5-phenyl-2-(4-pyridyl) oxazole methyl tosylate salt, and the like;

(B) morpholines and morpholine derivatives, including those of the general formula

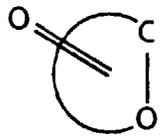


wherein R_1, R_2, R_3, R_4, R_s, R_6, R_7, R_8, and R_9 each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, and R_9 can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula $xH_nY_n^-$, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

Examples of suitable morpholines include (1) 4-aminomorpholine, (2) 4-morpholine carbonitrile, (3) 4-morpholine propionitrile, (4) 4-formyl morpholine, (5) 4-acetylmorpholine, (6) 4-(2-hydroxyethyl) morpholine, (7) 3-morpholino-

1,2-propane diol, (8) 4-(3-amino propyl) morpholine, (9) 1-morpholino-1-cyclopentene, (10) 1-morpholino-1-cyclohexene, (11) 1-morpholino-1-cycloheptene, (12) 4-phenyl morpholine, (13) 4-morpholinoaniline, (14) 2,2,2-tribromoethyl phosphoromorpholino chloridate, (15) 1-(morpholino carbonyl methyl) piperazine, (16) 1,3-dimorpholine-2-nitropropane, (17) hemicholinium-3, (18) hemicholinium-15, (19) 2-methoxy-4-morpholinobenzene diazoniumchloride, zinc chloride, (20) fomocaine, (21) 4-morpholinobenzophenone, (22) 4,4'-ethylene-bis (2,6-morpholinedione), (23) N,N'-dicylcohexyl-4-morpholine carboxamidine, (24) 1-cyclohexyl-3-(2-morpholino ethyl)-2-thiourea, (25) 4-morpholinoacetophenone, (26) 4-(2-chloroethyl) morpholine hydrochloride, (27) 4-morpholine ethane sulfonic acid, (28) 4-morpholine propane sulfonic acid, (29) β-hydroxy morpholine propane sulfonic acid, (30) [N-(aminoiminomethyl)-4-morpholine carboximidamide] hydrochloride, (31) 4-morpholine carbodithioic acid compound with morpholine, (32) 2,5-dimethyl-4-(morpholinomethyl) phenol hydrochloride monohydrate, (33) 1-cyclohexyl-3-(2-morpholinoethyl) carbodiimide metho-p-toluene sulfonate, (34) hemicholinium-3[2,2'-(4,4'-biphenylene) bis(2-hydroxy-4,4-dimethyl morpholinium bromide), (35) hemicholinium-15[4,4-dimethyl-2-hydroxy-2-phenyl morpholinium bromide], and the like; (C) cyclic azaethers and diazaethers, such as (1) 1-aza-12-crown-4, (2) 1-aza-15-crown-5, (3) 1-aza-18-crown-6, (4) 1,4,10-trioxa-7,13-diazacyclopentadecane, (5) 1,4,10,13-tetraoxa-7,16-diazacyclooctadecane, (6) N,N'-dibenzyl-1,4,10,13-tetraoxa-7,16-diazacyclooctadecane, (7) 4,7,13,18-tetraoxa-1,10-diazabicyclo [8.5.5] eicosane, (8) 4,7,13,16,21-pentaoxa-1,10-diazabicyclo [8.5.5] tricosane, (9) 4,7,13,16,21,24-hexaoxa-1,10-diazabicyclo [8.8.8] hexacosane, (10) 5,6-benzo-4,17,13,16,21,24-hexaoxa-1,10-diazabicydo[8.8.8] hexacosane, and the like;

III. Oxacyclic compounds, including (A) cyclic compounds wherein the ring contains one oxygen atom, such as (1) lactones and lactone derivatives, including those of the general formula

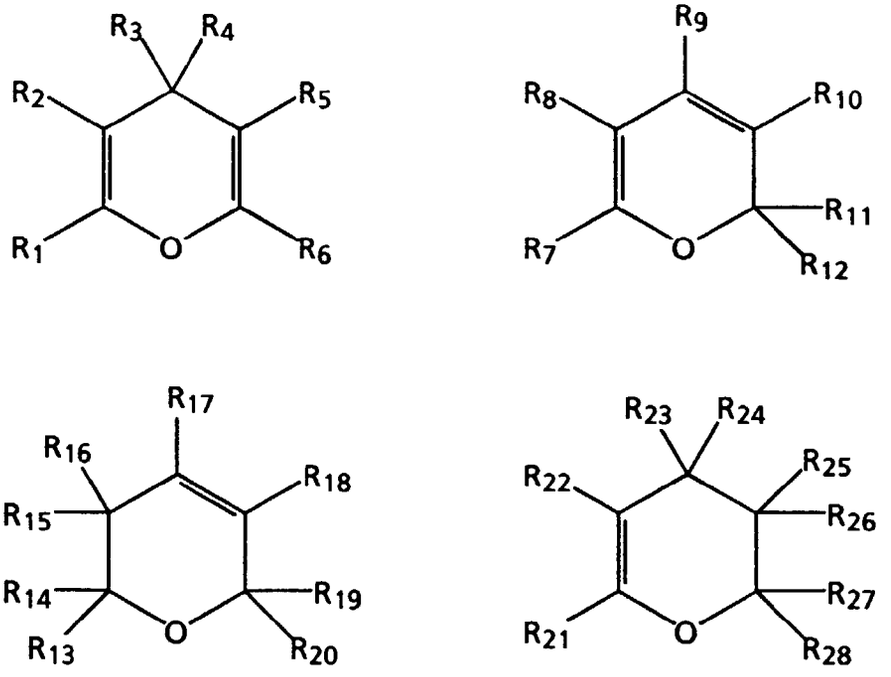


wherein the curved portion of the structure represents a hydrocarbon chain or a substituted hydrocarbon chain, preferably of from about 2 to about 20 carbon atoms, wherein two or more substituents can be joined together to form a ring, and wherein the substituents on the hydrocarbon chain can be (but are not limited to) alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula xH_nY_n-, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

Examples of lactone compounds include (a) y-butyrolactone, (b) y-valerolactone, (c) y-caprolactone, (d) y-octanoic lactone, (e) y-nonanoic lactone, (f) y-decanolactone, (g) undecanoic y-lactone, (h) y-phenyl-y-butyrolactone, (i) (±)-α-carbethoxy-y-phenyl-butyrolactone, (j) 2-coumaranone, (k) (±)-β,β-dimethyl-y-(hydroxymethyl)-y-butyrolactone, (l) (S)-(+)-y-ethoxy carbonyl-y-butyrolactone, (m) (S)-(-)-5-(hydroxymethyl)-2(5H)-furanone, (n) dihydro-4,4-dimethyl-

2,3-furandione, (o) 2,5-dimethyl-4-hydroxy-3(2H)-furanone, (p) (±)-mevalonic (β-hydroxy β-methyl-δ-valero) lactone, (q) (±)-δ-decanolactone, (r) (±)-undecanoic δ-lactone, (s) (±)-δ-dodecanolactone, (t) undecanoic ω-lactone, (u) oxacyclotridecan-2-one, (v) ω-pentadecalactone, (w) hydrindantin (2,2'-dihydroxy-2,2'-biindan-1,1'3,3'-tetrone, (x) hydrindantin dihydrate, (y) 2-oxepanone, and the like;

(2) pyrans and pyran derivatives, including those of the general formulae

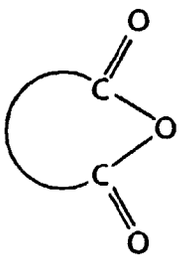


wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, R_{14}, R_{15}, R_{16}, R_{17}, R_{18}, R_{19}, R_{20}, R_{21}, R_{22}, R_{23}, R_{24}, R_{25}, R_{26}, R_{27}, and R_{28} each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, R_{14}, R_{15}, R_{16}, R_{17}, R_{18}, R_{19}, R_{20}, R_{21}, R_{22}, R_{23}, R_{24}, R_{25}, R_{26}, R_{27}, and R_{28} can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula $xH_nY_n^-$, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as

well as mixtures thereof.

Examples of pyran compounds include (a) 4H-pyran-2-one, (b) methylcoumalate (methyl-2-oxo-2H-pyran-5-carboxylate, (c) methyl 2-oxo-2H-pyran-3-carboxylate, (d) 4,6-dimethyl-α-pyrone, (e) 4-methoxy-6-methyl-2H-pyran-2-one, (f) 2-oxo-6-pentyl-2H-pyran-3-carboxylic acid, (g) methylisodehydracetate, (h) ethylisodehydracetate, (i) 5,6-dihydro-2H-pyran-2-one, (j) 3,6-dihydro-4,6,6-trimethyl-2H-pyran-2-one, (k) 3,4-dihydro-6-methyl-2H-pyran-2-one, (l) 3-acetyl coumarin, (m) 6-methyl coumarin, (n) 7-ethoxy coumarin, (o) ethyl-3-coumarin carboxylate, (p) 7-diethylamino-4-methyl coumarin, (q) dihydro coumarin, (r) 3-bromo-2-coumaranone, (s) patulin (4-hydroxy-4H-furo[3.2.c]pyran-2 (6H)-one), (t) 4H-pyran-4-one, (u) 2-ethyl-3-hydroxy-4H-pyran-4-one, (v) butopyronoxyl(butyl 3,4-dihydro-2,2-dimethyl-4-oxo-2H-pyran-6-carboxylate, (w) dehydroacetic acid, (x) 4-chromone (1-benzylpyran-4(4H)-one), (y) 4-chromanone, (z) 4-chromanol, (aa) 6,7-dimethoxy-2,2-dimethyl-4-chromanone, (bb) 3-isochromanone, (cc) 6,7-dimethoxy-3-isochromanone, (dd) 6-ethyl-4-oxo-4H-1-benzopyran-3-carbonitrile, (ee) 6-ethyl-4-oxo-4H-1-benzopyran-3-carboxaldehyde, (ff) 6-isopropyl-4-oxo-4H-1-benzopyran-3-carbonitrile, (gg) 6-isopropyl-4-oxo-4H-1-benzopyran-3-carboxaldehyde, and the like;

(3) cyclic anhydrides and anhydride derivatives, including those of the general formulae

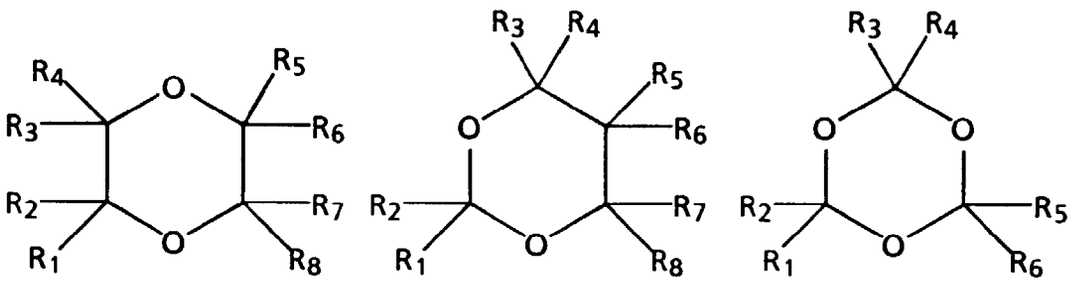


wherein the curved portion of the structure represents a hydrocarbon chain or a substituted hydrocarbon chain, preferably of from about 1 to about 20 carbon atoms, wherein two or more substituents can be joined together to form a ring, and wherein the substituents on the hydrocarbon chain can be (but are not limited to) alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula xH_nY_n-, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

Examples of cyclic anhydrides include (a) maleic anhydride, (b) bromomaleic anhydride, (c) citraconic anhydride, (d) 2,3-dimethylmaleic anhydride, (e) dichloromaleic anhydride, (f) cis-aconitic anhydride, (g) itaconic anhydride, (h) methylsuccinic anhydride, (i) S-acetylmercaptosuccinic anhydride, (j) 2,2-dimethylsuccinic anhydride, (k) phenylsuccinic anhydride, (l) (±)-2-octen-1-ylsuccinic anhydride, (m) 2-dodecen-1-ylsuccinic anhydride, (n) 2-octadecen-1-ylsuccinic anhydride, (o) 3-oxabicyclo [3.1.0] hexane-2,4-dione, (p) diglycolic anhydride, (q) glutaric anhydride, (r) 3-meth-

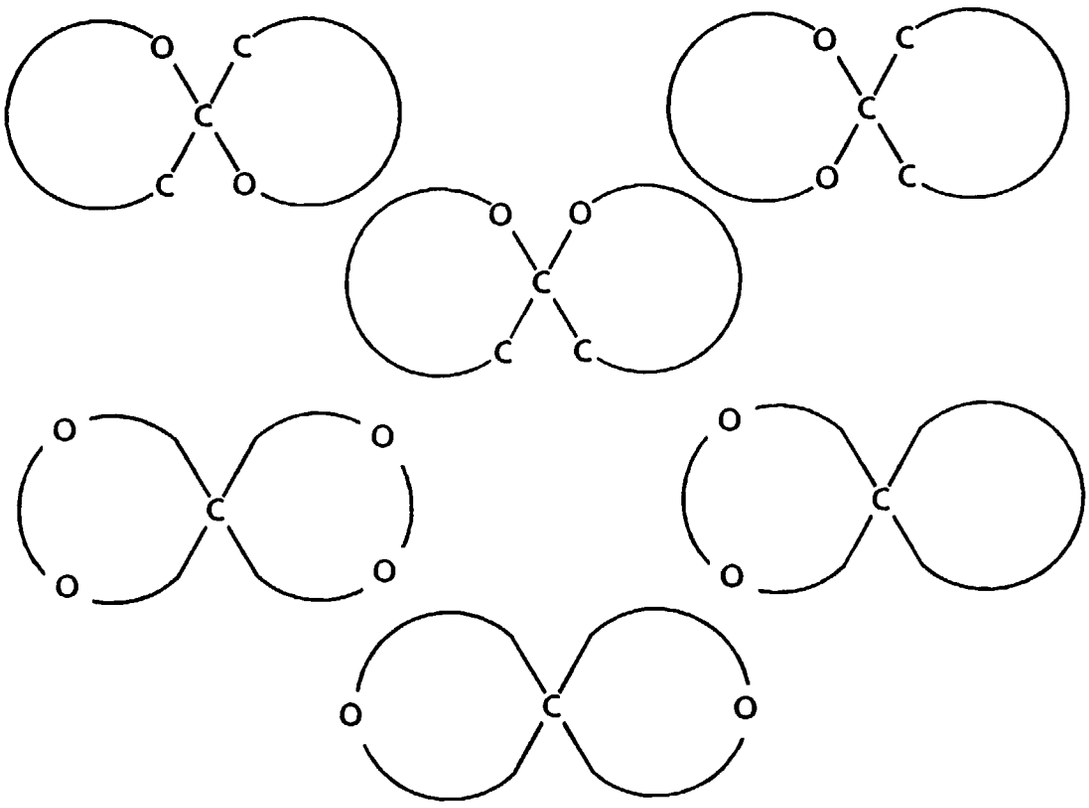
ylglutaric anhydride, (s) 2,2-dimethylglutaric anhydride, (t) 3,3-tetramethyleneglutaric anhydride, (u) 1-cyclopentene-1,2-dicarboxylic anhydride, (v) 3,4,5,6-tetrahydrophthalic anhydride, (w) cis-1,2-cyclohexanedicarboxylic anhydride, (x) (±)-hexahydro-4-methylphthalic anhydride, (y) methyl-5-norbornene-2,3-dicarboxylic anhydride, (z) 2,3-pyridinecarboxylic anhydride, (aa) 3,4-pyridinecarboxylic anhydride, and the like; (4) cyclic oxa-sulfur compounds and their derivatives, including (a) furfurylmercaptan, (b) S-furfurylthioacetate, (c) furfurylsulfide, (d) furfurylmethyldisulfide, (e) furfuryldisulfide, and the like;

(B) cyclic compounds wherein the ring contains at least two oxygen atoms, such as (1) dioxanes and dioxane derivatives, and trioxanes and trioxand derivatives, including those of the general formulae



wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, and R_8 each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, and R_8 can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula xH_nY_n-, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

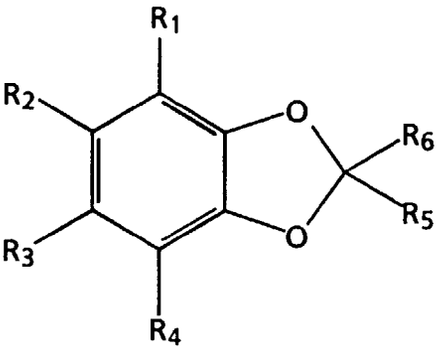
Examples of suitable dioxanes and trioxanes include (a) glycolaldehyde dimer (2,5-dihydroxy-1,4-dioxane), (b) 6,7-dihydrocyclopenta-1,3-dioxin-5(4H)-one, (c) (2R,6R)-tert-butyl-6-methyl-1,3-dioxan-4-one, (d) 2,2-dimethyl-1,3-dioxane-4,6-dione, (e) 3,6-dimethyl-1,4-dioxane-2,5-dione, (f) 2,2,6-trimethyl-4H-1,3-dioxin-4-one, (g) 2,2,5-trimethyl-1,3-dioxane-4,6-dione, (h) 5-bromo-2,2,5-trimethyl-1,3-dioxane-4,6-dione, (i) 1,3-dioxane-5,5-dimethanol, (j) 1,3,5-trioxane, and the like; (2) oxaspiros and oxaspiro derivatives, and ketals and ketal derivatives, including those of the general formulae



wherein the curved portions of the structures represent a hydrocarbon chain or a substituted hydrocarbon chain, preferably of from 1 to about 20 carbon atoms, wherein two or more substituents can be joined together to form a ring, and wherein the substituents on the hydrocarbon chains can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula xH_nY_n-, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

Examples of oxaspiros and ketals include (a) 1,6-dioxaspiro [4.4]nonane-2,7-dione, (b) 1,4-dioxaspiro [4.5]decan-2-one, (c) 1,7-dioxaspiro [5.5]undecane, (d) 2,4,8,10-tetraoxaspiro[5.5]undecane, (e) 3,9-divinyl-2,4,8-tetraoxaspiro

[5.5]undecane, (f) 2,2-pentamethylene-1,3-dioxalane, (g) 2-phenyl-1,3-dioxalane, (h) 1,4-cyclohexanedione monoethylene ketal, (i) 1,4-cyclohexanedione bis(ethylene ketal), (j) 1,4-cyclohexanedione mono-2,2-dimethyl trimethylene ketal, and the like; (3) methylene dioxys and methylene dioxy derivatives, including those of the general formula



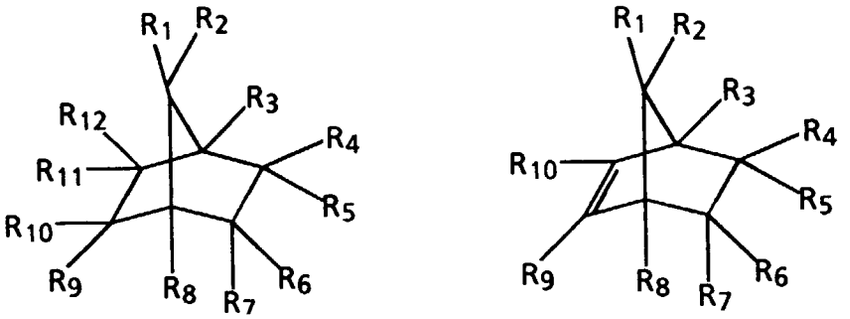
wherein R_1, R_2, R_3, R_4, R_5, and R_6 each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, R_4, R_5, and R_6 can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula xH_nY_n-, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

Examples of suitable methylenedioxy compounds include (a) piperonal, (b) piperonyl acetate, (c) piperonyl alcohol, (d) piperonylnitrile, (e) piperonyl amine, (f) 6-nitropiperonal, (g) 6-nitropiperonyl alcohol, (h) 3',4'-(methylenedioxy)acetophenone, (i) 3,4-(methylenedioxy)aniline, (j) 2,3-(methylenedioxy)benzaldehyde, (k) 3,4-(methylenedioxy)phenylacetonitrile, (l) 3,4-(methylenedioxy)toluene, and the like;

(C) crown ethers, including (1) 1,4,7,10-tetraoxacyclododecane (12-crown-4), (2) 2-(hydroxyethyl)-12-crown-4, (3) 2-(aminoethyl)-12-crown-4, (4) benzo-12-crown-4, (5) 1,4,7,10,13-pentaoxacyclododecane (15-crown-5), (6) 2-(hydroxyethyl)-15-crown-5, (7) 2-(aminoethyl)-15-crown-5, (8) benzo-15-crown-5, (9) 4'-aminobenzo-15-crown-5, (10) 4'-formylbenzo-15-crown-5, (11) 4'-nitrobenzo-15-crown-5, (12) bis [(benzo-15-crown-5)-15-ylmethyl] pimelate, (13) 1,4,7,10,13,16-hexaoxacydooctadecane (18-crown-6), (14) 2-(aminoethyl)-18 crown-6, (15) benzo-18 crown-6, (16) 4'-bromobenzo-18-crown-6, (17) dibenzo-18-crown-6 (2,3,11,12-dibenzo-1,4,7,10,13,16-hexaoxacydooctadeca-2,11-diene), (18) di-tert-butyldibenzo-18-crown-6, (19) cis-dicyclohexane-18 crown-6 (2,3,11,12-dicyclohexano-1,4,7,10,13,16-hexaoxacyclooctadecane), (20) dibenzo-24-crown-8 [2,3,14,15-dibenzo-1,4,7,10,13,16,19,22-octaoxacyclotetracosa 2,14-diene], (21) dicyclohexano-24-crown-8, (22) dibenzo-

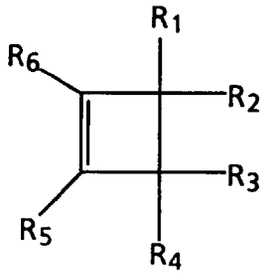
30-crown-10,[2,3,17,18-dibenzo-1,4,7,10,13,16,19,22,25,28-decaoxacyclotriaconta-2,17-diene], and the like;

III. Cyclic hydrocarbons (wherein the compound contains at least one ring with only carbon atoms, although other rings present in the compound may contain atoms other than carbon and substituents may be present on the ring (s)), including (A) norbornanes and norbornane derivatives, and norbornenes and norbornene derivatives, including those of the general formulae



wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, and R_{12} each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, and R_{12} can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula xHnYn-, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

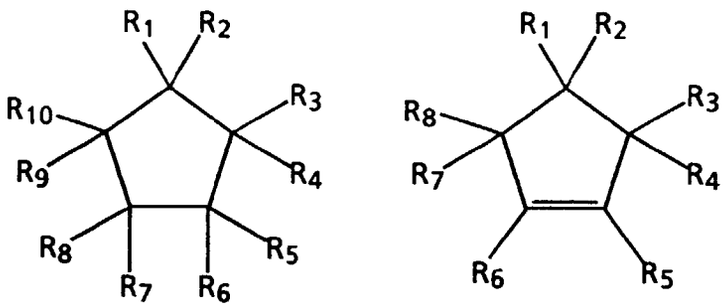
Examples of norbornanes and norbornenes include (1) norbornane, (Aldrich N3,200-8), (2) 2-norbornane carbonitrile, (3) 2-norbornane methanol, (4) 3-methyl-2-norbornane methanol, (5) camphene, (6) fenchyl alcohol, (7) thiocamphor, (8) norbornene, (9) 5-norbornene-2-carbonitrile, (10) 5-norbornene-2-carboxaldehyde, (11) 5-norbornene-2-methanol, (12) 5-norbornene-2,2-dimethanol, (13) 5-norbornene-2-benzoyl, (14) 2-norbornanone (norcamphor), (15) 3-chloro-2-norbornanone, (16) fenchone (1,3,3-trimethyl-2-norbornanone, (17) (+)-3-(trifluoroacetyl)camphor, (18) 3-heptafluorobutyryl camphor, (19) 3-bromocamphor, (20) 9,10-dibromocamphor, (21) 3,9,10-tribromocamphor, (22) dicyclopentadiene, (23) methylcyclopentadiene dimer, (24) tricyclo[5.2.1]decane, (25) 4,8-bis(hydroxymethyl)tricyclo [5.2.1.$0^{2.6}$]decane, (26) 8-ketotricydo[5.2.1.$0^{2.6}$]decane, and the like; (B) cyclobutenes and cyclobutene derivatives, of the general formula



wherein R_1, R_2, R_3, R_4, R_5, and R_6 each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, R_4, R_5, and R_6 can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula xH_nY_n-, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, or the like, as well as mixtures thereof.

Examples of cyclobutenes and cyclobutene derivatives include (1) 3,4-dimethoxy-3-cyclobutene-1,2-dione, (2) 3,4-diethoxy-3-cyclobutene-1,2-dione, (3) 3,4-diisopropoxy-3-cyclobutene-1,2-dione, (4) 3,4-dibutoxy-3-cyclobutene-1,2-dione, and the like;

(C) cyclopentanes and cyclopentane derivatives, and cyclopentenes and cyclopentene derivatives, of the formulae

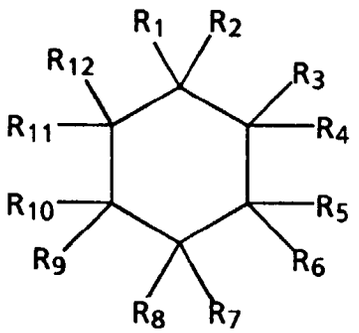


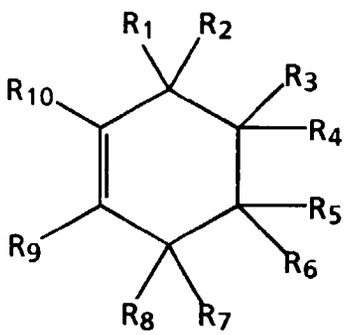
wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, and R_{10} each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably

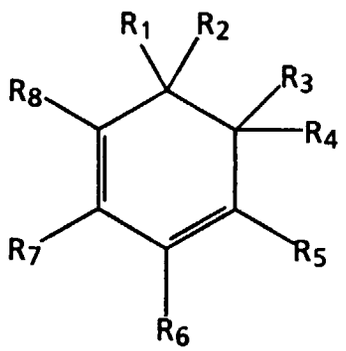
with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, and R_{10} can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula xH_nY_n-, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, ClO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

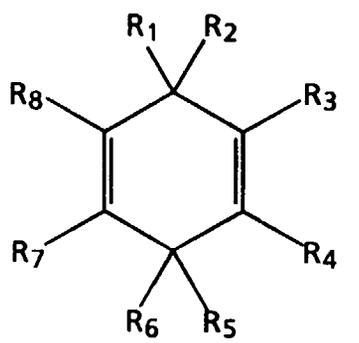
Examples of cyclopentanes and cyclopentenes include (1) 3-methyl-2-(nitromethyl)-5-oxocyclopentaneacetic acid, (2) 3-ethyl-2-hydroxy-2-cyclopenten-1-one, (3) methyl-4-methoxy-2-oxo-3-cyclopentene-1-carboxylate, (4) 3,3a,6,6a-tetrahydro-2H-cyclopenta[b]furan-2-one, (5) 3a,4,5,6a-hexahydro-5-hydroxy-4(hydroxymethyl)-2H-cydopenta[b] furan-2-one, (6) 3-methyl-1,2-cyclopentanedione, (7) 4-hydroxy-5-methyl-4-cyclopentene-1,3-dione monohydrate, and the like;

(D) cyclohexane, cyclohexene, and cyclohexadiene compounds and derivatives, of the general formulae







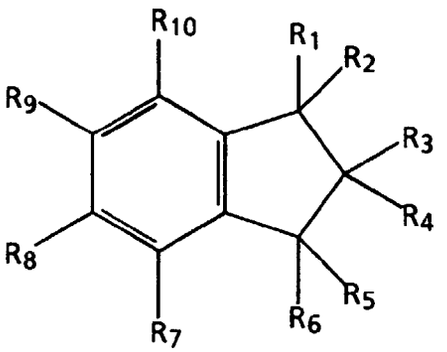


wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, and R_{12} each, independently of the others, can be (but are not

limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R11, and R12 can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula $xH_nY_{n^-}$, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, $Cl0_3^-$, or the like, as well as mixtures thereof.

Examples of cyclohexanes, cyclohexenes, and cyclohexadienes include (1) 2,4,4-trimethylcyclohexen-1-one, (2) ethyl-6-methyl-2-oxo-3-cyclohexene-1-carboxylate, (3) ethyl 4-hydroxy-6-methyl-2-oxo-3-cyclohexene-1-carboxylate, (4) 5-(1-acetoxy-1-methylethyl)-2-methyl-2-cyclohexen-1-one, (5) thymoquinone, (6) 2,6,6-trimethyl-2-cyclohexene-1,4-dione, and the like;

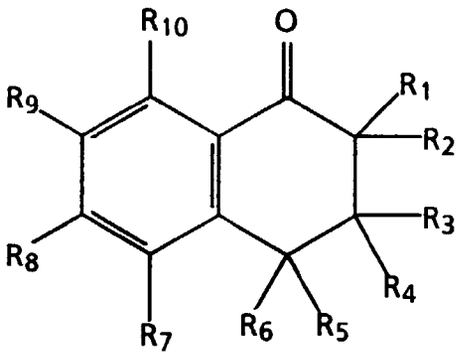
(E) indans and indan derivatives, including those of the general formula

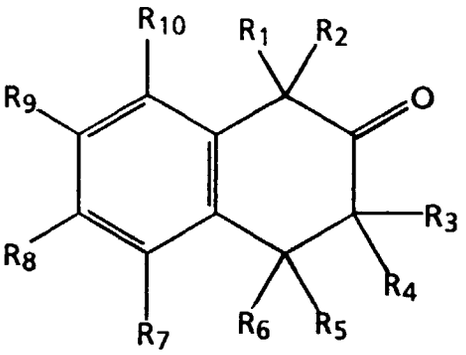


wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, and R_{10} each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, and R_{10} can be joined together to form a ring, and wherein the substituents on the

substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula xH_nY_n-, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

Examples of indans and indan derivatives include (1) indan, (2) 1-indanol, (3) 2-indanol, (4) 1-indanone, (S) 2-indanone, and the like; (F) tetralones and tetralone derivatives, including those of the general formulae

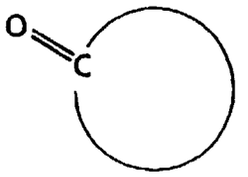




wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, and R_{10} each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, and R_{10} can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula xH_nY_n-, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

Examples of tetralones and tetralone derivatives include (1) 2-acetyl-1-tetralone, (2) 4-methyl-1-tetralone, (3) 5,7-dimethyl-1-tetralone, (4) 6,7-dimethoxy-1-tetralone, (5) 1-methyl-2-tetralone, (6) 6,7-dimethoxy-2-tetralone, and the like;

(G) cyclonones and cyclonone derivatives, of the general formula



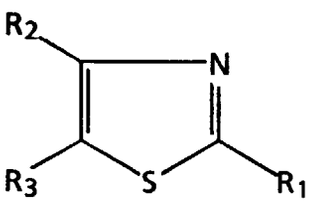
wherein the curved portion of the structure represents a hydrocarbon chain or a substituted hydrocarbon chain, preferably of from about 3 to about 1 1 carbon atoms, wherein two or more substituents can be joined together to form a ring, and wherein the substituents on the hydrocarbon chain can be (but are not limited to) alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula xH_nY_n-, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

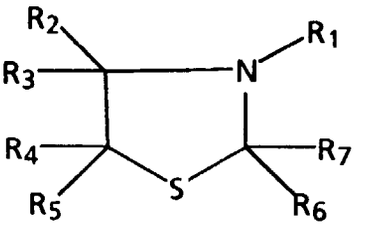
Examples of cyclonones and cyclonone derivatives include (1) cyclohexanone, (2) cycloheptanone, (3) cyclooctanone, (4) cyclononanone, (5) cyclodecanone, (6) cycloundecanone, (7) cyclododecanone, (8) cyclotridecanone, (9) cyclopentadecanone, (10) 2-acetylcyclohexanone, (11) 2-allylcyclohexanone, (12) 2-phenylcyclohexanone, (13) cyclohexanedione, (14) 2-acetyl-1,3-cyclohexanedione, (15) 4,4-dimethyl-1,3-cyclohexanedione, (16) 2-acetyl-1,3-cyclopentanedione, (17) 3,3,5,5-tetramethyl-1,2-cyclopentanedione, and the like; (H) bicyclo[3.2.1]octan-2-one, (I) endodimethyl 7-oxabicyclo[2.2.1]heptane-2,3-dicarboxylate, (J) cineole, (K) bicyclo[2.2.2]oct-5-ene-2,3-dimethanol, (L) tropone, (M) tropolone, (N) cyclooctene oxide (9-oxabicyclo[6.1.0]nonane), (O) 1,2,5,6-diepoxycyclooctane, (P) 9-methyl-$\Delta^{5(10)}$-octalin-1,6-dione, (Q) cis-bicyclo[3.3.0]octane-3.7-dione, (R) azulene, (S) 1-benzosuberone, (T) 1,5,9-cyclododecatriene, (U) cyclododecane epoxide, (V) 2,3-cyclododeceno pyridine, (W) 1,2,5,6,9,10-hexabromo cyclododecane, (X) 8-cyclohexadecen-1-one, (Y) bicyclo[10.3.0]pentadec-12(1)-en-13-one, (Z) 1,4,4a,8a-tetrahydro-endo-1,4-methanonaphthalene-5,8-dione, and the like;

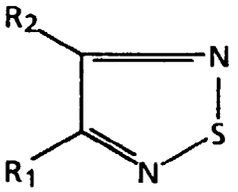
IV. Sulfur-containing compounds, including (A) thioureas and thiourea derivatives, such as (1) 1-allyl-2-thiourea, (2) 1-methallyl-3-methyl-2-thiourea, (3) 4-allyl-3-thiosemicarbazide, (4) 1,3-diethyl-2-thiourea, (5) 1,3-dibutyl-2-thiourea, (6) 1-benzyl-3-methyl-2-thiourea, (7) 1,1,3,3-tetramethyl-2-thiourea, (8) 2-imino-4-thiobiuret, (9) 1-allyl-3-(2-hydroxyethyl)-2-thiourea, (10) S-(2-aminoethyl)isothiouronium bromide hydrobromide, (11) S,S-diphenylsulfillimine monohydrate, and the like; (B) sulfones and sulfone derivatives, such as (1) methylsulfone (dimethylsulfone), (2) ethylsulfone (diethylsulfone), (3) butylsulfone (dibutylsulfone), (4) butadiene sulfone, (5) tetramethylene sulfone, (6) 1,4-butane sulfone, (7) 1,4-butanediolcydic sulfate, (8) benzylsulfone, (9) phenylsulfone (diphenylsulfone), (10) phenylvinylsulfone, (11) phenylstyrenesulfone, (12) phenyl-2-(trimethylsilyl)methyl sulfone, (13) phenyl

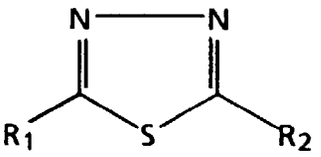
2-(trimethylsilyl)ethyl sulfone, (14) phenyl 2-(trimethylsilyl)ethynyl sulfone, (15) 4-(fluorophenyl)sulfone, (16) 4-(fluorophenyl)methyl sulfone, (17) chloromethylphenyl sulfone, (18) chloromethyl-p-tolyl sulfone, (19) 2-chloroethylphenyl sulfone, (20) methylthiomethylphenyl sulfone, (21) methylthiomethyl-p-tolyl sulfone, (22) 2-(phenylsulfonyl) tetrahydropyran, (23) 1-(phenylsulfonyl)indole, (24) 1-(p-toluenesulfonyl)imidazole, (25) 1-(p-tosyl)-3,4,4-trimethyl imidazolidine, (26) 4-(p-tosylsulfonyl)hexahydro -1,4-thiazepine, and the like; (C) thiocyclic compounds, such as (1) thionaphthene, (2) 4-keto-4,5,6,7-tetrahydrothianaphthene, (3) 2,2'-bithiophene, (4) 2,2':5', 2''-terthiophene, (5) D,L-N-acetylhomocysteine thiolactone, (6) tetrahydrothiopyran-4-one, (7) thiochroman-4-one, (8) thiochroman-4-ol, (9) D,L-thioctic acid, (10) ethyl 1,3-dithiolane-2-carboxylate, (11) 3H-1,2-benzodithiol-3-one, (12) 1,3-dithiane, (13) 2-phenyl-1,3-dithiane, (14) ethyl-1,3-dithiane-2-carboxylate, (15) 5,6-dihydro-5-methyl-4H-1,3,5-dithiazine, (16) 1,4-dithiane, (17) 2,5-dihydroxy-2,5-dimethyl-1,4-dithiane, (18) 1,5-dithiacydooactan-3-ol, (19) 1,4-dithiaspiro [45] decan-8-ol, (20) 1,3,5-trithiane, (21) 1,4,7-trithiacyclononane, (22) 1,4,7-trithiacyclodecane, (23) 1,4,7,10-tetrathiacyclododecane, (24) 3,6,9,14-tetrathiabicydo [9.2.1] tetradeca-11,13-diene, (25) 1,4,8,1-tetrathiacyclotetradecane, (26) 1,5,9,13-tetrathiocyclohexadecane, (27) 1,5,9,13-tetrathiacyclohexadecane-3,11-diol, (28) 1,4,7,10,13-pentathiacyclopentadecane, (29) 1,4,7,10,13,16-hexathiacyclooctadecane, (30) 1,5,9,13,17,21-hexathiacyclotetracosane-3,11,19-triol, (31) 1,4,7,10,13,16,19,22-octathiacyclotetracosane, (32) 1,4,8,11,15,18,22,25-octathiacyclooctacosane, (33) 1,4,7,10,13,16,19,22,25-nonathiacycloheptacosane, and the like; (D) sulfites and sulfite derivatives, including (1) dimethylsulfite, (2) diethylsulfite, (3) sodium sulfite, and the like; (E) sulfides and sulfide derivatives, including (1) allyldisulfide, (2) aminophenyldisulfide, (3) benzyldisulfide, (4) benzylphenylsulfide, and the like; (F) quaternary sulfur compounds and their derivatives, including (1) trimethylsulfonium methylsulfate, (2) (2-chloroethyl)dimethylsulfonium iodide, (3) 3-(chloropropyl)diphenylsulfonium tetrafluoroborate, (4) trimethyl sulfonium iodide, (5) trimethyl sulfoxonium iodide, (6) trimethyl sulfoxonium chloride, (7) triphenyl methane sulfenyl chloride, (8) dimethyl (2-methoxy-5-nitrobenzyl) sulfonium bromide, (9) thionin perchlorate, (10) p-xylylene bis(tetrahydrothiopheneum chloride), (11) tris (dimethyl amino) sulfonium difluorotrimethyl silicate, (12) tris (dimethyl amino) sulfonium trifluoromethoxide, (13) (3-amino-3-carboxypropyl) dimethyl sulfonium chloride, and the like;

V. Thia-aza-cyclic compounds, including (A) thiazoles and thiazole derivatives, and thiazolidines and thiazolidine derivatives, and thiadiazoles and thiadiazole derivatives, including those of the general formulae





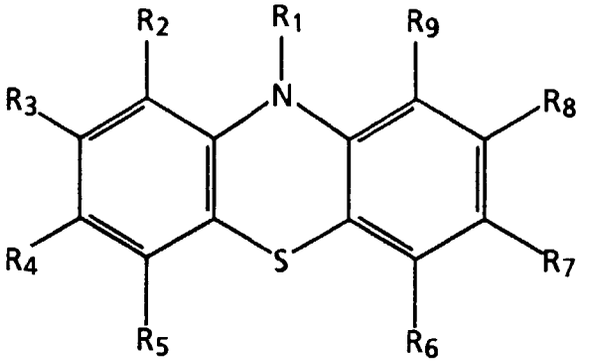




wherein R_1, R_2, R_3, R_4, R_5, R_6, and R_7 each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto

groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, and R_7 can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula xH_nY_n-, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, I^-, HSO_4^-, $SO4^{2-}$, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

Examples of thiazoles include (1) 2-amino-2-thiazoline, (2) 2-amino thiazole, (3) 2-amino-4-methylthiazole, (4) 2-amino-4-methylthiazole, (S) 2-amino-4-thiazoleacetic acid, (6) 2-acetamido-4-methylthiazole, (7)2-acetylthiazole, (8) 5-acetyl-2,4-dimethylthiazole, (9) 4-methyl-5-vinylthiazole, (10) 2-amino-4-phenyl-5-tetradecylthiazole, (11) 2,4-thiazolidine dione, (12) 3-aminorhodanine, (13) 3-methylrhodanine, (14) 3-ethylrhodanine, (15) 3-allylrhodanine, (16) 3-hydroxy-4-methyl-2(3H)-thiazolethione, (17) benzothiazole, (18) 2-methyl benzothiazole, (19) 2-(methylthio)benzothiazole, (20) 2-amino-4-methylbenzothiazole, (21) 3-methylbenzothiazole-2-thione, (22) 2,1,3-benzothiadiazole, (23) 4-amino-2,1,3-benzothiadiazole, (24) 3,4-dimethyl-5-(2-hydroxyethyl)thiazolium iodide, (25) 3-ethyl-5-(2-hydroxyethyl) 4-methylthiazolium bromide, (26) 2-amino-5-nitrothiazole, (27) 2-amino-α-(methoxyimino)-4-thiazole acetic acid, (28) ethyl 2-amino-a-(hydroxyimino)-4-thiazole acetate, (29) ethyl 2-amino-a-(methoxyimino)-4-thiazole acetate, (30) ethyl 2-amino-4-thiazole acetate, (31) ethyl 2-amino-4-thiazole glyoxylate, (32) 1-phenyl-3-(2-thiazolyl)-2-thiourea, (33) 2-amino-4-methoxy benzothiazole, (34) 2-amino-5,6-dimethylbenzothiazole, (35) N'-(2-thiazolyl) sulfanilamide, (36) 6-ethoxy-2-benzothiazole sulfonamide, (37) ethyl-2-(formylamino)-4-thiazoleacetate, (38) ethyl-2-(formylamino)-4-thiazoleglyoxylate, (39) 2-(formylamino)-α-(methoxyimino)-4-thiazole acetic acid, (40) 2-acetamido-4-methyl-5-thiazole sulfonyl chloride, (41) (4R)-(-)-2-thioxo-4-thiazolidine carboxylic acid, (42) (R)-(-)-thiazolidine-4-carboxylic acid, (43) pseudothiohydantoin, (44) 2-amino-1,3,4-thiadiazole, (45) 2-amino-5-trifluoromethyl-1,3,4-thiadiazole, (46) 2-amno-5-methyl-1,3,4-thiadiazole, (47) 2-amino-5-ethyl-1,3,4-thiadiazole, (48) 2-amino-5-(ethylthio)-1,3,4-thiadiazole, (49) 5-amino-1,3,4-thiadiazole-2-thiol, (50) 2-acetamido-5-benzyl thio-1,3,4-thiadiazole, (51) 5-acetamido-1,3,4-thiadiazole-2-sulfonamide, (52) 5-anilino-1,2,3,4-thiatriazole, (53) 2-amino-4,5-dimethyl thiazole hydrochloride, (54) 2-amino 4-imino-2-thiazoline hydrochloride, (55) 2-amino-2-thiazoline hydrochloride, (56) 2-amino-5-bromothiazole monohydrobromide, (57) 5-amino-3-methyl isothiazole hydrochloride, (58) 3-methyl-2- benzothiazolinone hydrazone hydrochloride hydrate, (59) 5-amino-2-methylbenzothiazole dihydrochloride, (60) 2,4-diamino-5-phenyl thiazole monohydrobromide, (61) 2-amino-4-phenyl thiazole hydrobromide monohydrate, (62) 2-(tritylamino)-α-(methoxyimino)-4-thiazole acetic acid hydrochloride, (63) (2,3,5,6-tetrahydro-6-phenylimidazo [2,1-b] thiazole hydrochloride, (64) 3-ethyl-2-methyl-2-thiazolium iodide, (65) 3-benzyl-5-(2-hydroxyethyl)-4-methyl thiazolium chloride, (66) thiamine hydrochloride, (67) 3-(carboxymethyl) benzothiazolium bromide, (68) 2-azido-3-ethyl benzothiazolium tetrafluoroborate, (69) 3-ethyl-2-methyl benzothiazolium iodide, (70) 2-methyl-3-propyl benzothiazolium iodide, (71) 3-ethyl-2-(2-hydroxy-1-propenyl) benzothiazolium chloride, (72) 3,6-dimethyl-2-(4-dimethyl aminophenyl) benzothiazolium bromide, and the like; (b) phenothiazines, including those of the general formula



wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, and R_9 each, independently of the others, can be (but are not limited to) hydrogen atoms, alkyl groups, preferably with from 1 to about 6 carbon atoms and more preferably with from 1 to about 3 carbon atoms, substituted alkyl groups, preferably with from 1 to about 12 carbon atoms and more preferably with from 1 to about 6 carbon atoms, aryl groups, preferably with from about 6 to about 24 carbon atoms and more preferably with from about 6 to about 12 carbon atoms, substituted aryl groups, preferably with from about 6 to about 30 carbon atoms and more preferably with from about 6 to about 18 carbon atoms, arylalkyl groups, preferably with from about 7 to about 31 carbon atoms and more preferably with from about 7 to about 20 carbon atoms, substituted arylalkyl groups, preferably with from about 7 to about 32 carbon atoms and more preferably with from about 7 to about 21 carbon atoms, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more of R_1, R_2, R_3, R_4, R_s, R_6, R_7, R_8, and R_9 can be joined together to form a ring, and wherein the substituents on the substituted alkyl groups, substituted aryl groups, and substituted arylalkyl groups can be (but are not limited to) hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, azide groups, and the like, wherein two or more substituents can be joined together to form a ring. Other variations are also possible, such as a double bond between one of the ring carbon atoms and another atom, such as carbon, oxygen, or the like. These compounds can also be in acid salt form, wherein they are associated with a compound of the general formula $xH_nY_{n^-}$, wherein n is an integer of 1, 2, or 3, x is a number indicating the relative ratio between compound and acid (and may be a fraction), and Y is an anion, such as Cl^-, Br^-, L^-, HSO_4^-, SO_4^{2-}, NO_3^-, $HCOO^-$, CH_3COO^-, HCO_3^-, CO_3^{2-}, $H_2PO_4^-$, HPO_4^{2-}, PO_4^{3-}, SCN^-, BF_4^-, ClO_4^-, SSO_3^-, $CH_3SO_3^-$, $CH_3C_6H_4SO_3^-$, SO_3^{2-}, BrO_3^-, IO_3^-, ClO_3^-, or the like, as well as mixtures thereof.

Examples of phenothiazines include (1) trifluoroperazine dihydrochloride, (2) thioridazine hydrochloride, (3) (±)-promethazine hydrochloride, (4) ethopropazine hydrochloride, (5) chlorpromazine hydrochloride, and the like;

VI. Phosphorus compounds and their derivatives, including (A) phosphines, such as (1) trialkyl, triaryl, and heterocyclic phosphines and their derivatives, including (a) triphenylphosphine, (b) tri-m-tolyl phosphine, (c) tris(3-methoxyphenyl)phosphine, (d) tris(4-chlorophenyl)phosphine, (e) tris(pentafluorophenyl)phosphine, (f) tricyclohexylphosphine, (g) tribenzylphosphine, (h) tri-2-furylphosphine, (i) bis (pyrrolidino)methoxy phosphone, (j) compounds of the general formula $(C_6H_5)_2P(CH_2)nP(C_6H_5)_2$ where n is an integer of from 0 to about 10, such as (1) n = 0: tetraphenylbiphosphine, (2) n=3: 1,3-bis(diphenylphosphino)propane, (3) n = 5: 1,5-bis(diphenylphosphino)pentane, (4) n = 6: 1,6-bis(diphenylphosphino)hexane, and the like; (k) alkyldiphenyl or dialkylphenyl compounds, including (1) isopropyl diphenyl phosphine, (2) diphenyl (p-tolyl) phosphine, (3) (4-bromophenyl) diphenyl phosphine, (4) diphenyl-2-pyridylphosphine, (5) dicyclohexylphenyl phosphine, and the like; (B) phosphites and phosphite derivatives, including (1) trialkyl and triaryl phosphites and their complexes, such as (a) trimethyl phosphite, (b) triethyl phosphite, (c) tris(2-chloroethyl) phosphite, (d) tributyl phosphite, (e) triphenyl phosphite,(f) trimethyl phosphite copper iodide, (g) triethyl phosphite copper iodide, and the like; (2) dialkyl and diaryl phosphites, such as (a) dipropyl phosphite, (b) bis(2-ethylhexyl) phosphite, (c) bis(4-nitrobenzyl) phosphite, (d) 2,2'-ethylidene bis (4,6-di-tert-butylphenyl) fluorophosphite, (e) pentaerythritol diphenyl diphosphite, and the like; (C) cyclic phospho-

rus compounds, including (1) 2-furyltetramethyl phosphorodiamidate, (2) diethyl(pyrrolidinomethyl)phosphonate, (3) cyclophosphamide monohydrate, (4) 2-chloro-1,3,2-dioxaphospholane-2-oxide, (5) N,N-diethyl-1,5-dihydro-2,4,3-benzodioxaphosphepin-3-amine, (6) 1,2-phenylene phosphochloridite, (7) 1,2-phenylene phosphochloridate, (8) 2-chloro-4H-1,3,2-benzodioxaphosphorin-4-one, (9) 2,4-bis(methylthio)-1,3-dithia-2,4-diphosphetane-2,4-disulfide, and the like; (D) phosphine oxide compounds, including (1) trisubstituted phosphine oxides, such as (a) triphenyl phosphine oxide, (b) tris(hydroxymethyl) phosphine oxide, (c) trimethoxy phosphine oxide, (d) triethoxy phosphine oxide, (e) triphenoxy phosphine oxide, (f) tris (2-butoxy ethoxy) phosphine oxide, and the like; (2) disubstituted phosphine oxides, such as (a) diphenyl phosphine oxide, (b) diphenyl (2,4,6-trimethylbenzoyl) phosphine oxide, and the like; (3) hydroxy phosphine oxide compounds, such as (a) phenyl phosphinic acid, (b) diphenyl phosphate, (c) vinyl phosphonic acid, (d) propyl phosphonic acid, (e) pyrophosphoric acid, (f) triphenylphosphate, and the like; (E) quaternary phosphonium salts, including (1) tetrabutylphosphonium chloride, (2) tetrabutylphosphonium bromide, (3) hexadecyltributylphosphonium bromide, (4) stearyltributylphosphonium bromide, (5) azidotris(diethylamino)phosphonium bromide, (6) phosphonitrilic chloride trimer, (7) tetramethyl phosphonium bromide, (8) tetramethyl phosphonium chloride, (9) tetraethyl phosphonium bromide, (10) tetraethyl phosphonium chloride, (11) tetraethyl phosphonium iodide, (12) tetraphenyl phosphonium bromide, (13) tetraphenyl phosphonium chloride, (14) tetraphenyl phosphonium lodide, (15) methyl triphenyl phosphonium bromide, (16) methyl triphenyl phosphonium iodide, (17) ethyl triphenyl phosphonium bromide, (18) n-propyl triphenyl phosphonium bromide, (19) isopropyl triphenyl phosphonium iodide, (20) cyclopropyl triphenyl phosphonium bromide, (21) n-butyl triphenyl phosphonium bromide, (22) isobutyl triphenyl phosphonium bromide, (23) hexyl triphenyl phosphonium bromide, (24) benzyl triphenyl phosphonium chloride, (25) bromomethyl triphenyl phosphonium bromide, (26) chloromethyl triphenyl phosphonium chloride, (27) 3-bromopropyl triphenyl phosphonium bromide, (28) 3-bromobutyl triphenyl phosphonium bromide, (29) 4-bromobutyl triphenyl phosphonium bromide, (30) 2-dimethyl aminoethyl triphenyl phosphonium bromide, (31) [(3-dimethyl amino) propyl] triphenyl phosphonium bromide, (32) 2-hydroxyethyl triphenyl phosphonium bromide (33) (2-hydroxyethyl) triphenyl phosphonium chloride, (34) [(R)-(+)-3-hydroxy-2-methyl propyl] triphenyl phosphonium bromide, (35) [(S)-(-)-3-hydroxy-2-methyl propyl] triphenyl phosphonium bromide, (36) (2-hydroxybenzyl triphenyl phosphonium bromide, (37) (formyl methyl) triphenyl phosphonium chloride, (38) (methoxymethyl) triphenyl phosphonium chloride, (39) acetonyl triphenyl phosphonium chloride, (40) carbomethoxymethyl triphenyl phosphonium bromide, (41) (ethoxy carbonyl methyl) triphenyl phosphonium chloride, (42) carbethoxymethyl triphenyl phosphonium bromide, (43) (tert-butoxy carbonyl methyl) triphenyl phosphonium bromide, (44) phenacyl triphenyl phosphonium bromide, (45) (4-ethoxybenzyl) triphenyl phosphonium bromide, (46) 4-butoxybenzyl triphenyl phosphonium bromide, (47) 2-(1,3-dioxan-2-yl) ethyl] triphenyl phosphonium bromide, (48) (1,3-dioxolan-2-ylmethyl) triphenyl phosphonium bromide, (49) vinyl triphenyl phosphonium bromide, (50) allyl triphenyl phosphonium bromide, (51) allyl triphenyl phosphonium chloride, (52) propargyl triphenyl phosphonium bromide, (53) (3-trimethyl silyl-2-propynyl) triphenyl phosphonium bromide, (54) p-xylylene bis (triphenyl phosphonium bromide), and the like;

VII. Nitrile compounds and their derivatives, including (1) cyanoacetohydrazide, (2) 4,4-dimethyl-3-oxopentanenitrile, (3) 1-cyano-N-methylthioformamide, (4) cyanomethyl N,N-dimethyl dithiocarbamate, (S) 4-hydroxy-3-methoxy-phenyl acetonitrile, (6) tosyl cyanide, (7) tosylmethyl isocyanide, (8) 5-fluoro-2-methyl benzonitrile, (9) 2-fluoro-5-methyl benzonitrile, (10) 4-(methylthio) benzonitrile, (11) 4-(dimethylamino) benzonitrile, (12) 3,4-dimethoxy benzonitrile, (13) 4-hydroxy-3-methoxy benzonitrile, (14) 4-(trans-4-pentyl cyclohexyl)benzonitrile, (15) 4'-pentyl-4'-biphenyl carbonitrile, (16) 4'-(pentyloxy)-4-biphenylcarbonitrile, (17) 4'-hexyl-4-biphenyl carbonitrile, (18) 4'-(hexyloxy)-4-biphenyl carbonitrile, (19) 4'-heptyl-4-biphenyl carbonitrile, (20) 4'-heptyloxy-4-biphenyl carbonitrile, (21) 4'-octyl-4-biphenyl carbonitrile, (22) 4'-(octyloxy)-4-biphenyl carbonitrile, (23) succinonitrile, (24) fumaronitrile, (25) 1,4-dicyano-2-butene, (26) (dimethyl aminomethylene)malononitrile, (27) (1-ethoxyethylidene)malononitrile, (28) α-chlorobenzylidenemalononitrile, (29) benzylidenemalononitrile, (30) 2-benzoyloxy-2-phenyl malononitrile, (31) O-(p-tosyl)isonitrosomalononitrile, (32) tetrafluorophthalonitrile, (33) iminodiacetonitrile, (34) phenylene diacetonitrile, (35) 3,3'-(4-formyl phenylimino) dipropionitrile, (36) tris (2-cyanoethyl) nitromethane, (37) 1,1,3,3-propanetetracarbonitrile, (38) tetracyanoethylene oxide, and the like;

VIII. Isothiocyanate compounds and isocyanate compounds and their derivatives, including (A) 4-azidophenyl isothiocyanate, (B) 1-naphthyl isothiocyanate, (C) 4-dimethyl amino-1-naphthyl isothiocyanate, (D) 1-isothiocyanato-4-(trans-4-propyl cyclohexyl) benzene, (E) 1-(trans-4-hexyl cyclohexyl)-4-isothiocyanato benzene, (F) 1-(4-trans-hexyl cyclohexyl)-4-[2-(4-isothio cyanatophenyl)] benzene, (G) 1-isothiocyanato-4-(trans-4-octylcyclohexyl) benzene, (H) 4-isothiocyanatophenyl-4-pentabicyclo [2.2.2] octane-1-carboxylate, (I) benzylthiocyanate, (J) guanidinethiocyanate, (K) methylene dithiocyanate, (L) 4,4'-methylene bis (phenyl isocyanate), (M) 4,4'-methylene bis (2,6-diethyl isocyanate), and the like;

IX. Oxime compounds and their derivatives, including (A) formamidoxime, (B) acetaldoxime, (C) pyruvic aldehyde-1-oxime, (D) acetone oxime, (E) ethylchlorooximido acetate, (F) 2,3-butane dione monoxime, (G) 5-hydroxy pentenal oxime, (H) cyclopentanone oxime, (I) cyclohexanone oxime, (J) cyclooctanone oxime, (K) benzaldehyde

oxime, (L) 2-nitrobenzaldehyde oxime, (M) salicyl aldoxime, (N) 2-isonitroso acetphenone, (O) 1-phenyl-1,2-propanedione 2-oxime, (P) 2-pyridine aldoxime, (Q) nifuroximeand the like;

X. Hydroxamic acid derivatives, including (A) acetohydroxamic acid, (B) suberohydroxamic acid, (C) mandelohydroxamic acid, (D) benzohydroxamic acid, (E) N-phenylbenzohydroxamic acid, and the like;

XI. Halide compounds, including (A) tetraalkyl ammonium salts, such as (1) tetramethylammonium fluoride tetrahydrate, (2) tetraethylammonium acetate tetrahydrate, (3) tetrabutylammonium chloride, (4) tetrabutylammonium chloride hydrate, (5) tetrabutylammonium bromide, (6) tetrabutylammonium tribromide, (7) tetrabutylammonium acetate, (8) tetrabutylammonium thiocyanate, (9) tetrapentylammonium bromide, (10) tetrahexylammonium bromide, (11) tetrahexylammonium chloride, (12) tetrahexylammonium hydrogensulfate, (13) tetraheptylammonium chloride, (14) tetraheptylammonium bromide, (15) tetraoctylammonium bromide, (16) tetrakisdecylammonium bromide, (17) tetrahexadecylammonium bromide, (18) tetramethyl ammonium bromide, (19) tetramethyl ammonium chloride, (20) tetramethyl ammonium iodide, (21) tetraethyl ammonium bromide, (22) tetraethyl ammonium chloride, (23) tetraethyl ammonium iodide, (24) tetrapropyl ammonium bromide, (25) tetrapropyl ammonium iodide, (26) tetrabutyl ammonium iodide, (27) tetrapentyl ammonium chloride, (28) tetrahexyl ammonium bromide, (29) tetrahexyl ammonium iodide, (30) tetradecyl ammonium bromide, (31) tetradodecyl ammonium bromide, (32) tetraoctadecyl ammonium bromide, and the like; (B) alkyl trialkyl ammonium salts, aryl trialkyl ammonium salts, alkyl triaryl ammonium salts, and aryl triaryl ammonium salts, such as (1) methyltrioctylammonium bromide, (2) tridodecylmethylammonium chloride, (3) tridodeylmethylammonium iodide, (4) (-)-N-dodecyl-N-methylephedrinium bromide, (5) phenyltrimethylammonium tribromide, (6) tricapryl methyl ammonium chloride, (7) tridodecyl methyl ammonium chloride, (8) tridecyloxypropyl dihydroxy ethyl methyl ammonium chloride, (9) N-tetradecyl dimethyl-naphthyl methyl ammonium chloride, (10) octadecyl diethanol methyl ammonium chloride, (11) octadecyl dihydroxyethyl methyl ammonium chloride, (12) dihydrogenated tallow benzyl methyl ammonium chloride, (13) 2-aminoethyl trimethyl ammonium chloride hydrochloride, (14) 2-bromoethyl trimethyl ammonium bromide, (15) 2-chloroethyl trimethyl ammonium chloride, (16) 3-carboxypropyl trimethyl ammonium chloride, (17) [3-(methacryloyl amino) propyl] trimethyl ammonium chloride, (18) phenyl trimethyl ammonium bromide, (19) phenyl trimethyl ammonium chloride, (20) phenyl trimethyl ammonium iodide, (21) benzyl trimethyl ammonium chloride, (22) benzyl trimethyl ammonium bromide, (23) 4-nitrobenzyl trimethyl ammonium chloride, (24) [2-(4-nitrophenyl) allyl] trimethyl ammonium iodide, (25) coco trimethyl ammonium chloride, (26) palmityl trimethyl ammonium chloride, (27) myristyl trimethyl ammonium bromide, (28) oleyl trimethyl ammonium chloride, (29) soya trimethyl ammonium chloride, (30) tallow trimethyl ammonium chloride, (31) hydrogenated tallow trimethyl ammonium chloride, (32) stearyl trimethyl ammonium chloride, (33) behenyl trimethyl ammonium chloride, (34) guar hydroxypropyl trimethyl ammonium chloride, (35) benzyl triethyl ammonium chloride, (36) benzyl triethyl ammonium bromide, (37) butyl tripropyl ammonium bromide, (38) methyl tributyl ammonium chloride, (39) methyl tributyl ammonium bromide, (40) methyl tributyl ammonium iodide, (41) benzyl tributyl ammonium chloride, (42) benzyl tributyl ammonium bromide, (43) benzyl tributyl ammonium iodide, (44) heptyl tributyl ammonium bromide, and the like; (C) dialkyl dialkyl ammonium salts, such as (1) benzyldodecyldimethylammonium bromide, (2) benzyltetradecyldimethylammonium chloride dihydrate, (3) benzylcetyldimethylammonium chloride monohydrate, (4) benzylstearyldimethylammonium chloride monohydrate, (5) N,N-dimethyl methylene ammonium chloride, (6) N,N-dimethyl methylene ammonium iodide, (7) chloromethylene dimethyl ammonium chloride, (8) dichloromethylene dimethyl ammonium chloride, (9) dimethyl amino methylene amino methylene dimethyl ammonium chloride, (10) benzethonium chloride, (11) methyl benzethoniumchloride, (12) 1-propanaminium 2,3-dihydroxy-N-dimethyl-N-[3(oxococoyl) amino]propyl]-chloride, (13) cetyl dimethyl ethyl ammonium bromide, (14) octyl dodecyl dimethyl ammonium chloride, (15) dodecyl (2-hydroxyl-methyl-2-phenyl-ethyl) dimethyl ammonium bromide, (16) dodecyl dimethyl 2-phenoxyethyl ammonium bromide, (17) dodecanoyl-N-methylamino ethyl-(phenyl carbamyl methyl) dimethyl ammonium chloride, (18) 3-chloro-2-hydroxypropyl N,N,N-dimethyl dodecyl ammonium chloride, (19) 3-chloro-2-hydroxypropyl N,N,N-dimethyl octadecyl ammonium chloride, (20) dodecyl benzyl dimethyl ammonium bromide, (21) dodecyl benzyl dimethyl ammonium chloride, (22) coco benzyl dimethyl ammonium chloride, (23) benzyl tetradecyl dimethyl ammonium chloride, (24) benzyl cetyl dimethyl ammonium chloride, (25) benzyl octadecyl dimethyl ammonium chloride, (26) benzyl tallow dimethyl ammonium chloride, (27) benzyl hydrogenated tallow dimethyl ammonium chloride, (28) benzyl behenyl dimethyl ammonium chloride, (29) dioctyl dimethyl ammonium chloride, (30) didecyl dimethyl ammonium chloride, (31) didecyl dimethyl ammonium bromide, (32) dicoco dimethyl ammonium chloride, (33) dicetyl dimethyl ammonium chloride, (34) disoya dimethyl ammonium chloride, (35) ditallow dimethyl ammonium chloride, (36) dihydrogenated tallow dimethyl ammonium chloride, (37) dibehenyl/diarachidyl dimethyl ammonium chloride, (38) soya amido propyl benzyl dimethyl ammonium chloride, (39) soya dicoco quaternary ammonium chloride, (40) gluconamidopropyl dimethyl-2-hydroxyethyl ammonium chloride, (41) N-alkyl-N-N-dimethyl-N(dodecyl acetate) ammonium chloride, wherein alkyl has from 14 to 20 carbon atoms, (42) mink amidopropyl dimethyl-2-hydroxyethyl ammonium chloride, (43) N-rapeseed-(3-amidopropyl)-N-N-dimethyl-N-(2,3 epoxy propyl) ammonium chloride, (44) N-stearyl-(3-amido propyl)-N-benzyl dimethyl ammonium chloride, (45) rapeseed amido propyl benzyl dime-

thyl ammonium chloride, (46) rapeseed amido propyl ethyl dimethyl ammonium chloride, (47) cocamidopropyl polyethylene glycol dimethyl ammonium chloride phosphate, and the like; (D) choline salts, such as butyrylcholine chloride, and the like.

Any other transparentizing agent suitable for the selected migration marking material(s) can also be employed, as well as mixtures thereof.

EXAMPLE I

Migration imaging members were prepared as follows. A solution for the softenable layer was prepared by dissolving about 84 parts by weight of a terpolymer of styrene/ethylacrylate/acrylic acid (prepared as disclosed in U.S. Patent 4,853,307, and about 16 parts by weight of N,N'-diphenyl-N,N'-bis(3''-methylphenyl)-(1,1'-biphenyl)-4,4'-diamine (prepared as disclosed in U.S. Patent 4,265,990, in about 450 parts by weight of toluene. N,N'-diphenyl-N,N'-bis(3''-methylphenyl)-(1,1'-biphenyl)-4,4'-diamine is a charge transport material capable of transporting positive charges (holes). The resulting solution was coated by a solvent extrusion technique onto 3 mil thick polyester substrates (Melinex 442), aluminized to 50 percent light transmission), and the deposited softenable layers were allowed to dry at about 115°C for about 2 minutes, resulting in dried softenable layers with thicknesses of about 4 microns. The temperature of the softenable layers was then raised to about 115°C to lower the viscosity of the exposed surfaces of the softenable layers to about 5×10^{3} poises in preparation for the deposition of marking material. Thin layers of particulate vitreous selenium were then applied by vacuum deposition in a vacuum chamber maintained at a vacuum of about 4×10^{-4} Torr. The imaging members were then rapidly chilled to room temperature. Reddish monolayers of selenium particles having an average diameter of about 0.3 micron embedded about 0.05 to 0.1 micron below the surfaces of the copolymer layers were formed.

Separate sheets of polyester 100 microns thick were solvent coated from solutions of toluene containing about 10 percent by weight solids with blends of various transparentizing agents as indicated in the tables below with a styrene/ethyl acrylate/acrylic acid binder (obtained from Scientific Polymer Products, #815) to form coating layers about 4 microns thick. The weight ratio of transparentizing agent to binder was 1:4 in each instance. The coated sheets were dried at 25°C for 1 hour. Thereafter, the coated surfaces of the polyester sheets were placed in intimate contact with the surfaces of the migration imaging members coated with the softenable material and the migration marking material, and the "sandwiches" thus formed were subjected to temperatures of 100°C for 1 minute, at which temperature the softenable layer was softened sufficiently to enable contact between the embedded selenium particles and the transparentizing agents while the softenable material was in a molten state. The polyester sheets coated with the transparentizing agents were then separated from the migration imaging members and the UV absorption spectra at 685 nm of the migration imaging members were measured to determine the extent of migration marking material transparentization. UV absorption spectra were measured with a Shimadzu UV-160 spectrometer; all spectra were recorded by using 50% transmission aluminized ICI 442 polyester as a reference. The optical densities of the migration imaging members were also measured with a Macbeth TR927 densitometer in the visible, ultraviolet, and infrared range, using a Wratten No. 47 filter for the blue measurements, a Wratten No. 18A filter for the UV measurements, and a Wratten No. 25 filter for the IR measurements. For comparison purposes, the UV absorption spectrum at 685 nm and the optical density of the migration imaging members prior to contact with the sheet coated with transparentizing agent were also measured. The results were as follows:

Agent	UV absorption	Optical Density		
		vis.	UV	IR
none	1.50	1.82	2.65	0.89
piperidine thiocyanate	0.00	0.40	1.30	0.70
2-piperidine methanol	0.50	0.65	0.50	0.36
bis(pentamethylene) urea	0.00	0.27	0.60	0.35
4,4'-trimethylene bis(1-piperidine propionitrile)	0.00	0.25	0.60	0.50
tripiperidino phosphine oxide	0.00	0.24	0.55	0.35
homopiperazine	0.00	0.30	0.55	0.32
1-piperonyl piperazine	0.00	0.28	1.09	0.30
hexacyclentrisulfate	0.50	0.60	1.20	0.70

(continued)

Agent	UV absorption	Optical Density		
		vis.	UV	IR
5,10,15,20-tetraphenyl-21*H*,23*H*porphine	0.40	1.00	1.50	0.80
5,10,15,20-tetrakis(4-methoxyphenyl)-2*H*,23*H*-porphine	0.70	1.00	1.50	1.10
pyrrole-2-carboxaldehyde	0.00	0.28	0.76	0.35
3-pyrrolidino-1,2-propanediol	0.00	0.25	0.95	0.31
pyrazole	0.50	0.38	0.79	0.45
3-aminopyrazole	0.10	0.41	1.00	0.50
imidazole	1.00	0.60	1.10	0.60
2-ethylimidazole	0.00	0.35	0.55	0.38
2-(2-piperidinoethyl) pyridine	0.00	0.25	0.75	0.28
1-dodecyl pyridinium chloride	0.00	0.32	0.83	0.27
pyridinium bromide perbromide	0.00	0.11	0.90	0.19
3-aminoquinoline	0.20	0.45	0.97	0.48
8-hydroxyquinoline	0.40	0.40	0.85	0.50
8-hydroxyquinaldine	0.10	0.40	0.72	0.55
quinoxaline	0.00	0.30	0.57	0.37
4,5-dihydro-6-methyl-3(2*H*)-pyridazinone monohydrate	1.00	0.80	1.50	0.70

Agent	UV absorption	Optical Density		
		vis.	UV	IR
phthalazine	0.50	0.45	0.97	0.48
1,10-phenanthroline	0.20	0.41	1.30	0.45
1,3,5-triazine	0.00	0.50	0.97	0.52
trichloromelamine	0.00	0.15	0.57	0.09
trichloroisocyanouric acid	0.00	0.11	0.55	0.08
norbornane	0.05	0.34	0.85	0.44
tricyclo[5.2.1.0] decane	0.00	0.26	0.53	0.35
norcamphor	0.00	0.37	0.51	0.39
tropolone	0.00	0.28	3.55	0.08
1-indanol	0.00	0.20	0.40	0.33
trans,trans,cis-1,5,9-cyclododecatriene	0.00	0.23	0.80	0.30
cyclodecane epoxide	0.00	0.26	0.50	0.33
2,3-cyclododecane pyridine	0.50	0.71	0.50	0.33
1,2,5,6,9,10-hexabromo-cyclododecane	0.00	0.35	0.85	0.35
1,4,4a,8a-tetrahydro-endo-1,4-methanonaphthalene-5,8-dione	0.10	0.39	1.41	0.43
γ-butyrolactone	0.00	0.62	0.94	0.63
β,β-dimethyl-γ-(hydroxymethyl)-γ-butyrolactone	0.30	0.42	1.20	0.50

(continued)

Agent	UV absorption	Optical Density		
		vis.	UV	IR
2,5-dimethyl-4-hydroxy-3(2*H*)-furanone	0.00	0.28	0.65	0.35
hydrindantin dihydrate	0.33	0.60	1.00	0.65
2,4,8,10-tetraoxaspiro [5.5]undecane	0.00	0.27	0.65	0.35
1,3,5-trioxane	0.00	0.26	0.50	0.35
cyclooctanone	0.00	0.27	0.48	0.33
piperonal	0.00	0.25	0.90	0.28
piperonylalcohol	0.00	0.31	0.88	0.40
piperonyl nitrile	0.00	0.25	0.40	0.35
3,4(methylenedioxy) phenylacetonitrile	0.10	0.40	0.75	0.40

Agent	UV absorption	Optical Density		
		vis.	UV	IR
maleic anhydride	0.00	0.27	0.65	0.35
s-acetylmercapto succinic anhydride	0.00	0.30	0.48	0.38
2-octadecen-1-yl succinic anhydride	0.00	0.28	0.55	0.35
18-crown-6	0.00	0.30	0.60	0.35
benzo-18 crown-6	0.16	0.41	1.00	0.60
dibenzo-18 crown-6	0.60	0.60	1.20	0.65
dibenzo-24 crown-8	0.00	0.30	1.00	0.50
5-amino-3-methyl isooxazole	0.00	0.32	0.55	0.45
2-oxazolidone	0.50	0.71	0.95	0.75
5,5-dimethyl oxazolidine-2,4-dione	0.15	0.37	0.90	0.44
3-ethyl-2-thioxo-4-oxazolidinone	0.00	0.22	0.45	0.35
3-morpholino-1,2-propandiol	0.20	0.35	0.73	0.55
4-phenyl morpholine	0.00	0.30	0.55	0.32
N,N'-dibenzyl-1,4,10,13-tetraoxa-7,16 diazacycloocta-decane	0.00	0.26	0.70	0.30
4,7,13,16,21,24-hexaoxa-1,10-diazabicyclo [8.8.8] hexacosane	0.00	0.30	0.70	0.60
γ-valerolactam	0.20	0.46	1.15	0.51
ε-caprolactam	0.00	0.26	0.50	0.35
2-azacyclooctanone	0.00	0.30	0.45	0.40
2-azacyclononanone	0.00	0.30	0.41	0.40
maleimide	0.00	0.35	0.70	0.35
n-methylsuccinimide	0.00	0.32	0.70	0.42
phthalimide DBU salt	0.00	1.20	0.20	0.80
1-allyl-2-thiourea	0.00	0.52	1.00	0.55
1-benzyl-3-methyl-2-thiourea	0.00	0.22	1.12	0.33

(continued)

Agent	UV absorption	Optical Density		
		vis.	UV	IR
2-imino-4-thiobiuret	0.00	0.60	1.25	0.67
butyl sulfone	0.00	0.25	0.72	0.40

Agent	UV absorption	Optical Density		
		vis.	UV	IR
2,2'-bithiophene	0.00	0.58	1.45	0.58
2-phenyl-1,3-dithiane	0.00	0.30	0.50	0.41
3,6,9,14-tetrathiabicyclo [9.2.1] tetradeca-11,13-diene	0.25	0.50	1.10	0.65
1,5,9,13-tetra-thiacyclohexadecane-3,11-diol	0.00	0.30	0.60	0.45
1,4,7,10,13-penta-thiacyclopentadecane	0.60	0.70	1.50	0.70
2-aminothiazole	0.10	0.30	1.60	0.45
2-amino-2-thiazoline	0.00	0.23	0.65	0.30
3-methyl rhodanine	0.20	0.50	1.85	0.33
3-ethyl-5-(2-hydroxy-ethyl)-4- methylthiazolium bromide	0.00	0.29	1.04	0.32
triphenylphosphine	0.00	0.28	0.55	0.32
tricyclohexylphosphine	0.20	0.25	0.68	0.35
1,3-bis (diphenylphosphino) propane	0.00	0.22	0.76	0.31
1,5-his(diphenyl phosphino) pentane	0.00	0.23	0.48	0.30
isopropyldiphenyl phosphine	0.10	0.23	0.55	0.30
triethyl phosphite	0.00	0.25	0.70	0.33
triphenyl phosphite	0.00	0.05	0.30	0.05
triethyl phosphite copper iodide	0.20	0.28	0.46	0.25
dipropyl phosphite	0.00	0.05	0.12	0.05
bis(2-ethylhexyl) phosphite	0.00	0.15	0.70	0.12
bis(4-nitrobenzyl) phosphite	0.10	0.20	1.15	0.15
diphenyl phosphine oxide	0.00	0.23	0.66	0.31
diphenyl(2,4,6-trimethylbenzoyl) phosphine oxide	0.00	0.26	3.45	0.31
vinyl phosphonic acid	0.00	0.24	0.65	0.30
cyanoaceto-hydrazide	0.10	0.35	0.95	0.45
cyanomethyl *N,N*-dimethyl dithiocarbamate	0.00	0.56	1.00	0.40

Agent	UV absorption	Optical Density		
		vis.	UV	IR
4'-pentyl-4'-biphenyl carbonitrile	0.00	0.22	1.15	0.30
4'-(octyloxy)-4-biphenyl carbonitrile	0.00	0.30	0.70	0.39
1,4-dicyano-2-butene	0.00	0.30	0.68	0.40

(continued)

Agent	UV absorption	Optical Density		
		vis.	UV	IR
benzylidene malononitrile	0.00	0.30	1.00	0.35
1-isothiocyanato-4-(*trans*-4- propylcyclohexyl)benzene	0.00	0.33	0.70	0.35
formamidoxime	0.00	0.28	1.00	0.35
ethyl chlorooximido acetate	0.00	0.09	0.15	0.07
acetohydroxamic acid	0.00	0.25	0.50	0.35
tetraheptylammonium chloride	0.00	0.25	0.80	0.32
tetraheptylammonium bromide	0.00	0.30	0.75	0.30

As the data indicate, contact between the migration marking material and the indicated transparentizing agents while the softenable material was in a molten state resulted in transparentization of the migration marking material. The process was repeated except that poly (2-hydroxyethyl methacrylate) (obtained from Scientific Polymer Products, #414) was substituted for the styrene/ethyl acrylate/acrylic acid terpolymer as the binder. Substantially similar results were obtained.

EXAMPLE II

Migration imaging members were prepared as described in Example I. The surfaces of the members thus formed were uniformly negatively charged to a surface potential of -142 Volts with a corona charging device and were subsequently optically exposed by placing test pattern masks comprising silver halide images in contact with the imaging members and exposing the members to blue light of 480 nanometers through the mask for a period of 5 seconds. The imaging members were then developed by heating them with an aluminum heating block in contact with the polyester substrates at temperatures of from about 85 to about 100°C for about 5 seconds. Images corresponding to the images on the test pattern masks were subsequently visible in the developed imaging members.

The developed migration imaging members were then cut into pieces and pieces containing only Dmin areas (i. e., areas wherein the selenium particles had migrated in depth through the softenable layer) were placed in intimate contact with polyester sheets coated with a binder and a transparentizing agent and prepared as described in Example I. The UV absorption spectra at 685 nm of the D_{min} areas of the migration imaging members were measured to determine the extent of migration marking material transparentization. UV absorption spectra were measured with a Shimadzu UV-160 spectrometer; all spectra were recorded by using 50% transmission aluminized ICI 442 polyester as a reference. The optical densities of the D_{min} areas of the migration imaging members were also measured with a Macbeth TR927 densitometer in the visible, ultraviolet, and infrared range, using a Wratten No. 47 filter for the blue measurements, a Wratten No. 18A filter for the UV measurements, and a Wratten No. 25 filter for the IR measurements. For comparison purposes, the UV absorption spectrum at 685 nm and the optical density of the D_{min} areas of the migration imaging members prior to contact with the sheet coated with transparentizing agent were also measured. The results were as follows:

Agent	UV absorption	Optical Density		
		vis.	UV	IR
none	1.45	0.74	1.63	0.79
piperidine	0.00	0.25	0.85	0.35
2-piperidine methanol	0.50	0.50	0.40	0.28
bis(pentamethylene) urea	0.00	0.25	0.50	0.30
4,4'-trimethylene bis(1-piperidine propionitrile)	0.00	0.20	0.50	0.40
homopiperazine	0.00	0.25	0.50	0.28
hexacyclentrisulfate	0.25	0.40	0.80	0.50

(continued)

Agent	UV absorption	Optical Density		
		vis.	UV	IR
5,10,15,20-tetraphenyl-21*H*,23*H*porphine	0.25	0.50	0.78	0.50
3-pyrrolidino-1,2-propanediol	0.00	0.24	0.75	0.28
1-dodecyl pyridinium chloride	0.00	0.29	0.80	0.30
7,8-benzoquinoline	0.15	0.28	0.61	0.33
8-hydroxyquinaldine	0.05	0.26	0.74	0.35
phthalazine	0.25	0.30	0.85	0.36
1,10-phenanthroline	0.10	0.36	0.80	0.42
1,3,5-triazine	0.00	0.42	0.83	0.40
norbornane	0.05	0.30	0.80	0.45
γ-butyrolactone	0.00	0.45	1.01	0.52
1,3,5-trioxane	0.00	0.28	0.66	0.31
piperonal	0.00	0.29	0.65	0.35
piperonylalcohol	0.00	0.23	0.55	0.37
maleic anhydride	0.00	0.28	0.73	0.34
benzo-18-crown-6	0.10	0.35	0.77	0.33
5-amino-3-methyl isooxazole	0.00	0.28	0.57	0.40
3-ethyl-2-thioxo-4-oxazolidinone	0.00	0.26	0.85	0.31
3-morpholino-1,2-propandiol	0.10	0.37	0.88	0.42
4-phenyl morpholine	0.00	0.26	0.65	0.32

Polymer Products, #414) was substituted for the styrene/ethyl acrylate/acrylic acid terpolymer as the binder. Substantially similar results were obtained.

EXAMPLE III

Migration imaging members are prepared as described in Example I with the exception that prior to coating the softenable layer onto the polyester substrate, the polyester substrate is first coated as follows. A solution is prepared of toluene containing about 10 percent solids, wherein the solids comprise about 10 percent by weight of a transparentizing agent and about 90 percent by weight of a styrene/ethyl acrylate/acrylic acid terpolymer. The resulting solution is coated by a solvent extrusion technique onto the polyester substrates. The layer thus deposited is allowed to dry at about 25°C for about 1 hour, resulting in a dried transparentizing layer with a thickness of about 2 microns. Thereafter, the softenable layer is coated onto the transparentizing layer by the method described in Example I. The transparentizing agents used are those set forth in Examples I and II. During the selenium vacuum deposition process, the transparentizing layer and the softenable layer fuse to form a single softenable layer with the transparentizing agent concentrated in the bottom area thereof. The imaging members thus formed are imaged as described in Example II. It is believed that the optical contrast density of these imaging members will be greater than that of an imaging member of identical composition except that it contains no transparentizing agent, and that the optical density of the D_{min} areas of these imaging members will be less than that of an imaging member of identical composition except that it contains no transparentizing agent.

EXAMPLE IV

Migration imaging members are prepared as described in Example I with the exception that the solution for the softenable layer is prepared by dissolving about 76 parts by weight of the styrene/ethyl acrylate/acrylic acid terpolymer,

about 14 parts by weight of the charge transporting compound, and about 10 parts by weight of a transparentizing agent. The transparentizing agents used are those set forth in Examples I and II. The imaging members thus formed are imaged as described in Example II. It is believed that the optical contrast density of these imaging members will be greater than that of an imaging member of identical composition except that it contains no transparentizing agent, and that the optical density of the D_{min} areas of these imaging members will be less than that of an imaging member of identical composition except that it contains no transparentizing agent.

Agent	UV absorption	Optical Density		
		vis.	UV	IR
N,N'-dibenzyl-1,4,10,13-tetraoxa-7,16 diazacyclooctadecane	0.00	0.24	0.65	0.30
γ-valerolactam	0.10	0.29	0.83	0.31
2-azacyclooctanone	0.00	0.26	0.74	0.38
1-allyl-2-thiourea	0.00	0.30	0.95	0.35
1,3-dithiane	0.15	0.34	0.54	0.35
2-amino-2-thiazoline	0.00	0.23	0.90	0.30
3-ethyl-5-(2-hydroxy-ethyl)-4-methylthiazolium bromide	0.00	0.31	1.09	0.27
triphenylphosphine	0.00	0.31	0.87	0.29
tricyclohexylphosphine	0.10	0.30	0.75	0.40
1,3-bis(diphenyl-phosphino) propane	0.00	0.25	0.80	0.35
1,5-bis(diphenyl phosphino) pentane	0.00	0.26	0.60	0.30
triethyl phosphite copper iodide	0.10	0.35	0.50	0.33
bis(4-nitrobenzyl) phosphite	0.10	0.25	0.80	0.30
diphenyl phosphine oxide	0.00	0.24	0.71	0.35
vinyl phosphonic acid	0.00	0.30	0.75	0.25
triphenyl phosphate	0.20	0.35	0.80	0.45
cyanoaceto-hydrazide	0.10	0.30	0.92	0.42
1-isothiocyanato-4-(*trans*-4-propylcyclohexyl)benzene	0.00	0.41	0.72	0.41
formamidoxime	0.00	0.28	1.30	0.38
acetohydroxamic acid	0.00	0.23	0.77	0.30
tetrahexylammonium chloride	0.40	0.34	0.90	0.41
tetraheptylammonium bromide	0.00	0.27	0.75	0.30

As the data indicate, contact between the migration marking material in the D_{min} areas and the indicated transparentizing agents while the softenable material was in a molten state resulted in transparentization of the migration marking material in the D_{min} areas. The process was repeated except that poly (2-hydroxyethyl methacrylate) (obtained from Scientific

EXAMPLE V

Migration imaging members are prepared as described in Example I with the exception that prior to coating the softenable layer onto the polyester substrate, the polyester substrate is first coated as follows. A solution is prepared of methanol containing about 10 percent solids, wherein the solids comprise about 10 percent by weight of a transparentizing agent and about 90 percent by weight of a poly (2-hydroxyethyl methacrylate) binder (available from Scientific Polymer Products). The resulting solution is coated by a solvent extrusion technique onto the polyester substrates. The layer thus deposited is allowed to dry at about 25°C for about 1 hour, resulting in a dried transparentizing layer with a thickness of about 2 microns. Thereafter, the softenable layer is coated onto the transparentizing layer by the method described in Example I. The transparentizing agents used are those set forth in Examples I and II. The imaging

members thus formed are imaged as described in Example II. It is believed that the optical contrast density of these imaging members will be greater than that of an imaging member of identical composition except that it contains no transparentizing agent, and that the optical density of the D_{min} areas of these imaging members will be less than that of an imaging member of identical composition except that it contains no transparentizing agent.

EXAMPLE VI

Migration imaging members are prepared as described in Example I with the exception that subsequent to vacuum deposition of the selenium migration marking material, the softenable layer is coated as follows. A solution is prepared of methanol containing 10 percent by weight solids, wherein the solids comprise about 10 percent by weight of a transparentizing agent and about 90 percent by weight of a poly (2-hydroxyethyl methacrylate) binder. The resulting solution is coated by a solvent extrusion technique onto the softenable layers containing migration marking material. The layer thus deposited is allowed to dry at about 25°C for about 1 hour, resulting in a dried transparentizing layer with a thickness of about 2 microns. The transparentizing agents used are those set forth in Examples I and II. The imaging members thus formed are imaged as described in Example II. It is believed that the optical contrast density of these imaging members will be greater than that of an imaging member of identical composition except that it contains no transparentizing agent, and that the optical density of the D_{min} areas of these imaging members will be less than that of an imaging member of identical composition except that it contains no transparentizing agent.

Claims

1. A migration imaging member (1) comprising (a) a substrate (2), (b) a softenable layer (6) comprising a softenable material (7) and a photosensitive migration marking material (8), and (c) a transparentizing agent which transparentizes migration marking material in contact therewith contained in at least one layer of the migration imaging member.

2. A migration imaging member according to claim 1, wherein the migration marking material (8) is selected from the group consisting of (a) selenium, (b) tellurium, (c) alloys of selenium and a material selected from the group consisting of tellurium, arsenic, antimony, thallium, bismuth, or mixtures thereof, (d) alloys of tellurium and a material selected from the group consisting of arsenic, antimony, thallium, bismuth, or mixtures thereof, (e) halogen doped selenium, (f) halogen doped tellurium, (g) halogen doped alloys of selenium and a material selected from the group consisting of tellurium, arsenic, antimony, thallium, bismuth, or mixtures thereof, (h) halogen doped alloys of tellurium and a material selected from the group consisting of arsenic, antimony, thallium, bismuth, or mixtures thereof, and (i) mixtures thereof.

3. A migration imaging member according to claim 1 or claim 2, wherein the transparentizing agent is contained in the softenable layer.

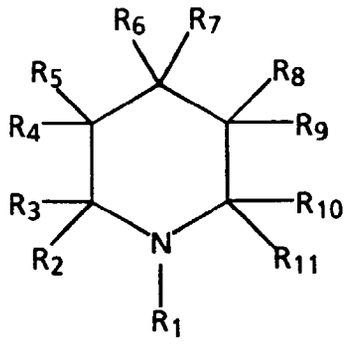
4. A migration imaging member according to claim 1 or claim 2, wherein the transparentizing agent is contained in a layer situated between the softenable layer and the substrate.

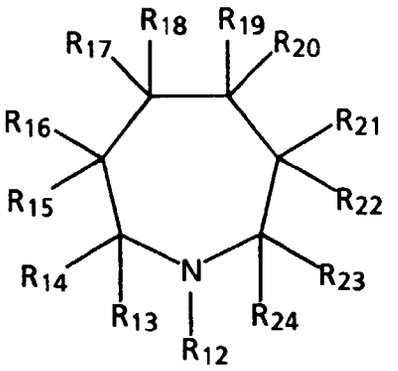
5. A migration imaging member according to claim 1 and claim 2, wherein the softenable layer is situated between the substrate and a layer containing the transparentizing agent.

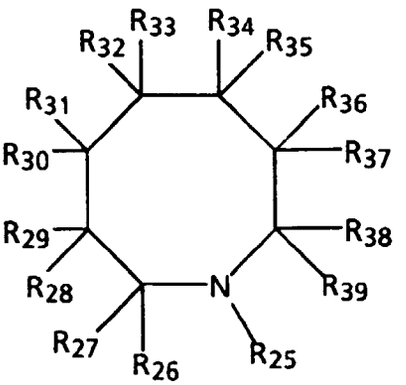
6. A migration imaging member according to claim 1 or claim 2, wherein the migration imaging member comprises a substrate, a first softenable layer comprising a first softenable material and a first migration marking material, and a second softenable layer comprising a second softenable material and a second migration marking material, wherein the transparentizing agent is contained in a layer situated between the first softenable layer and the second softenable layer.

7. A migration imaging member according to any of claims 1 to 6, wherein the transparentizing agent is present in an amount of from about 1 to about 50 percent by weight of the material comprising the layer in which it is contained.

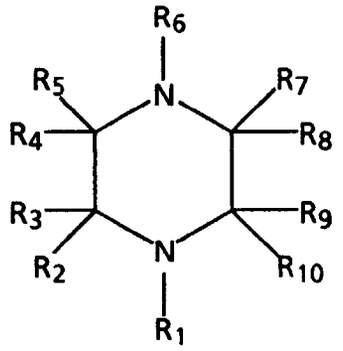
8. A migration imaging member according to claim 1 wherein the transparentizing agent is an azacyclic compound; or wherein the transparentizing agent is selected from the group consisting of: (A) materials of the general formulae:



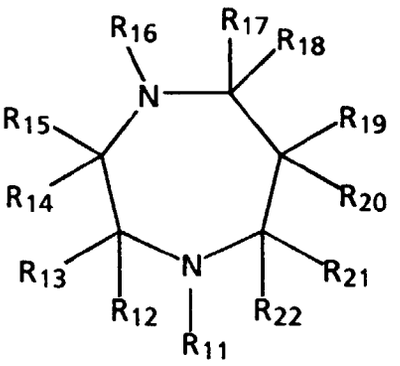




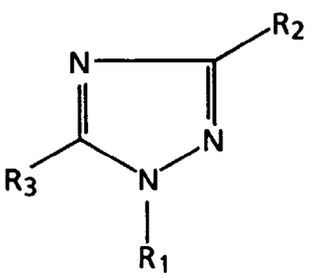
wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, R_{14}, R_{is}, R_{16}, R_{17}, R_{18}, R_{19}, R_{20}, R_{21}, R_{22}, R_{23}, R_{24}, R_{25}, R_{26}, R_{27}, R_{28}, R_{29}, R_{30}, R_{31}, R_{32}, R_{33}, R_{34}, R_{35}, R_{36}, R_{37}, R_{38}, and R_{39} each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, R_{14}, R_{15}, R_{16}, R_{17}, R_{18}, R_{19}, R_{20}, R_{21}, R_{22}, R_{23}, R_{24}, R_{25}, R_{26}, R_{27}, R_{28}, R_{29}, R_{30}, R_{31}, R_{32}, R_{33}, R_{34}, R_{35}, R_{36}, R_{37}, R_{38}, and R_{39} can be joined together to form a ring; (B) materials of the general formulae:



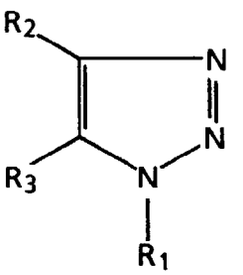
and



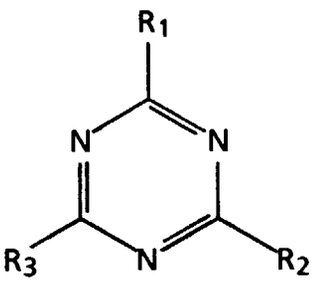
wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, R_{14}, R_{15}, R_{16}, R_{17}, R_{18}, R_{19}, R_{20}, R_{21}, and R_{22} each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, R_{14}, R_{15}, R_{16}, R_{17}, R_{18}, R_{19}, R_{20}, R_{21}, and R_{22} can be joined together to form a ring; (C) materials of the general formulae:



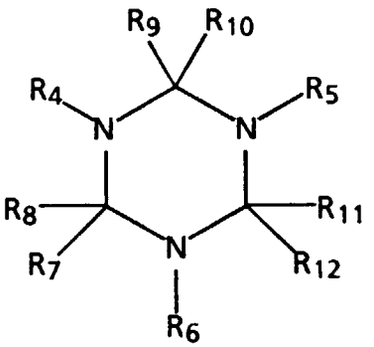
and



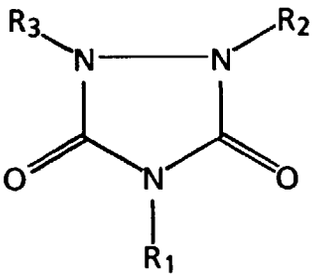
wherein R_1, R_2, and R_3 each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, and R_3 can be joined together to form a ring; (D) materials of the general formulae:



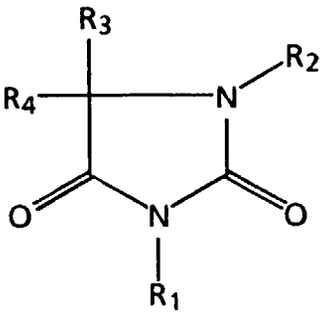
and



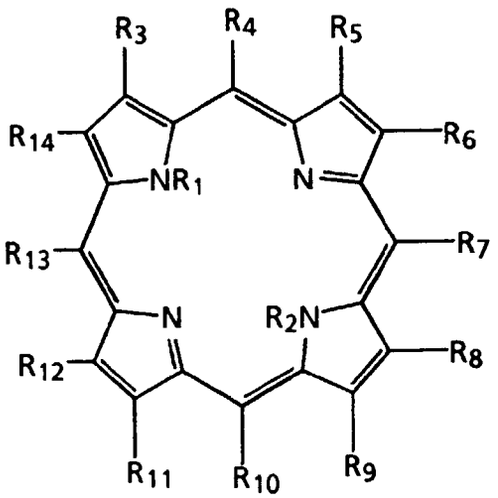
wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, and R_{12} each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R1, R2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, and R_{12} can be joined together to form a ring; (E) materials of the general formulae:



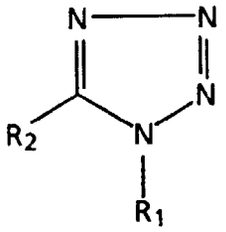
and



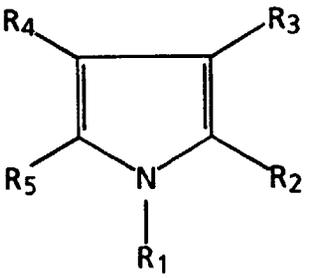
wherein R_1, R_2, R_3, and R_4 each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, and R_4 can be joined together to form a ring; (F) materials of the general formula:



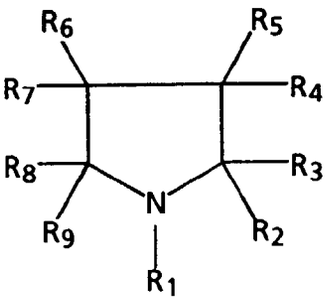
R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, and R_{14} each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, and R_{14} can be joined together to form a ring; (G) materials of the general formula:



wherein R_1 and R_2 each, independently of the other, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein R_1 and R_2 can be joined together to form a ring; (H) materials of the general formula:

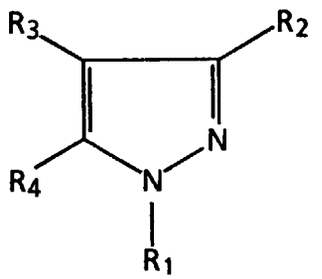


wherein R_1, R_2, R_3, R_4, and R_5 each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, R_4, and R_5 can be joined together to form a ring; (I) materials of the general formula:

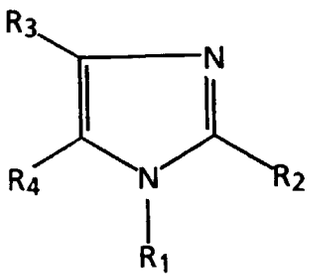


wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, and R_9 each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, and R_9 can be joined together to form a ring;

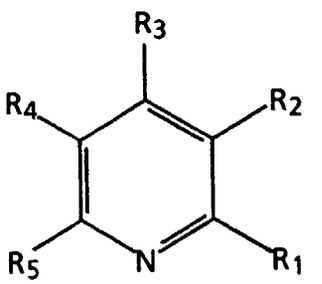
(J) materials of the general formula:



wherein R_1, R_2, R_3, and R_4 each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, and R_4 can be joined together to form a ring; (K) materials of the general formula:

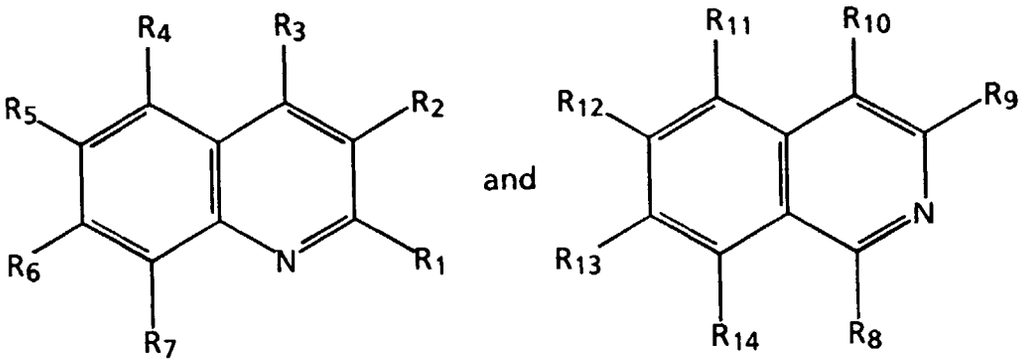


wherein R_1, R_2, R_3, and R_4 each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, and R_4 can be joined together to form a ring; (L) materials of the general formula:

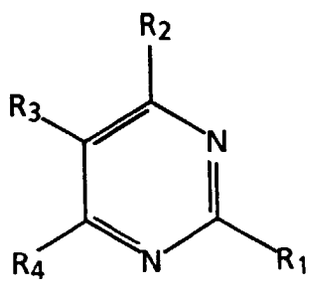


wherein R_1, R_2, R_3, R_4, and R_5 each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phos-

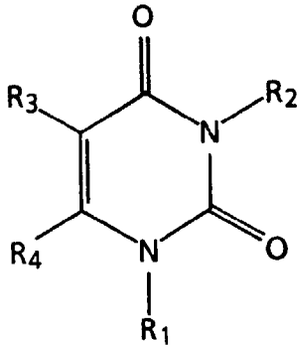
phine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, R_4, and R_5 can be joined together to form a ring; (M) materials of the general formulae:



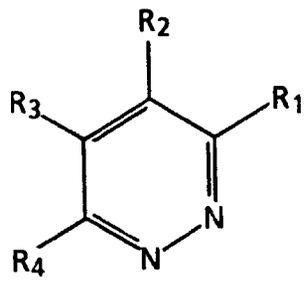
wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, and R_{14} each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, and R_{14} can be joined together to form a ring; (N) materials of the general formula:



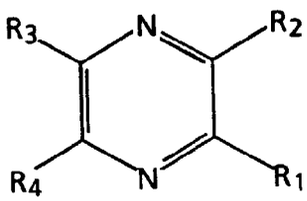
wherein R_1, R_2, R_3, and R_4 each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, and R_4 can be joined together to form a ring; (O) materials of the general formula:



wherein R_1, R_2, R_3, and R_4 each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, and R_4 can be joined together to form a ring; (P) materials of the general formula:

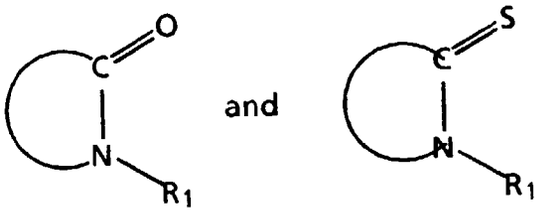


wherein R_1, R_2, R_3, and R_4 each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, and R_4 can be joined together to form a ring; (Q) materials of the general formula:

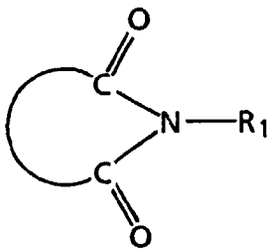


wherein R_1, R_2, R_3, and R_4 each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups,

halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, and R_4 can be joined together to form a ring; (R) materials of the general formulae:



wherein R_1 is selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, and wherein the curved portion of the structure represents a hydrocarbon chain or a substituted hydrocarbon chain, wherein two or more substituents can be joined together to form a ring; (S) materials of the general formula:



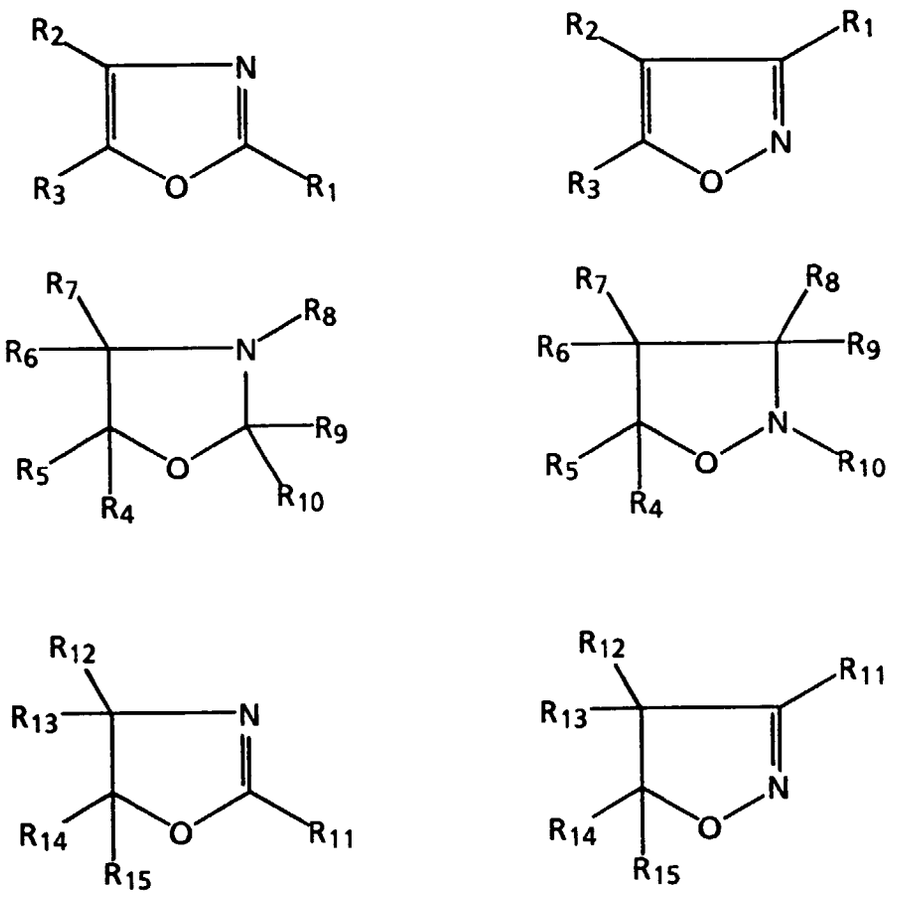
wherein R_1 is selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, and wherein the curved portion of the structure represents a hydrocarbon chain or a substituted hydrocarbon chain, wherein two or more substituents can be joined together to form a ring; and (T) mixtures thereof; or wherein the transparentizing agent is selected from the group consisting of (1) homopiperidine, (2) piperidinethiocyanate, (3) -2-piperidinemethanol, (4) 3-piperidinemethanol, (5) 2-piperidineethanol, (6) 4-piperidineethanol, (7) 4-piperidine monohydrate hydrochloride, (8) 1-aminopiperidine, (9) 1-(2-aminoethyl)piperidine, (10) 4-(aminomethyl)piperidine, (11) 3-piperidino-1,2-propanediol (Aldrich 21,849-9), (12) 1-piperidine propionic acid, (13) 1-methyl-4-(methylamino)piperidine, (14) 1-acetyl-3-methylpiperidine, (15) 4'-piperidinoacetophenone, (16) 4-phenylpiperidine, (17) 4-piperidinopiperidine, (18) 4-benzylpiperidine, (19) 4-(4-methylpiperidino)pyridine, (20) 4-piperidone ethylene ketal, (21) bis(pentamethylene)urea, (22) 1-benzyl-4-hydroxypiperidine, (23) 1-benzoyl-4-piperidone, (24) 1,1'-methylenebis(3-methyl piperidine), (25) 4,4'-trimethylenedipiperidine, (26) 4,4'-trimethylenebis(1-menthylpiperidine), (27) 4,4'-trimethylenebis(1-piperidinepropionitrile), (28) 4,4'-trimethylenebis(1-piperidineethanol), (29) 2,2,6,6-tetramethylpiperidine, (30) 4-amino-2,2,6,6-tetramethylpiperidine, (31) 4-(dimethylamino)-1,2,2,6,6-pentamethylpiperidine, (32) N,N'-bis(2,2,6,6-tetramethyl-4-piperidinyl)-1,6-hexanediamine, (33) tripiperidinophosphine oxide, (34) tropane, (35) tropinehydrate, (36) tropinone, (37) 8-hydroxytropinone, (38) 2-piperidine carboxylic acid, (39) 2-piperidone, (40) 4,4'-trimethylene bis (1-piperidine carboxamide), (41) 4-methyl-2-(piperidinomethyl) phenol, (42) 1-methyl-4-piperidinyl bis (chlorophenoxy) acetate, (43) 2-(hexamethylene imino) ethyl chloride monohydrochloride, (44) 3-(hexahydro-1H-azepin-1-yl)-3'-nitropropiophenone hydrochloride, (45) imipramine hydrochloride, (46) carbamezepine, (47) 5,6,11,12-tetrahydro dibenz [b, f] azocine hydrochloride, (48) quinuclidine hydrochloride, (49) 3-quinuclidinol hydrochloride, (50) 3-quinuclidinone hydrochloride, (51) 2-methylene-3-quinuclidinone dihydrate hydrochloride, (52) 3-amino quinuclidine dihydrochlo-

ride, (53) 3-chloro quinuclidine hydrochloride, (54) quinidine sulfate dihydrate, (55) quinine monohydrochloride dihydrate, (56) quinine sulfate monohydrate, (57) hydroquinidine hydrochloride, (58) hydroquinine hydrobromide dihydrate, (59) piperazine, (60) homopiperazine, (61) 1-methylpiperazine, (62) 2-methylpiperazine, (63) 1-acetylpiperazine, (64) 1-(2-hydroxyethyl)piperazine, (65) 1-(2-aminoethyl)piperazine, (66) tert-butyl 1-piperazinecarboxylate, (67) N-isopropyl-1-piperazineacetamide, (68) 1-(2-methoxyphenyl)piperazine, (69) 1-(2-pyridyl)piperazine, (70) 1-benzylpiperazine, (71) 1-cinnamylpiperazine, (72) 1-(4-chlorobenzhydryl)piperazine, (73) 2,6-dimethylpiperazine, (74) 1-amino-4-methylpiperazine, (75) 1-amino-4-(2-hydroxyethyl)piperazine, (76) 1,4-bis(2-hydroxyethyllpiperazine, (77) 1,4-bis(3-aminopropyl)piperazine, (78) tert-butyl-4-benzyl-1-piperazinecarboxylate, (79) 1-piperonyl piperazine, (80) bis(4-methyl-1-homopiperazinylthiocarbonyl)disulfide, (81) 1-amino-4-methyl piperazine dihydrochloride monohydrate, (82) 1-(3-chloropropyl)-piperazine dihydrochloride monohydrate, (83) 1-(2,3-xylyl) piperazine monohydrochloride, (84) 1,1-dimethyl-4-phenyl piperazineium iodide, (85) 1,4,7-triazacyclononane, (86) 1,5,9-triazacydododecane, (87) 1,2,3-triazole, (88) 4-amino-1,2,4-triazole, (89) 3-amino-5-methylthio-lH-1,2,4-triazole, (90) benzotriazole, (91) 1-aminobenzotriazole, (92) 1-cyanobenzotriazole, (93) 5-methyl-1H-benzotriazole, (94) 1H-benzotriazole-1-ylmethyl isocyanide, (95) 2-[3-(2H-benzotriazole-2-yl)-4-hydroxyphenyl]ethyl methacrylate, (96) 1,2,4-triazole, (97) 1,2,4-triazole sodium derivative, (98) 3-amino-1,2,4-triazole, (99) 3,5-diamino-1,2,4-triazole, (100) 3-amino-5-mercapto-1,2,4-triazole, (101) 3-amino-1,2,4-triazole-5-carboxylic acid hemihydrate, (102) 4-amino-3-hydrazino-5-mercapto-1,2,4-triazole, (103) 1,2,3-triazole-4,5-dicarboxylic acid monohydrate, (104) nitron, (105) 1-hydroxybenzotriazole hydrate, (106) 1,3,5-triazine, (107) cyanuric acid, (108) trithiocyanuric acid, (109) 2,4-bis (methylthio)-6-chloro-1,3,5-triazine, (110) 2-chloro-4,6-dimethoxy-1,3,5-triazine, (111) 2-chloro-4,6-diamino-1,3,5-triazine, (112) trichloromelamine, (113) cyanuric chloride, (114) 2,4,6-tris(perfluoroheptyl)-1,3,5-triazine, (115) hexahydro-2,4,6-trimethyl-1,3,5-triazine trihydrate, (116) 1,3,5-trimethylhexahydro-1,3,5-triazine, (117) 1,3,5-triethylhexahydro-1,3,5-triazine, (118) 1,3,5-triclohexylhexahydro-1,3,5-triazine, (119) 1,3,5-tribenzylhexahydro-1,3,5-triazine, (120) trichloroisocyanuric acid, (121) tris (2,3-dibromopropylisocyanurate), (122) cyanuric acid compound with melamine, (123) urazole, (124) 1-methyl urazole, (125) 4-phenyl urazole, (126) 5-(4-hydroxyphenyl)-5-phenyl hydantoin, (127) β-tetralone hydantoin, (128) cyclen (1,4,7,10-tetraazacyclododecane), (129) 1,4,8,11-tetraazacyclotetradecane, (130) 1,4,8,11-tetramethyl-1,4,8,11-tetraazacydotetradecane, (131) 1,4,8,11-tetraazacyclotetradecane-5,7-dione, (132) 1,4,8,12-tetraazacyclopentadecane, (133) 2,3,7,8,12,13,17,18-octaethyl-21H,23H-porphine, (134) dimethyl 3,7,12,17-tetramethyl-21H,23H-porphine-2,18-dipropionate, (135) dimethyl 7,12-diacetyl-3,8,13,17-tetramethyl-21H,23H-porphine-2,18-dipropionate, (136) 8,3-divinyl-3,7,12,17-tetramethyl-21H,23H-porphine-2,18-dipropionic acid, disodium salt, (137) 5,10,15,20-tetraphenyl-21H,23H-porphine, (138) 5,10,15,20-tetrakis(4-methoxyphenyl)-21H,23H-porphine, (139) 5,10,15-20-tetrakis[4-(trimethylamino)phenyl]-21H,23H-porphine tetra-p-tosylate salt, (140) 5,10,15,20-tetra(4-pyridyl)-21H, 23H-porphine, (141) 5,10,1 5,20-tetrakis(1-methyl-4-pyridyl)-21H,23H-porphine, tetra-p-tosylate salt), (142) 1,5-pentamethylenetetrazole, (143) 1-H-tetrazole, (144) 5-amino tetrazole monohydrate, (145) 2,3,5-triphenyl-2H-tetrazolium chloride, (146) 2-(4-iodophenyl)-5-(4-nitrophenyl)-3-phenyltetrazolium chloride, (147) 1,2,3,3-tetramethyl-3H-indolinium iodide, (148) hexacyclen trisulfate, (149) hexamethylhexacyclen, (150) pyrrole-2-carboxaldehyde, (151) proline amide, (152) 3-pyrrolidino-1,2-propane diol, (153) 1-(pyrrolidino carbonylmethyl) piperazine, (154) 4-pyrrolidinopyridine, (155) 3-indolylacetonitrile, (156) 6-nitroindoline, (157) 7-azaindole, (158) indazole, (159) 2-acetyl-pyrrole, (160) 2-acetyl-1-methylpyrrole, (161) 3-acetyl-1-methylpyrrole, (162) 3-acetyl-2,4-dimethylpyrrole, (163) pyrrole-2-carboxylic acid, (164) 3-carboxy-1,4-dimethyl-2-pyrroleacetic acid, (165) proline, (166) 2-pyrrolidone-5-carboxylic acid, (167) 4-hydroxyproline, (168) 1,1'-ethylene bis (5-oxo-3-pyrrolidine carboxylic acid), (169) kainic acid monohydrate, (170) 1-amino pyrrolidine hydrochloride, (171) 2-(2-chloroethyl)-1-methyl pyrrolidine hydrochloride, (172) 1-(2-chloroethyl) pyrrolidine hydrochloride, (173) tremorine dihydrochloride, (174) L-proline methyl ester hydrochloride, (175) ammonium pyrrolidine dithiocarbamate, (176) pyrrolidone hydrotribromide, (177) 1-(4-chlorobenzyl)-2-(1-pyrrolidinyl methyl) benzimidazole hydrochloride, (178) billverdin dihydrochloride, (179) indole, (180) 4,5,6,7-tetrahydroindole, (181) 3-indolemethanol hydrate, (182) 3-indole ethanol, (183) indole-3-carboxaldehyde, (184) 3-indolylacetate, (185) indole-3-acetamide, (186) indole-3-carboxylic acid, (187) indole-3-acetic acid, (188) 3-indole propionic acid, (189) 3-indole acrylic acid, (190) 3-indole glyoxylic acid, (191) indole-3-pyruvic acid, (192) 3-indolelactic acid, (193) 3-indole butyric acid, (194) N-acetyltryptophanamide, (195) N-(3-indolylacetyl)alanine, (196) N-(3-indolyl acetyl)valine, (197) N-(3-indolyl acetyl)isoleucine, (198) N-(3-indolyl acetyl)leucine, (199) N-(3-indolyl acetyl)aspartic acid, (200) N-(3-indolyl acetyl)-L-phenylalanine, (201) 4-hydroxyindole, (202) indole-4-carboxylic acid, (203) 4-indolyl acetate, (204) 4-methyl indole, (205) 5-hydroxy indole, (206) 5-hydroxy indole-3-acetic acid, (207) 5-hydroxy-2-indole carboxylic acid, (208) N-acetyl-5-hydroxytryptamine, (209) indole-5-carboxylic acid, (210) 5-methyl indole, (211) 5-methoxy indole, (212) indole-2-carboxylic acid, (213) indolene-2-carboxylic acid, (214) indole-2,3-dione, (215) 2-methyl indole, (216) 2,3,3-trimethyl indolenine, (217) tryptamine hydrochloride, (218) 5-methyl tryptamine hydrochloride (219) serotonin hydrochloride hemihydrate, (220) norharman hydrochloride monohydrate, (221) harmane hydrochloride monohydrate, (222) harmine hydrochloride hydrate, (223) harmaline hydrochloride dihydrate, (224) harmol hydrochloride dihydrate, (225) harmalol

hydrochloride dihydrate, (226) 3,6-diamino acridine hydrochloride, (227) (3-indolyl) isothiuronium iodide, (228) yohimbine hydrochloride, 229) pyrazole, (230) 3-amino pyrazole, (231) 5-amino-1-ethylpyrazole, (232) 3-amino-4-carbethoxypyrazole, (233) 3-amino-5-methylpyrazole, (234) 3-amino-5-phenylpyrazole, (235) ethyl 4-pyrazole carboxylate, (236) diethyl 3,5-pyrazolecarboxylate, (237) 1,1'-(1-ethylpropylidene)bis 1H-pyrazole, (238) 4-bromopyrazole, (239) 4-bromo-3-methyl pyrazole, (240) 3,5-dimethyl pyrazole, (241) 4-bromo-3,5-dimethyl pyrazole, (242) 3,5-dimethyl pyrazole-1-carboxamide, (243) 3,5-dimethylpyrazole-1-methanol, (244) 3-methyl-1-vinylpyrazole, (245) 4-benzoyl-3-methyl-1-phenyl-2-pyrazolin-5-one, (246) 1-nitropyrazole, (247) 4-pyrazole carboxylic acid, (248) 3,5-pyrazole dicarboxylic acid monohydrate, (249) 3-amino-5-hydroxypyrazole, (250) 3-amino-4-pyrazole carbonitrile, (251) 3-amino-4-pyrzaolecarboxylic acid, (252) 4-methyl pyrazole hydrochloride, (253) 3,4-diamino-5-hydroxy pyrazole sulfate, (254) (3,5-dimethyl pyrazole-1-carboxamidine nitrate), (255) 3-amino-4-pyrazole carboxamide hemisulfate, (256) acid salt of 6-amino indazole hydrochloride, (257) 4-hydroxypyrazolo [3,4-d] pyrimidine, (258) 4-mercapto-1H-pyrazolo-[3,4-d]-pyrimidine, (259) indazole, (260) 5-aminoindazole, (261) 6-aminoindazole, (262) 3-indazolinone, (263) N'-(6-indazolyl) sulfanilamide, (264) 4,5-dihydro-3-(4-pyridinyl)-2H-benz[g] indazole methane sulfonate, (265) imidazole, (266) 4-methylimidazole, (267) 2-ethylimidazole, (268) 2-propylimidazole, (269) 1-butylimidazole, (270) 2-undecylimidazole, (271) histamine, (272) 1-(3-aminopropyl) imidazole, (273) 1-acetylimidazole, (274) 2-methyl-1-vinylimidazole, (275) 2-ethyl-4-methylimidazole, (276) 1-benzyl-2-methylimidazole, (277) 1-methylbenzimidazole, (278) 1-ethyl-3-methyl-1,H-imidazolinium chloride, (279) 2-(aminomethyl) benzimidazole dihydrochloride hydrate, (280) 2,6-diamino-8-purinol hemisulfate monohydrate, (281) purin-6-yl-trimethyl ammonium chloride, (282) 4-methyl-5-imidazole methanol hydrochloride, (283) N,N'-bis[3-(4,5-dihydro-1H-imidazol-2-yl)phenyl]urea dipropanoate, (284) 1-(p-tosyl)-3,4,4-trimethyl-2-imidazolinium iodide, (285) 1-ethyl-3-methyl-1H-imidazolinium chloride, (286) 2-amino imidazole sulfate, (287) 4-amino-5-imidazole carboxamide hydrochloride, (288) 2-hydrazino-2-imidazoline hydrobromide, (289) imidazole hydrochloride, (290) 4-imidazole acetic acid hydrochloride, (291) 2-benzyl-2-imidazoline hydrochloride, (292) propyl-1-(1-phenyl ethyl imidazole-5-carboxylate hydrochloride, (293) 2,6-diamino purine sulfate hydrate, (294) 1-tallow amido ethyl-3-methyl-2-heptadecyl imidazolinium methyl sulfate, (295) isostearyl ethyl imidonium ethyl sulfate, (296) methyl-1-tallow amido ethyl-2-tallow imidazolinium methyl sulfate, (297) isostearyl benzyl imidonium chloride, (298) methyl-1-hydrogenated tallow amido ethyl (299) hydrogenated tallow imidazolinium methyl sulfate, (300) 1-methyl-1-oleyl amido ethyl-2-oleyl-imidazolinium methyl sulfate, (301) cocohydroxyethyl polyethyleneglycol imidazolinium chloride phosphate, (302) guanine, (303) guanosine hydrate, (304) xanthine, (305) 1-methylxanthine, (306) 3-methyl xanthine, (307) 3-isobutyl-1-methyl xanthine, (308) hypoxanthin, (309) xanthosine dihydrate, (310) 6-thioxanthene, (311) purine, (312) 6-amino purine, (313) 6-methoxy purine hemihydrate, (314) 6-mercaptopurine monohydrate, (315) 2-amino-6-chloropurine, (316) 2-amino-6,8-dihydroxy purine, (317) theophylline (3,7 dihydro-1,3-dimethyl-1H-purine-2,6-dione), (318) kinetin, (319) 1-methyl adenine, (320) 3-methyl adenine, (321) adenosine, (322) inosine, (323) 6-mercaptopurine riboside, (324) 6-amino purine hydrochloride hemihydrate, (325) 6-amino purine sulfate, (326) 2,6-diamino-8-purinol hemisulfate monohydrate, (327) benzimidazole, (328) 2-aminobenzimidazole, (329) 2-amino-5,6-dimethlybenzimidazole, (330) 5-benzimidazole carboxylic acid, (331) 2,4,5-trimethyl benzimidazole, (332) 2-guanidinobenzimidazole, (333) 2-hydroxybenzimidazole, (334) 4-(2-keto-1-benzimidazolinyl) piperidine, (335) 2-imidazolidine thione, (336) 2-imidazolidone, (337) hydantoin, (338) 1-methyl hydantoin, (339) creatinine, (340) 2-thiohydrantoin, (341) 5-hydantoin acetic acid, (342) 5-ureidohydantoin, (343) 5,5-dimethyl hydantoin, (344) 2-imidazolidone-4-carboxylic acid, (345) N,N-bis (2-hydroxyethyl) isonicotinamide, (346) 1,2-bis(4-pyridyl) ethylene, (347) 2-(2-piperidinoethyl) pyridine, (348) 1,2-bis (4-pyridyl)ethane, (349) 4,4'-trimethylene pyridine, (350) aldrithiol-2, (351) aldrithiol-4, (352) 1,3-bis (3-pyridylmethyl)-2-thiourea, (353) 2,2':6',2''-terpyridine, (354) 2-[N,N-bis(triflouromethylsulfonyllamino]pyridine, (355) 2,3-pyridine dicarboxylic acid, (356) 2,4-pyridine dicarboxylic acid monohydrate, (357) 2,5-pyridine dicarboxylic acid, (358) 2,6-pyridine dicarboxylic acid, (359) 3,4-pyridine dicarboxylic acid, (360) 3,5-pyridine dicarboxylic acid, (361) 2,6-pyridine dicarboxaldehyde, (362) 3,4-pyridine carboxamide, (363) 3,4-pyridine carboximide, (364) 2,3-pyridine carboxylic anhydride, (365) 3,4-pyridine carboxylic anhydride, (366) 2,6-pyridine methanol, (367) 2-pyridine ethane sulfonic acid, (368) 4-pyridine ethane sulfonic acid, (369) 3-pyridine sulfonic acid, (370) pyridoxic acid, (371) trans-3-(3-pyridyl) acrylic acid, (372) 2-pyridyl hydroxymethane sulfonic acid, (373) 3-pyridyl hydroxymethane sulfonic acid, (374) 6-methyl-2,3-pyridine dicarboxylic acid, (375) isonicotinic acid, (376) pyridine hydrobromide, (377) pyridine hydrochloride, (378) 2-(chloromethyl) pyridine hydrochloride, (379) 2-pyridylacetic acid hydrochloride, (380) nicotinoyl chloride hydrochloride, (381) 2-hydrazinopyridine dihydrochloride, (382) 2-(2-methyl aminoethyl) pyridine dihydrochloride, (383) 1-methyl-1,2,3,6-tetrahydropyridine hydrochloride, (384) 2,6-dihydroxypyridine hydrochloride, (385) 3-hydroxy-2(hydroxymethyl) pyridine hydrochloride, (386) pyridoxine hydrochloride, (387) pyridoxal hydrochloride, (388) pyridoxal 5-phosphate monohydrate, (389) 3-amino-2,6-dimethoxy pyridine hydrochloride, (390) pyridoxamine dihydrochloride monohydrate, (391) iproniazid phosphate, (392) tripelennamine hydrochloride, (393) pyridinium bromide perbromide, (394) pyridinium 3-nitrobenzenesulfonate, (395) 1-ethyl-3-hydroxy pyridinium bromide, (396) 1-ethyl-4-(methoxy carbonyl) pyridinium iodide, (397) 1-heptyl-4-(4-pyridyl) pyridinium bromide, (398) 1-dodecyl pyridinium

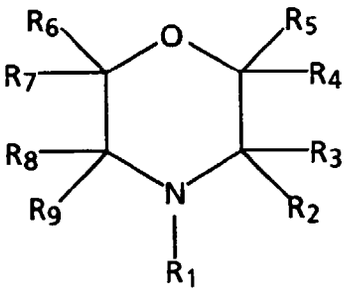
chloride, (399) 1-hexadecyl pyridinium chloride monohydrate, (400) 1-hexadecyl pyridinium bromide monohydrate, (401) 1-(carboxymethyl) pyridinium chloride, (402) 1-(carboxymethyl) pyridinium chloride hydrazide, (403) 1-(3-nitrobenzyloxymethyl) pyridinium chloride, (404) 1-(3-sulfopropyl) pyridinium hydroxide, (405) N-(lauroyl colamino formyl methyl) pyridinium chloride, (406) N-(stearoyl colamine formyl methyl) pyridinium chloride, (407) 2-chloro-1-methyl pyridinium iodide, (408) 2-pyridine aldoxime-1-methyl methane sulfonate, 2-pyridine aldoxime-1-methyl chloride, (409) 2-[4-(dimethyl amino) styryl]1-ethylpyridinium iodide, (410) 1-benzyl-3-hydroxy pyridinium chloride, (411) 1,4 dimethyl pyridinium iodide, (412) 1-ethyl-4-phenyl pyridinium iodide, (413) 4-phenyl-1-propyl pyridinium iodide, (414) 1-docosyl-4-(4 hydroxystyryl) pyridinium bromide, (415) 1,1'-dimethyl-4-4'-bipyridinium dichloride, (416) 1,1'-diethyl-4-4'-bipyridinium dibromide, (417) 1,1'-dibenzyl-4,4'-bipyridinium dichloride, (418) 1,1'-diheptyl-4,4'-bipyridinium dibromide, (419) 1,7-phenanthroline, (420) 1,10-phenanthroline, (421) 5-chloro-1,10-phenanthroline, (422) 4,5-dihydro-3-(4-pyridinyl)-2H-benz[g] indazole methane sulfonate, (423) 1,2,3,4-tetrahydro quinoline, (424) 6-ethoxy-1,2,3,4-tetrahydro-2,2,4-trimethyl quinoline, (425) 2-cyanoquinoline, (426) 1-cyanoisoquinoline, (427) 3-cyanoisoquinoline, (428) 3-amino quinoline, (429) 8-aminoquinoline, (430) 7,8-benzoquinoline, (431) 8-hydroxy quinoline, (432) 8-hydroxyquinoline, aluminium salt, (433) 8-hydroxyquinaldine, (434) 3,4,5,6,7,8-hexahydro 2 (1H)-quinolinane, (435) julolidine, (436) quinoxaline, (437) ethyl-2-quinoxalinecarboxylate, (438) quinoline, (439) 2-hydroxyquinoline, (440) 4-hydroxy quinoline, (441) 5-hydroxy quinoline, (442) 5-amino quinoline, (443) 6-amino quinoline, (444) 2-quinoline carboxylic acid, (445) 3-quinoline carboxylic acid, (446) 4-quinoline carboxylic acid, (447) 4-quinoline carboxaldehyde, (448) 2-quinoline thiol, (449) 2,4-quinoline diol, (450) quinaldine, (451) 4-aminoquinaldine, (452) 2,6-dimethyl quinoline, (453) 2,7-dimethyl quinoline, (454) 4-methoxy-2-quinoline carboxylic acid, (455) methyl-2-phenyl-4-quinoline carboxylate, (456) 2-(N-butyl carbamoyl)-1,2,3,4-tetrahydro-isoquinoline, (457) 1-hydroxyisoquinoline, (458) 1-isoquinoline carboxylic acid, (459) 3-isoquinoline carboxylic acid, (460) 1,5-isoquinoline diol, (461) 8-hydroxyquinoline hemisulfate hemihydrate, (462) 5-amino-8-hydroxy quinoline dihydrochloride, (463) 2-(chloromethyl) quinoline monohydrochloride, (464) 8-hydroxyquinoline-5-sulfonic acid monohydrate, (465) 8-ethoxy-5-quinoline sulfonic acid sodium salt hydrate, (466) 1,2,3,4-tetrahydroisoquinoline hydrochloride, (467) 1,2,3,4-tetrahydro-3-isoquinoline carboxylic acid hydrochloride, (468) 6,7-dimethoxy-1,2,3,4-tetrahydro isoquinoline hydrochloride, (469) 1-methyl-6,7-dihydroxy-1,2,3,4-tetrahydro isoquinoline hydrobromide, (470) primaquine diphosphate, (471) pentaquine phosphate, (472) dibucaine hydrochloride, (473) 9-aminoacridine hydrochloride hemihydrate, (474) 3, 6-diamino acridine hemisulfate, (475) 2-quinoline thiol hydrochloride, (476) sparteine sulfate pentahydrate, (477) papaverine hydrochloride, (478) emetine dihydrochloride hydrate, (479) 1,10-phenanthroline monohydrochloride monohydrate, (480) neocuproine hydrochloride trihydrate, (481) pyrimidine, (482) 2 chloropyrimidine, (483) 4-phenylpyrimidine, (484) 5-bromopyrimidine, (485) 2,4-dichloropyrimidine, (486) 4,6-dichloropyrimidine, (487) 2,4-dichloro-6-methylpyrimidine, (488) 6-chloro-2,4-dimethoxypyrimidine, (489) 2-amino-4,6-dimethoxypyrimidine, (490) 2,4,6-trichloropyrimidine, (491) 2,4,5,6-tetrachloropyrimidine, (492) 1,3,4,6,7,8-hexahydro-1-methyl-2H-pyrimido [1,2-a] pyrimidine, (493) 1,3,4,6,7,8-hexahydro-2H-pyrimido [1,2-a] pyrimidine, (494) hexetidine, (495) tert-butyl S-(4,6-dimethylpyrimidin-2-yl) thiocarbonate, (496) 4-methoxybenzyl-S(4,6-dimethylpyrimidin-2-yl) thiocarbonate, (497) 2-amino pyrimidine, (498) 2-amino-4-methyl pyrimidine, (499) 2-amino-5-nitropyrimidine, (500) 2-amino-5-bromopyrimidine, (501) 2-amino-4-chloro-6-methyl pyrimidine, (502) 2-amino-4,6-dimethyl pyrimidine, (503) 2-amino-4-hydroxy-6-methyl pyrimidine, (504) 2-amino-4,6-dichloropyrimidine, (505) 2-amino-5-bromo-6-methyl-4-pyrimidinol, (506) 4-aminopyrimidine, (507) 4,5-diamino pyrimidine, (508) 4-amino-2,6-dimethyl pyrimidine, (509) 2,4-diamino-6-hydroxypyrimidine, (510) 2,6-diamino-4-chloro pyrimidine, (511) 4,6-diamino-2-mercaptopyrimidine hemihydrate, (512) 2,4,6-triamino pyrimidine, (513) 5-nitroso-2,4,6-triamino pyrimidine, (514) 4,6-dihydroxy pyrimidine, (515) 4,6-dihydroxy-2-amino pyrimidine, (516) 4,6-dihydroxy-2-methyl pyrimidine, (517) 4,6-dihydroxy-5-nitropyrimidine, (518) 2,4-dihydroxy-5-methyl pyrimidine, (519) 2,4-dihydroxy-6-methyl pyrimidine, (520) 2,4-dihydroxy-5,6-dimethyl pyrimidine, (521) 2,6-dihydroxy pyrimidine-5-carboxylic acid hydrate, (522) 2,6-dihydroxy-4-amino pyrimidine, (523) 2,4,5-trihydroxy pyrimidine, (524) 2-thiouracil, (525) 6-amino-5-nitroso-2-thiouracil, (526) folic acid dihydrate, (527) folinic acid, calcium salt hydrate, (528) 2-hydroxypyrimidine hydrochloride, (529) 2-hydroxy-4-methyl pyrimidine hydrochloride, (530) 4,6-dimethyl-2-hydroxypyrimidine hydrochloride, (531) 2-mercapto-4-methyl pyrimidine hydrochloride, (532) 4,6-diamino pyrimidine hemisulfate monohydrate, (533) 4,5,6-triamino pyrimidine sulfate hydrate, (534) 4,5-diamino-6-hydroxy pyrimidine sulfate, (535) 2,4-diamino-6-mercapto pyrimidine hemisulfate, (536) 2,4-diamino-6-hydroxy pyrimidine hemisulfate hydrate, (537) 6-hydroxy-2,4,5-triamino pyrimidine sulfate, (538) 5,6-diamino-2,4-dihydroxy pyrimidine sulfate, (539) N4-(2-amino-4-pyrimidinyl) sulfanilamide monohydrochloride, (540) 2,4,5,6-tetraamino pyrimidine sulfate, (541) 2,4 (1H,3H)-pyrimidine dione, (542) 5-amino uracil, (543) 5-nitrouracil, (544) 5-iodouracil, (545) 5-(hydroxymethyl) uracil hydrate, (546) 5,6-dihydrouracil, (547) 6-amino-1-methyl uracil, (548) 5,6-diamino-1,3-dimethyl uracil hydrate, (549) uridine, (550) 5-methyl uridine, (551) 5-iodouridine, (552) thimidine, (553) 5-methyl-2-thiouracil, (554) 4-thiouridine, (555) 2-thiocytidine dihydrate, (556) orotic acid monohydrate, (557) hydroorotic acid, (558) 5-aminoorotic acid, (559) methylorotate, (560) barbituric acid, (561) 5-nitrobarbituric acid trihydraet, (562) violuric acid monohydrate, (563) alloxan monohydrate, (564) 4,5,6-triamino-2(1H)-pyrimidinethione sulfate, (565) cyclocy-

tidine hydrochloride, (566) cytosine arabinoside hydrochloride, (567) pyridazine, (568) phthalazine, (569) 4,5-dihydro-6-methyl-3(2H)-pyridazinone monohydrate, (570) 3,6-dichloropyridazine, (571) 3,4,5-trichloropyridazine, (572) 3,6-dichloro-4-methylpyridazine, (573) 3-chloro-6-methoxypyridazine, (574) pyrazine, (575) acetylpyrazine, (576) aminopyrazine, (577) 2,6-dichloropyrazine, (578) 2,3,5-trimethylpyrazine, (579) tetramethyl pyrazine, (580) 5-methyl-2-pyrazine carboxylic acid, (581) pyrazine amide, (582) 2,3-pyrazine dicarboxamide, (583) 4-pyridazine carboxylic acid, (584) 2,3-pyrazine dicarboxylic acid, (585) lumazine monohydrate, (586) xanthopterin monohydrate, (587) 2-quinoxazoline carboxylic acid, (588) 2-quinoxalinol, (589) 2,3-dihydroxy quinoxaline, (590) phenazine methosulfate, (591) 2-azetidinone, (592) 2-pyrrolidinone, (593) pyrrolidone hydrotribromide, (594) δ-valerolactam, (595) ε-caprolactam, (596) amino-ε-caprolactam, (597) N-methyl caprolactam, (598) 2-azacyclooctanone, (599) 2-azacyclononanone, (600) ω-thiocaprolactam, (601) N-vinylcaprolactam, (602) 2-azabicyclo[2.2.1]hept-5-en-3-one, (603) maleimide, (604) N-ethylmaleimide, (605) N-butylmaleimide, (606) N-cyclohexylmaleimide, (607) N-phenylmaleimide, (608) N-benzylmaleimide, (609) N-hydroxymaleimide, (610) succinimide, (611) N-methylsuccinimide, (612) 2-hydroxy-N-methylsuccinimide, (613) N-hydroxysuccinimide, (614) succinimidyl 2,2,2-trichloroethyl carbonate, (615) 2-dodecyl-N-(2,2,6,6-tetramethyl-4-ppiperidinyl) succinimide, (616) 2-dodecyl-N-(1,2,2,6,6-pentamethyl-4-piperdinyl) succinimide, (617) N-(1-acetyl-2,2,6,6-tetramethyl-4-piperidinyl)-2-dodecyl succinimide, (618) α-methyl-α-propylsuccinimide, (619) α-methyl-α-phenylsuccinimide, (620) N-vinylphthalimide, (621) N-ethylphthalimide, (622) N-(trimethylsilylmethyl)phthalimide, (623) N-(2-bromoethyl)phthalimide, (624) N-(3-bromopropyl)phthalimide, (625) N-(4-bromobutyl)phthalimide, (626) phthalimidoacetaldehyde diethyl acetal, (627) diethyl (phthalimidomethyl)phosphonate, (628) N-benzylphthalimide, (629) phthalimide, DBU (1,8-diazabicyclo [5.4.0]undec-7-ene) salt, (630) phthalimide, DBN (1,5-diazabicyclo [4.3.0]non-5-ene), and (631) mixtures thereof; or wherein the transparentizing agent is an oxa-aza-cyclic compound; or wherein the transparentizing agent is selected from the group consisting of: (A) materials of the general formulae:

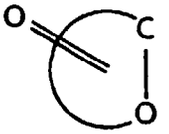


wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, R_{14}, and R_{15} each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester

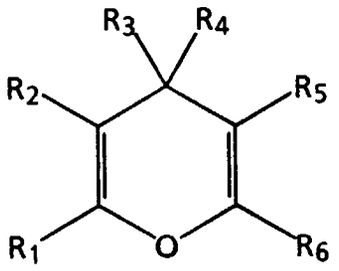
groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, R_{14}, and R_{15} can be joined together to form a ring; (B) materials of the general formula:

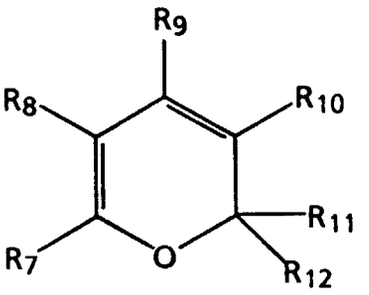


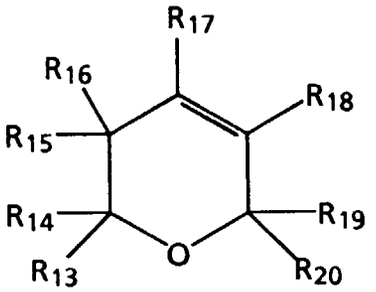
wherein R_1, R_2, R_3, R_4, R_5, and R_6 each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, R_4, R_5, and R_6 can be joined together to form a ring; (C) mixtures thereof; or wherein the transparentizing agent is selected from the group consisting of (1) 3-amino-5-methyl isoxazole, (2) 5-amino-3-methyl isoxazole, (3) 3,5-dimethyl-4-nitroisoxazole, (4) 1,2-benzisoxazole, (5) 2,1-benzisoxazole, (6) cycloserine, (7) 4-benzyl-2-methyl-2-oxazoline, (8) 2-methyl-5-phenyl-2-oxazoline-4-methanol, (9) benzoxazole, (10) 2-methylbenzoxazole, (11) 2-chlorobenzoxazole, (12) 2-chloro-3-ethylbenzeneoxazolium tetrafluoroborate, (13) 2-oxazolidone, (14) 3-methyl-2-oxazolidinone, (15) 5-chloromethyl-2-oxazolidinone, (16) 4-isopropyl-2-oxazolidinone, (17) 3-acetyl-2-oxazolidinone, (18) 5,5-dimethyl oxazolidine-2,4-dione, (19) 3-ethyl-2-thioxo-4-oxazolidinone, (20) 4-methyl-5-phenyl-2-oxazolidinone, (21) 4-benzyl-2-oxazolidinone, (22) 2-benzoisoxazolinone, (23) muscimol hydrate, (24) 5-methyl-3-phenyl isoxazole-4-carboxylic acid, (25) 2-methyl-5-phenyl-2-oxazoline-4-methanol, (26) sulfamethoxazole, (27) sulfisoxazole, (28) N'-(4,5-dimethyloxazol-2-yl) sulfanilamide, (29) chlorzoxazone, (30) 3,3'-dimethyl oxacarbocyanine iodide, (31) 2-ethyl-5-phenyl isoxazolium-3'-sulfonate, (32) 2-tert-butyl-5-methyl isoxazolium perchlorate, (33) 5-phenyl-2-(4-pyridyl) oxazole hydrochloride hydrate, (34) 5-phenyl-2-(4-pyridyl) oxazole methyl tosylate salt, (35) 4-aminomorpholine, (36) 4-morpholine carbonitrile, (37) 4-morpholine propionitrile, (38) 4-formyl morpholine, (39) 4-acetylmorpholine, (40) 4-(2-hydroxyethyl) morpholine, (41) 3-morpholino-1,2-propane diol, (42) 4-(3-amino propyl) morpholine, (43) 1-morpholino-1-cyclopentene, (44) 1-morpholino-1-cyclohexene, (45) 1-morpholino-1-cycloheptene, (46) 4-phenyl morpholine, (47) 4-morpholinoaniline, (48) 2,2,2-tribromoethyl phosphoromorpholino chloridate, (49) 1-(morpholino carbonyl methyl) piperazine, (50) 1,3-dimorpholine-2-nitropropane, (51) hemicholinium-3, (52) hemicholinium-15, (53) 2-methoxy-4-morpholinobenzene diazoniumchloride, zinc chloride, (54) fomocaine, (55) 4-morpholinobenzophenone, (56) 4,4'-ethylene-bis (2,6-morpholinedione), (57) N,N'-dicylcohexyl-4-morpholine carboxamidine, (58) 1-cyclohexyl-3-(2-morpholino ethyl)-2-thiourea, (59) 4-morpholinoacetophenone, (60) 4-(2-chloroethyl) morpholine hydrochloride, (61) 4-morpholine ethane sulfonic acid, (62) 4-morpholine propane sulfonic acid, (63) β-hydroxy morpholine propane sulfonic acid, (64) [N-(aminoiminomethyl)-4-morpholine carboximidamide] hydrochloride, (65) 4-morpholine carbodithioic acid compound with morpholine, (66) 2,5-dimethyl-4-(morpholinomethyl) phenol hydrochloride monohydrate, (67) 1-cyclohexyl-3-(2-morpholinoethyl) carbodiimide metho-p-toluene sulfonate, (68) hemicholinium-3[2,2'-(4,4'-biphenylene) bis(2-hydroxy-4,4-dimethyl morpholinium bromide), (69) hemicholinium-15[4,4-dimethyl-2-hydroxy-2-phenyl morpholinium bromide], (70) 1-aza-12-crown-4, (71) 1-aza-15-crown-5, (72) 1-aza-18-crown-6, (73) 1,4,10-trioxa-7,13-diazacyclopentadecane, (74) 1,4,10,13-tetraoxa-7,16-diazacyclooctadecane, (75) N,N'-dibenzyl-1,4,10,13-tetraoxa-7,16-diazacyclooctadecane, (76) 4,7,13,18-tetraoxa-1,10-diazabicyclo [8.5.5] eicosane, (77) 4,7,13,16,21-pentaoxa-1,10-diazabicyclo [8.5.5] tricosane, (78) 4,7,13,16,21,24-hexaoxa-1,10-diazabicyclo [8.8.8] hexacosane, (79) 5,6-benzo-4,17,13,16,21,24-hexaoxa-1,10-diazabicyclo[8.8.8] hexacosane, and (80) mixtures thereof; or wherein the transparentizing agent is an oxacyclic compound; or wherein the transparentizing agent is selected from the group consisting of: (A) materials of the general formula:

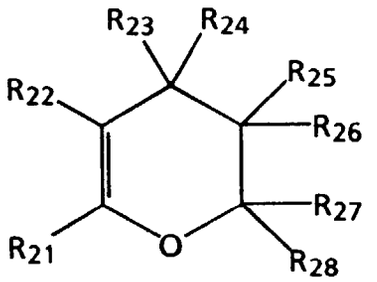


wherein the curved portion of the structure represents a hydrocarbon chain or a substituted hydrocarbon chain, wherein two or more substituents can be joined together to form a ring; (B) materials of the general formulae:

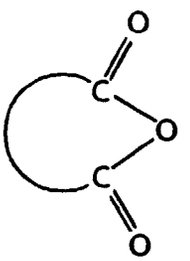




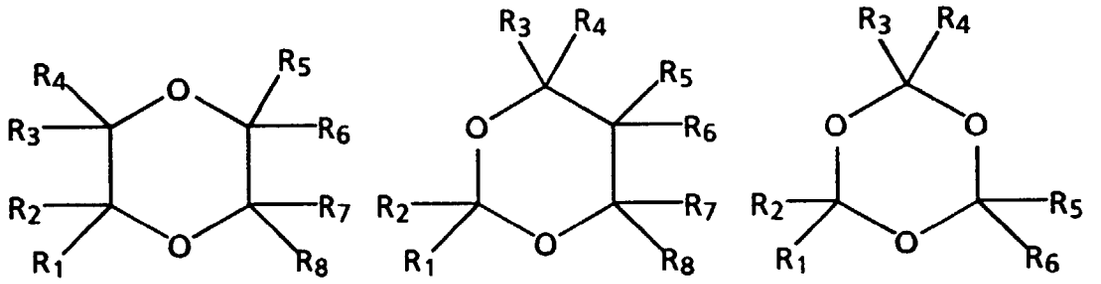




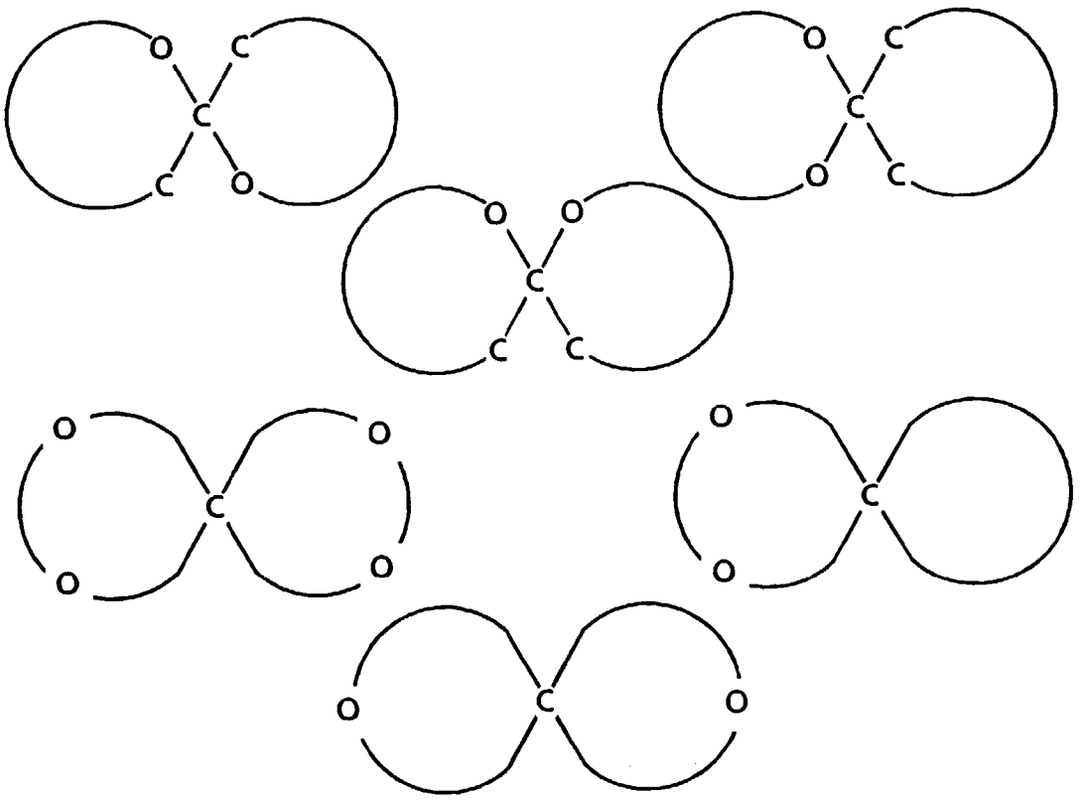
wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, R_{14}, R_{15}, R_{16}, R_{17}, R_{18}, R_{19}, R_{20}, R_{21}, R_{22}, R_{23}, R_{24}, R_{25}, R_{26}, R_{27}, and R_{28} each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, R_{14}, R_{15}, R_{16}, R_{17}, R_{18}, R_{19}, R_{20}, R_{21}, R_{22}, R_{23}, R_{24}, R_{25}, R_{26}, R_{27}, and R_{28} can be joined together to form a ring; (C) materials of the general formula:



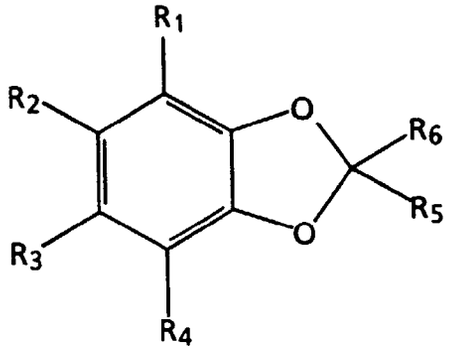
wherein the curved portion of the structure represents a hydrocarbon chain or a substituted hydrocarbon chain, wherein two or more substituents can be joined together to form a ring; (D) materials of the general formulae:



wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, and R_8 each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, and R_8 can be joined together to form a ring; (E) materials of the general formulae:

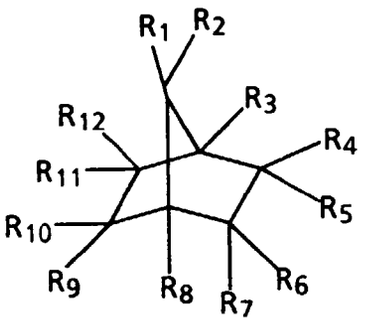


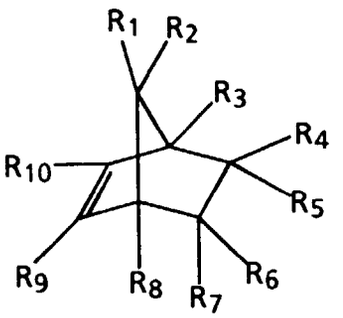
wherein the curved portions of the structures represent a hydrocarbon chain or a substituted hydrocarbon chain, wherein two or more substituents can be joined together to form a ring; (F) materials of the general formula:



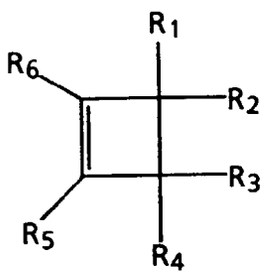
wherein R_1, R_2, R_3, R_4, R_5, and R_6 each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, R_4, R_5, and R_6 can be joined together to form a ring; and (G) mixtures thereof; or wherein the transparentizing agent is selected from the group consisting of (1) γ-butyrolactone, (2) γ-valerolactone, (3) γ-caprolactone, (4) γ-octanoic lactone, (5) γ-nonanoic lactone, (6) γ-decanolactone, (7) undecanoic γ-lactone, (8) γ-phenyl-γ-butyrolactone, (9) α-carbethoxy-γ-phenyl-butyrolactone, (10) 2-coumaranone, (11) β,β-dimethyl-γ-(hydroxymethyl)-γ-butyrolactone, (12) γ-ethoxy carbonyl-γ-butyrolactone, (13) 5-(hydroxymethyl)-2(5H)-furanone, (14) dihydro-4,4-dimethyl-2,3-furandione, (15) 2,5-dimethyl-4-hydroxy-3(2H)-furanone, (16) mevalonic (β-hydroxy β-methyl-δ-valero) lactone, (17) δ-decanolactone, (18) undecanoic δ-lactone, (19) δ-dodecanolactone, (20) undecanoic ω-lactone, (21) oxacyclotridecan-2-one, (22) ω-pentadecalactone, (23) hydrindantin (2,2'-dihydroxy-2,2'-biindan-1,1'3,3'-tetrone, (24) hydrindantin dihydrate, (25) 2-oxepanone, (26) 4H-pyran-2-one, (27) methylcoumalate, (28) methyl 2-oxo-2H-pyran-3-carboxylate, (29) 4,6-dimethyl-α-pyrone, (30) 4-methoxy-6-methyl-2H-pyran-2-one, (31) 3,6-dihydro-4,6,6-trimethyl-2H-pyran-2-one, (32) 3,4-dihydro-6-methyl-2H-pyran-2-one, (33) 3-acetyl coumarin, (34) 6-methyl coumarin, (35) 7-ethoxy coumarin, (36) ethyl-3-coumarin carboxylate, (37) 7-diethylamino-4-methyl coumarin, (38) dihydro coumarin, (39) 3-bromo-2-coumaranone, (40) patulin, (41) 4H-pyran-4-one, (42) 2-ethyl-3-hydroxy-4H-pyran-4-one, 43v) butopyronoxyl(butyl 3,4-dihydro-2,2-dimethyl-4-oxo-2H-pyran-6-carboxylate, (44) dehydroacetic acid, (45) 4-chromone, (46) 4-chromanone, (47) 4-chromanol, (48) 6,7-dimethoxy-2,2-dimethyl-4-chromanone, (49) 3-isochromanone, (50) 6,7-dimethoxy-3-isochromanone, (51) 6-ethyl-4-oxo-4H-1-benzopyran-3-carbonitrile, (52) 6-ethyl-4-oxo-4H-1-benzopyran-3-carboxaldehyde, (53) 6-isopropyl-4-oxo-4H-1-benzopyran-3-carbonitrile, (54) 6-isopropyl-4-oxo-4H-1-benzopyran-3-carboxaldehyde, (55) maleic anhydride, (56) bromomaleic anhydride, (57) citraconic anhydride, (58) 2,3-dimethylmaleic anhydride, (59) dichloromaleic anhydride, (60) cis-aconitic anhydride, (61) itaconic anhydride, (62) methylsuccinic anhydride, (63) acetylmercaptosuccinic anhydride, (64) 2,2-dimethylsuccinic anhydride, (65) phenylsuccinic anhydride, (66) 2-octen-1-ylsuccinic anhydride, (67) 2-dodecen-1-ylsuccinic anhydride, (68) 2-octadecen-1-ylsuccinic anhydride, (69) 3-oxabicyclo [3.1.0] hexane-2,4-dione, (70) diglycolic anhydride, (71) glutaric anhydride, (72) 3-methylglutaric anhydride, (73) 2,2-dimethylglutaric anhydride, (74) 3,3-tetramethyleneglutaric anhydride, (75) 1-cyclopentene-1,2-dicarboxylic anhydride, (76) 3,4,5,6-tetrahydrophthalic anhydride, (77) cis-1,2-cyclohexanedicarboxylic anhydride, (78) hexahydro-4-methylphthalic anhydride, (79) methyl-5-norbornene-2,3-dicarboxylic anhydride, (80) 2,3-pyridinecarboxylic anhydride, (81) 3,4-pyridinecarboxylic anhydride, (82) furfurylmercaptan, (83) S-furfurylthioacetate, (84) furfurylsulfide, (85) furfurylmethyldisulfide, (86) furfuryldisulfide, (87) glycolaldehyde dimer, (88) 6,7-dihydrocyclopenta-1,3-dioxin-5(4H)-one, (89) (2R,6R)-tert-butyl-6-methyl-1,3-dioxan-4-one, (90) 2,2-dimethyl-1,3-dioxane-4,6-dione, (91) 3,6-dimethyl-1,4-dioxane-2,5-dione, (92) 2,2,6-trimethyl-4H-1,3-dioxin-4-one, (93) 2,2,5-trimethyl-1,3-dioxane-4,6-dione, (94) 5-bromo-2,2,5-trimethyl-1,3-dioxane-4,6-dione, (95) 1,3-dioxane-5,5-dimethanol, (96) 1,3,5-trioxane, (97) 1,6-dioxaspiro [4.4]nonane-2,7-dione, (98) 1,4-dioxaspiro [4.5]decan-2-one, (99) 1,7-dioxaspiro [5.5]undecane, (100) 2,4,8,10-tetraoxaspiro[5.5]undecane, (101) 3,9-divinyl-2,4,8-tetraoxaspiro[5.5]undecane, (102) 2,2-pentamethylene-1,3-dioxalane, (103) 2-phenyl-1,3-dioxalane, (104) 1,4-cyclohexanedione monoethylene ketal, (105) 1,4-cyclohexanedione bis(ethylene ketal), (106) 1,4-cyclohexanedione mono-2,2-dimethyl trimethylene ketal, (107) piperonal, (108) piperonyl acetate, (109) piperonyl alcohol, (110) piperonylnitrile, (111) piperonyl amine, (112) 6-nitropiperonal, (113) 6-nitropiperonyl alcohol, (114) 3',4'-(meth-

ylenedioxy)acetophenone, (115) 3,4-(methylenedioxy)aniline, (116) 2,3-(methylenedioxy)benzaldehyde, (117) 3,4-(methylenedioxy)phenylacetonitrile, (118) 3,4-(methylenedioxy)toluene, and (119) mixtures thereof; or wherein the transparentizing agent is a crown ether; or wherein the transparentizing agent is selected from the group consisting of (1) 1,4,7,10-tetraoxacyclododecane (12-crown-4), (2) 2-(hydroxyethyl)-12-crown-4, (3) 2-(aminoethyl)-12-crown-4, (4) benzo-12-crown-4, (5) 1,4,7,10,13-pentaoxacyclododecane (15-crown-5), (6) 2-(hydroxyethyl)-15-crown-5, (7) 2-(aminoethyl)-15-crown-5, (8) benzo-15-crown-5, (9) 4'-aminobenzo-15-crown-5, (10) 4'-formylbenzo-15-crown-5, (11) 4'-nitrobenzo-15-crown-5, (12) bis [(benzo-15-crown-5)-15-ylmethyl] pimelate, (13) 1,4,7,10,13,16-hexaoxacyclooctadecane (18-crown-6), (14) 2-(aminoethyl)-18 crown-6, (15) benzo-18 crown-6, (16) 4'-bromobenzo-18-crown-6, (17) dibenzo-18-crown-6, (18) di-tert-butyldibenzo-18-crown-6, (19) cis-dicydohexane-18 crown-6, (20) dibenzo-24-crown-8, (21) dicyclohexano-24-crown-8, (22) dibenzo-30-crown-10, and (23) mixtures thereof; or wherein the transparentizing agent is a cyclic hydrocarbon; or wherein the transparentizing agent is selected from the group consisting of: (A) materials of the general formulae:

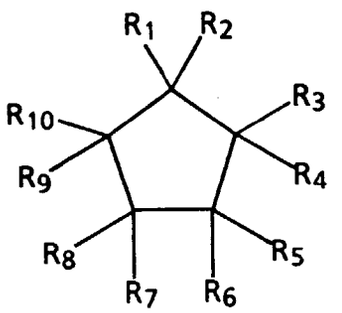


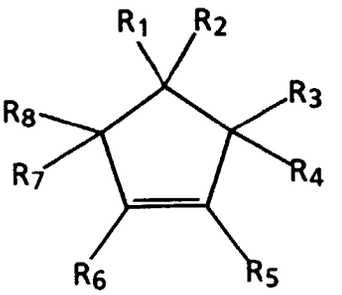


wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, and R_{12} each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, and R_{12} can be joined together to form a ring; (B) materials of the general formula:

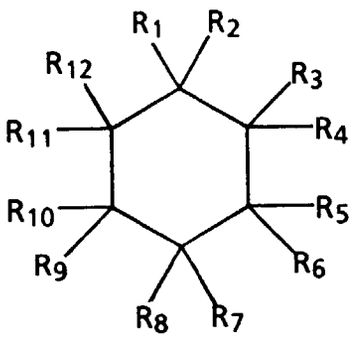


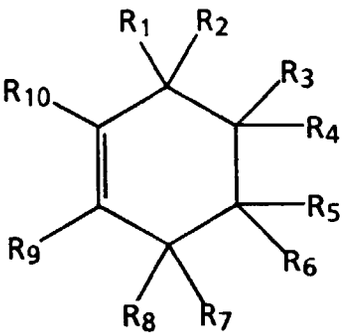
wherein R_1, R_2, R_3, R_4, R_5, and R_6 each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, R_4, R_5, and R_6 can be joined together to form a ring; (C) materials of the general formula:

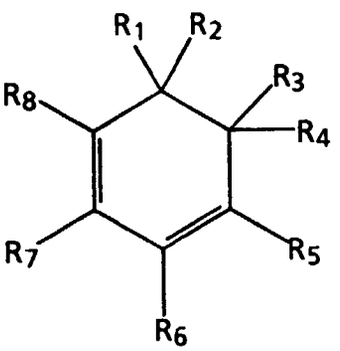


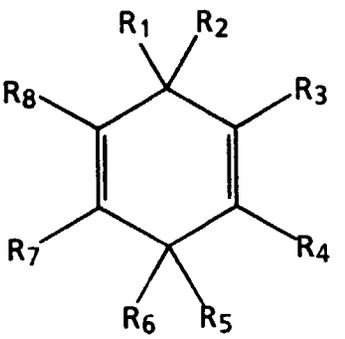


wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, and R_{10} each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, and R_{10} can be joined together to form a ring; (D) materials of the general formulae:



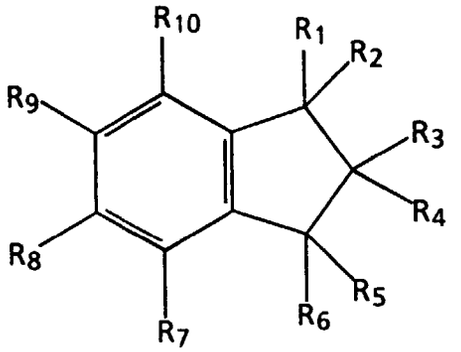




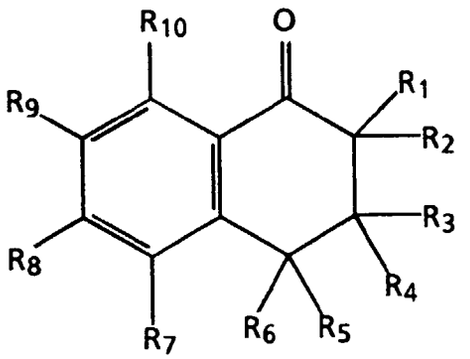


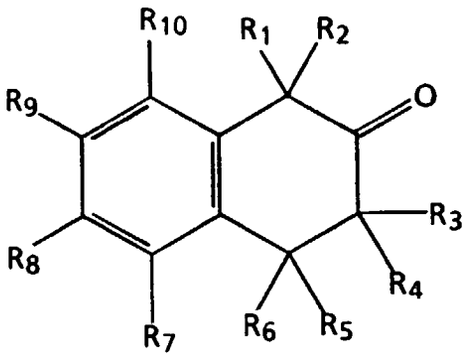
wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, and R_{12} each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, and R_{12} can be joined

together to form a ring; (E) materials of the general formula:

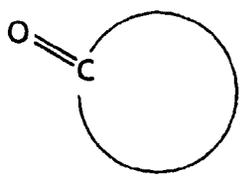


wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, and R_{10} each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, and R_{10} can be joined together to form a ring; (F) materials of the general formulae:



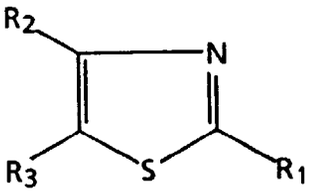


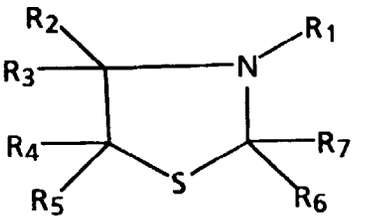
wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, and R_{10} each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, and R_{10} can be joined together to form a ring; (G) materials of the general formula:

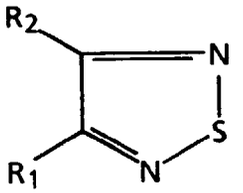


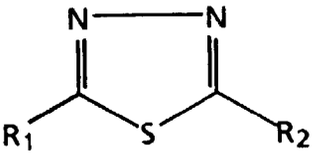
wherein the curved portion of the structure represents a hydrocarbon chain or a substituted hydrocarbon chain, wherein two or more substituents can be joined together to form a ring; and (H) mixtures thereof; or wherein the transparentizing agent is selected from the group consisting of (1) norbornane, (2) 2-norbornane carbonitrile, (3) 2-norbornane methanol, (4) 3-methyl-2-norbornane methanol, (5) camphene, (6) fenchyl alcohol, (7) thiocamphor, (8) norbornene, (9) 5-norbornene-2-carbonitrile, (10) 5-norbornene-2-carboxaldehyde, (11) 5-norbornene-2-methanol, (12) 5-norbornene-2,2-dimethanol, (13) 5-norbornene-2-benzoyl, (14) 2-norbornanone, (15) 3-chloro-2-norbornanone, (16) fenchone, (17) 3-(trifluoroacetyl)camphor, (18) 3-heptafluorobutyryl camphor, (19) 3-bromocamphor, (20) 9,10-dibromocamphor, (21) 3,9,10-tribromocamphor, (22) dicyclopentadiene, (23) methylcyclopentadiene dimer, (24) tricyclo[5.2.1]decane, (25) 4,8-bis(hydroxymethyl)tricyclo[5.2.1.$0^{2.6}$]decane, (26) 8-ketotricydo [5.2.1.$0^{2.6}$]decane, (27) 3,4-dimethoxy-3-cyclobutene-1,2-dione, (28) 3,4-diethoxy-3-cyclobutene-1,2-dione, (29) 3,4-diisopropoxy-3-cyclobutene-1,2-dione, (30) 3,4-dibutoxy-3-cyclobutene-1,2-dione, (31) 3-methyl-2-(nitromethyl)-5-oxocyclopentaneacetic acid, (32) 3-ethyl-2-hydroxy-2-cyclopenten-1-one, (33) methyl-4-methoxy-2-oxo-3-cyclopentene-1-carboxylate, (34) 3,3a,6,6a-tetrahydro-2H-cyclopenta[b]furan-2-one, (35) 3a,4,5,6a-hexahydro-5-hydroxy-4(hydroxymethyl)-2H-cydopenta[b]furan-2-one, (36) 3-methyl-1,2-cyclopentanedione, (37) 4-hydroxy-5-methyl-4-cyclopentene-1,3-dione monohydrate, (38) 2,4,4-trimethylcyclohexen-1-one, (39) ethyl-6-methyl-2-oxo-3-cyclohexene-1-carboxylate, (40) ethyl 4-hydroxy-6-methyl-2-oxo-3-cyclohexene-1-carboxylate, (41) 5-(1-acetoxy-1-methylethyl)-2-methyl-2-cyclohexen-1-one, (42) thymoquinone, (43) 2,6,6-trimethyl-2-cyclohexene-1,4-dione, (44) indan, (45) 1-indanol, (46) 2-indanol, (47) 1-indanone, (48) 2-indanone, (49) 2-acetyl-1-tetralone, (50) 4-methyl-1-tetralone, 513) 5,7-dimethyl-1-tetralone, (52) 6,7-dimethoxy-1-tetralone, (53) 1-methyl-2-tetralone, (54) 6,7-dimethoxy-2-tetralone, (55) cyclohexanone, (56) cycloheptanone, (57) cyclooctanone, (58) cyclononanone, (59) cyclodecanone, (60) cycloundecanone, (61) cyclododecanone, (62) cyclotridecanone, (63) cyclopentadecanone, (64) 2-acetylcyclohexanone, (65) 2-allylcyclohexanone, (66) 2-phenylcyclohexanone, (67) cyclohexanedione, (68) 2-acetyl-1,3-cyclohexanedione, (69) 4,4-dimethyl-1,3-cyclohexanedione, (70) 2-acetyl-1,3-cyclopentanedione, (71) 3,3,5,5-tetramethyl-1,2-cyclopentanedione, (72) bicyclo[3.2.1]octan-2-one, (73) endo-dimethyl 7-oxabicydo[2.2.1]heptane-2,3-dicarboxylate, (74) cineole, (75) bicyclo[2.2.2]oct-5-ene-2,3-dimethanol, (76) tropone, (77) tropolone, (78) cyclooctene oxide, (79) 1,2,5,6-diepoxycyclooctane, (80) 9-methyl-$\Delta^{5(10)}$-octalin-1,6-dione, (81) cis-bicyclo[3.3.0]octane-3.7-dione, (82) azulene, (83) 1-benzosuberone, (84) 1,5,9-cyclododecatriene, (85) cyclododecane epoxide, (86) 2,3-cyclododeceno pyridine, (87) 1,2,5,6,9,10-hexabromo cyclododecane, (88) 8-cyclohexadecen-1-one, (89) bicyclo[10.3.0]pentadec-12(1)-en-13-one, (90) 1,4,4a,8a-tetrahydro-endo-1,4-methanonaphthalene-5,8-dione, and (19) mixtures thereof; or wherein the transparentizing agent is a thiourea; or wherein the transparentizing agent is a sulfone; or wherein the transparentizing agent is a thiocyclic compound; or wherein the transparentizing agent is selected from the group consisting of sulfites, sulfite derivatives, sulfides, sulfide derivatives, quaternary sulfur compounds, quaternary sulfur derivatives, and mixtures thereof; or wherein the transparentizing agent is a thia-aza-cyclic compound; or wherein the transparentizing agent is selected from the group consisting of (1) 1-allyl-2-thioure, (2) 1-methallyl-3-methyl-2-thiourea, (3) 4-allyl-3-thiosemicarbazide, (4) 1,3-diethyl-2-thiourea, (5) 1,3-dibutyl-2-thiourea, (6) 1-benzyl-3-methyl-2-thiourea, (7) 1,1,3,3-tetramethyl-2-thiourea, (8) 2-imino-4-thiobiuret, (9) 1-allyl-3-(2-hydroxyethyl)-2-thiourea, (10) S-(2-aminoethyl)isothiouronium bromide hydrobromide, (11) S,S-diphenylsulfillimine monohydrate, (12) methylsulfon), (13) ethylsulfone, (14) butylsulfone, (15) butadiene sulfone, (16) tetramethylene sulfone, (17) 1,4-butane sulfone, (18) 1,4-butanediolcyclic sulfate, (19) benzylsulfone, (20) phenylsulfone, (21) phenylvinylsulfone, (22) phenylstyrenesulfone, (23) phenyl-2-(trimethylsilyl)methyl sulfone, (24) phenyl 2-(trimethylsilyl)ethyl sulfone, (25) phenyl 2-(trimethylsilyl) ethynyl sulfone, (26) 4-(fluorophenyl)sulfone, (27) 4-(fluorophenyl)methyl sulfone, (28) chloromethylphenyl sulfone, (29) chloromethyl-p-tolyl sulfone, (30) 2-chloroethylphenyl sulfone, (31) methylthiomethylphenyl sulfone, (32) methylthiomethyl-p-tolyl sulfone, (33) 2-(phenylsulfonyl) tetrahydropyran, (34) 1-(phenylsulfonyl)indole, (35) 1-(p-toluenesulfonyl)imidazole, (36) 1-(p-tosyl)-3,4,4-trimethyl imidazolidine, (37) 4-(p-tosylsulfonyl)hexahydro -1,4-thiazepine, (38) thionaphthene, (39) 4-keto-4,5,6,7-tetrahydrothianaphthene, (40) 2,2'-bithiophene, (41) 2,2':S',2"-terthiophene, (42) N-acetylhomocysteine thiolactone, (43) tetrahydrothiopyran-4-one, (44) thiochroman-4-one, (45) thiochroman-4-ol, (46) thioctic acid, (47) ethyl 1,3-dithiolane-2-carboxylate, (48) 3H-1,2-benzodithiol-3-one, (49) 1,3-dithiane, (50) 2-phenyl-1,3-dithiane, (51) ethyl-1,3-dithiane-2-carboxylate, (52) 5,6-dihydro-5-methyl-4H-1,3,5-dithiazine, (53) 1,4-dithiane, (54) 2,5-dihydroxy-2,5-dimethyl-1,4-dithiane, (55) 1,5-dithiacydooactan-3-ol, (56) 1,4-dithiaspiro [45] decan-8-ol, (57) 1,3,5-trithiane, (58) 1,4,7-trithiacyclononane, (59) 1,4,7-trithiacyclodecane, (60) 1,4,7,10-tetrathiacydododecane, (61) 3,6,9,14-tetrathiabicyclo [9.2.1] tetradeca-11,13-diene, (62) 1,4,8,1-tetrathiacydotetradecane, (63) 1,5,9,13-tetrathiocyclohexadecane, (64) 1,5,9,13-tetrathiacyclohexadecane-3,11-diol, (65) 1,4,7,10,13-pentathiacyclopentadecane, (66) 1,4,7,10,13,16-hexathiacyclooctadecane, (67) 1,5,9,13,17,21-hexathiacydotetracosane-3,11,19-triol, (68) 1,4,7,10,13,16,19,22-octathiacyclotetracosane, (69) 1,4,8,11,15,18,22,25-octathiacyclooctacosane, (70) 1,4,7,10,13,16,19,22,25-nonathiacycloheptacosane, (71) dimethylsulfite, (72) diethylsulfite, (73) sodium sulfite, (74) allyldisulfide, (75) aminophenyldisulfide, (76) benzyldisulfide, (77) benzylphenylsulfide, (78) trimethylsulfonium methylsulfate, (79) (2-chloroethyl)dimethylsulfonium io-

dide, (80) 3-(chloropropylldiphenylsulfonium tetrafluoroborate, (81) trimethyl sulfonium iodide, (82) trimethyl sulfoxonium iodide, (83) trimethyl sulfoxonium chloride, (84) triphenyl methane sulfenyl chloride, (85) dimethyl (2-methoxy-5-nitrobenzyl) sulfonium bromide, (86) thionin perchlorate, (87) p-xylylene bis(tetrahydrothiopheneum chloride), (88) tris (dimethyl amino) sulfonium difluorotrimethyl silicate, (89) tris (dimethyl amino) sulfonium trifluoromethoxide, (90) (3-amino-3-carboxypropyl) dimethyl sulfonium chloride, and (91) mixtures thereof; or wherein the transparentizing agent is of one of the general formulae:









wherein R_1, R_2, R_3, R_4, R_5, R_6, and R_7 each, independently of the others, are selected from the group consisting of hydrogen atoms, alkyl groups, substituted alkyl groups, aryl groups, substituted aryl groups, arylalkyl groups, substituted arylalkyl groups, hydroxy groups, amine groups, imine groups, ammonium groups, pyridine groups, pyridinium groups, ether groups, aldehyde groups, ketone groups, ester groups, amide groups, carboxylic acid groups, carbonyl groups, thiocarbonyl groups, sulfate groups, sulfonate groups, sulfide groups, sulfoxide groups, phosphine groups, phosphonium groups, phosphate groups, cyano groups, nitrile groups, mercapto groups, nitroso groups, halogen atoms, nitro groups, sulfone groups, acyl groups, acid anhydride groups, and azide groups, wherein two or more of R_1, R_2, R_3, R_4, R_5, R_6, and R_7 can be joined together to form a ring; or wherein the transparentizing agent is selected from the group consisting of (1) 2-amino-2-thiazoline, (2) 2-amino thiazole, (3) 2-amino-4-methylthiazole, (4) 2-amino-4-methylthiazole, (5) 2-amino-4-thiazoleacetic acid, (6) 2-acetamido-4-methylthiazole, (7) 2-acetylthiazole, (8) 5-acetyl-2,4-dimethylthiazole, (9) 4-methyl-5-vinylthiazole, (10) 2-amino-4-phenyl-5-tetradecylthiazole, (11) 2,4-thiazolidine dione, (12) 3-aminorhodanine, (13) 3-methylrhodanine, (14) 3-ethylrhodanine, (15) 3-allylrhodanine, (16) 3-hydroxy-4-methyl-2(3H)-thiazolethione, (17) benzothiazole, (18) 2-methyl benzothiazole, (19) 2-(methylthio)benzothiazole, (20) 2-amino-4-methylbenzothiazole, (21) 3-methylbenzothiazole-2-thione, (22) 2,1,3-benzothiadiazole, (23) 4-amino-2,1,3-benzothiadiazole, (24) 3,4-dimethyl-5-(2-hydroxyethyl) thiazolium iodide, (25) 3-ethyl-5-(2-hydroxyethyl)4-methylthiazolium bromide, (26) 2-amino-5-nitrothiazole, (27) 2-amino-α-(methoxyimino)-4-thiazole acetic acid, (28) ethyl 2-amino-α-(hydroxyimino)-4-thiazole acetate, (29) ethyl 2-amino-a-(methoxyimino)-4-thiazole acetate, (30) ethyl 2-amino-4-thiazole acetate, (31) ethyl 2-amino-4-thiazole glyoxylate, (32) 1-phenyl-3-(2-thiazolyl)-2-thiourea, (33) 2-amino-4-methoxy benzothiazole, (34) 2-amino-5,6-dimethylbenzothiazole, (35) N'-(2-thiazolyl) sulfanilamide, 6-ethoxy-2-benzothiazole sulfonamide, (37) ethyl-2-(formylamino)-4-thiazoleacetate, (38) ethyl-2-(formylaminol-4-thiazoleglyoxylate, (39) 2-(formylamino)-α-(methoxyimino)-4-thiazole acetic acid, (40) 2-acetamido-4-methyl-5-thiazole sulfonyl chloride, (41) 2-thioxo-4-thiazolidine carboxylic acid, (42) thiazolidine-4-carboxylic acid, (43) pseudothiohydantoin, (44) 2-amino-1,3,4-thiadiazole, (45) 2-amino-5-trifluoromethyl-1,3,4-thiadiazole, (46) 2-amno-5-methyl-1,3,4-thiadiazole, (47) 2-amino-5-ethyl-1,3,4-thiadiazole, (48) 2-amino-5-(ethylthio)-1,3,4-thiadiazole, (49) 5-amino-1,3,4-thiadiazole-2-thiol, (50) 2-acetamido-5-benzyl thio-1,3,4-thiadiazole, (51) 5-acetamido-1,3,4-thiadiazole-2-sulfonamide, (52) 5-anilino-1,2,3,4-thiatriazole, (53) 2-amino-4,5-dimethyl thiazole hydrochloride, (54) 2-amino 4-imino-2-thiazoline hydrochloride, (55) 2-amino-2-thiazoline hydrochloride, (56) 2-amino-5-bromothiazole monohydrobromide, (57) 5-amino-3-methyl isothiazole hydrochloride, (58) 3-methyl-2-benzothiazolinone hydrazone hydrochloride hydrate, (59) 5-amino-2-methyl benzothiazole dihydrochloride, (60) 2,4-diamino-5-phenyl thiazole monohydrobromide, (61) 2-amino-4-phenyl thiazole hydrobromide monohydrate, (62) 2-(tritylamino)-α-(methoxyiminol-4-thiazole acetic acid hydrochloride, (63) (2,3,5,6-tetrahydro-6-phenylimidazo [2,1-b] thiazole hydrochloride, (64) 3-ethyl-2-methyl-2-thiazolium iodide, (65) 3-benzyl-5-(2-hydroxyethyl)-4-methyl thiazolium chloride, (66) thiamine hydrochloride, (67) 3-(carboxymethyl)

benzothiazolium bromide, (68) 2-azido-3-ethyl benzothiazolium tetrafluoroborate, (69) 3-ethyl-2-methyl benzothiazolium iodide, (70) 2-methyl-3-propyl benzothiazolium iodide, (71) 3-ethyl-2-(2-hydroxy-1-propenyl) benzothiazolium chloride, (72) 3,6-dimethyl-2-(4-dimethyl aminophenyl) benzothiazolium bromide, (73) trifluoroperazine dihydrochloride, (74) thioridazine hydrochloride, (75) promethazine hydrochloride, (76) ethopropazine hydrochloride, (77) chlorpromazine hydrochloride, and (78) mixtures thereof; or wherein the transparentizing agent is selected from the group consisting of phosphines, phosphites, cyclic phosphorus compounds, phosphine oxides, quaternary phosphonium salts, and mixtures thereof; or wherein the transparentizing agent is selected from the group consisting of (1) triphenylphosphine, (2) tri-m-tolyl phosphine, (3) tris(3-methoxyphenyl)phosphine, (4) tris(4-chlorophenyl)phosphine, (5) tris(pentafluorophenyl)phosphine, (6) tricyclohexylphosphine, (7) tribenzylphosphine, (8) tri-2-furylphosphine, (9) bis (pyrrolidino)methoxy phosphone, (10) tetraphenylbiphosphine, (11) 1,3-bis(diphenylphosphino)propane, (12) 1,5-bis(diphenylphosphino)pentane, (13) 1,6-bis(diphenylphosphino)hexane, (14) isopropyl diphenyl phosphine, (15) diphenyl (p-tolyl) phosphine, (16) (4-bromophenyl) diphenyl phosphine, (17) diphenyl-2-pyridylphosphine, (18) dicyclohexylphenyl phosphine, (19) trimethyl phosphite, (20) triethyl phosphite, (21) tris (2-chloroethyl) phosphite, (22) tributyl phosphite, (23) triphenyl phosphite, (24) trimethyl phosphite copper iodide, (25) triethyl phosphite copper iodide, (26) dipropyl phosphite, (27) bis(2-ethylhexyl) phosphite, (28) bis(4-nitrobenzyl) phosphite, (29) 2,2'-ethylidene bis(4,6-di-tert-butylphenyl) fluorophosphite, (30) pentaerythritol diphenyl diphosphite, (31) 2-furyltetramethyl phosphorodiamidate, (32) diethyl(pyrrolidinomethyl)phosphonate, (33) cyclophosphamide monohydrate, (34) 2-chloro-1,3,2-dioxaphospholane-2-oxide, (35) N,N-diethyl-1,5-dihydro-2,4,3-benzodioxaphosphepin-3-amine, (36) 1,2-phenylene phosphochloridite, (37) 1,2-phenylene phosphochloridate, (38) 2-chloro-4H-1,3,2-benzodioxaphosphorin-4-one, (39) 2,4-bis(methylthio)-1,3-dithia-2,4-diphosphetane-2,4-disulfide, (40) triphenyl phosphine oxide, (41) tris(hydroxymethyl) phosphine oxide, (42) trimethoxy phosphine oxide, (43) triethoxy phosphine oxide, (44) triphenoxy phosphine oxide), (45) tris (2-butoxy ethoxy) phosphine oxide, (46) diphenyl phosphine oxide, (47) diphenyl (2,4,6-trimethylbenzoyl) phosphine oxide, (48) phenyl phosphinic acid, (49) diphenyl phosphate, (50) vinyl phosphonic acid, (51) propyl phosphonic acid, (52) pyrophosphoric acid, (53) triphenylphosphate, (54) tetrabutylphosphonium chloride, (55) tetrabutylphosphonium bromide, (56) hexadecyltributylphosphonium bromide, (57) stearyltributylphosphonium bromide, (58) azidotris(diethylamino)phosphonium bromide, (59) phosphonitrilic chloride trimer, (60) tetramethyl phosphonium bromide, (61) tetramethyl phosphonium chloride, (62) tetraethyl phosphonium bromide, (63) tetraethyl phosphonium chloride, (64) tetraethyl phosphonium iodide, (65) tetraphenyl phosphonium bromide, (66) tetraphenyl phosphonium chloride, (67) tetraphenyl phosphonium Iodide, (68) methyl triphenyl phosphonium bromide, (69) methyl triphenyl phosphonium iodide, (70) ethyl triphenyl phosphonium bromide, (71) n-propyl triphenyl phosphonium bromide, (72) isopropyl triphenyl phosphonium iodide, (73) cyclopropyl triphenyl phosphonium bromide, (74) n-butyl triphenyl phosphonium bromide, (75) isobutyl triphenyl phosphonium bromide, (76) hexyl triphenyl phosphonium bromide, (77) benzyl triphenyl phosphonium chloride, (78) bromomethyl triphenyl phosphonium bromide, (79) chloromethyl triphenyl phosphonium chloride, (80) 3-bromopropyl triphenyl phosphonium bromide, (81) 3-bromobutyl triphenyl phosphonium bromide, (82) 4-bromobutyl triphenyl phosphonium bromide, (83) 2-dimethyl aminoethyl triphenyl phosphonium bromide, (84) [(3-dimethyl amino) propyl] triphenyl phosphonium bromide, (85) 2-hydroxyethyl triphenyl phosphonium bromide, (86) (2-hydroxyethyl) triphenyl phosphonium chloride, (87) [3-hydroxy-2-methyl propyl] triphenyl phosphonium bromide, (88) [3-hydroxy-2-methyl propyl] triphenyl phosphonium bromide, (89) (2-hydroxybenzyl triphenyl phosphonium bromide, (90) (formyl methyl) triphenyl phosphonium chloride, (91) (methoxymethyl) triphenyl phosphonium chloride, (92) acetonyl triphenyl phosphonium chloride, (93) carbomethoxymethyl triphenyl phosphonium bromide, (94) (ethoxy carbonyl methyl) triphenyl phosphonium chloride, (95) carbethoxymethyl triphenyl phosphonium bromide, (96) (tert-butoxy carbonyl methyl) triphenyl phosphonium bromide, (97) phenacyl triphenyl phosphonium bromide, (98) (4-ethoxybenzyl) triphenyl phosphonium bromide, (99) 4-butoxybenzyl triphenyl phosphonium bromide, (100) 2-(1,3-dioxan-2-yl) ethyl] triphenyl phosphonium bromide, (101) (1,3-dioxolan-2-ylmethyl) triphenyl phosphonium bromide, (102) vinyl triphenyl phosphonium bromide, (103) allyl triphenyl phosphonium bromide, (104) allyl triphenyl phosphonium chloride, (105) propargyl triphenyl phosphonium bromide, (106) (3-trimethyl silyl-2-propynyl) triphenyl phosphonium bromide, (107) p-xylylene bis (triphenyl phosphonium bromide), and (108) mixtures thereof; or wherein the transparentizing agent is a nitrile; or wherein the transparentizing agent is selected from the group consisting of (1) cyanoacetohydrazide, (2) 4,4-dimethyl-3-oxopentanenitrile, (3) 1-cyano-N-methylthioformamide, (4) cyanomethyl N,N-dimethyl dithiocarbamate, (5) 4-hydroxy-3-methoxy-phenyl acetonitrile, (6) tosyl cyanide, (7) tosylmethyl isocyanide, (8) 5-fluoro-2-methyl benzonitrile, (9) 2-fluoro-5-methyl benzonitrile, (10) 4-(methylthio) benzonitrile, (11) 4-(dimethylamino) benzonitrile, (12) 3,4-dimethoxy benzonitrile, (13) 4-hydroxy-3-methoxy benzonitrile, (14) 4-(trans-4-pentyl cyclohexyl)benzonitrile, (15) 4'-pentyl-4'-biphenyl carbonitrile, (16) 4'-(pentyloxy)-4-biphenylcarbonitrile, (17) 4'-hexyl-4-biphenyl carbonitrile, (18) 4'-(hexyloxy)-4-biphenyl carbonitrile, (19) 4'-heptyl-4-biphenyl carbonitrile, (20) 4'-heptyloxy-4-biphenyl carbonitrile, (21) 4'-octyl-4-biphenyl carbonitrile, (22) 4'-(octyloxy)-4-biphenyl carbonitrile, (23) succinonitrile, (24) fumaronitrile, (25) 1,4-dicyano-2-butene, (26) (dimethyl aminomethylene)malononitrile, (27) (1-ethoxyethylidene)malononitrile, (28) α-

chlorobenzylidenemalononitrile, (29) benzylidenemalononitrile, (30) 2-benzoyloxy-2-phenyl malononitrile, (31) O-(p-tosyl)isonitrosomalononitrile, (32) tetrafluorophthalonitrile, (33) iminodiacetonitrile, (34) phenylene diacetonitrile, (35) 3,3'-(4-formyl phenylimino) dipropionitrile, (36) tris (2-cyanoethyl) nitromethane, (37) 1,1,3,3-propanetetracarbonitrile, (38) tetracyanoethylene oxide, and (39) mixtures thereof; or wherein the transparentizing agent is selected from the group consisting of isothiocyanates, isocyanates, and mixtures thereof; or wherein the transparentizing agent is selected from the group consisting of (1) 4-azidophenyl isothiocyanate, (2) 1-naphthyl isothiocyanate, (3) 4-dimethyl amino-1-naphthyl isothiocyanate, (4) 1-isothiocyanato-4-(trans-4-propyl cyclohexyl) benzene, (5) 1-(trans-4-hexyl cyclohexyl)-4-isothiocyanato benzene, (6) 1-(4-trans-hexyl cyclohexyl)-4-[2-(4-isothio cyanatophenyl)] benzene, (7) 1-isothiocyanato-4-(trans-4-octylcyclohexyl) benzene, (8) 4-isothiocyanatophenyl-4-pentabicyclo [2.2.2] octane-1-carboxylate, (9) benzylthiocyanate, (10) guanidinethiocyanate, (11) methylene dithiocyanate, (12) 4,4'-methylene bis (phenyl isocyanate), (13) 4,4'-methylene bis (2,6-diethyl isocyanate), and (14) mixtures thereof; or wherein the transparentizing agent is selected from the group consisting of oxime compound, hydroxamic acid compounds, and mixtures thereof; or wherein the transparentizing agent is selected from the group consisting of (1) formamidoxime (2) acetaldoxime, (3) pyruvic aldehyde-1-oxime, (4) acetone oxime, (5) ethylchlorooximido acetate, (6) 2,3-butane dione monoxime, (7) 5-hydroxy pentenal oxime, (8) cyclopentanone oxime, (9) cyclohexanone oxime, (10) cyclooctanone oxime, (11) benzaldehyde oxime, (12) 2-nitrobenzaldehyde oxime, (13) salicyl aldoxime, (14) 2-isonitroso acetphenone, (15) 1-phenyl-1,2-propanedione 2-oxime, (16) 2-pyridine aldoxime, (17) nifuroxime, and (18) mixtures thereof; or wherein the transparentizing agent is a hydroxamic acid derivative; or wherein the transparentizing agent is selected from the group consisting of (1) acetohydroxamic acid, (2) suberohydroxamic acid, (3) mandelohydroxamic acid, (4) benzohydroxamic acid, (5) N-phenylbenzohydroxamic acid, and (6) mixtures thereof; or wherein the transparentizing agent is selected from the group consisting of alkyl ammonium salts, aryl ammonium salts, arylalkyl ammonium salts, and mixtures thereof; or wherein the transparentizing agent is selected from the group consisting of (1) tetramethylammonium fluoride tetrahydrate, (2) tetraethylammonium acetate tetrahydrate, (3) tetrabutylammonium chloride, (4) tetrabutylammonium chloride hydrate, (5) tetrabutylammonium bromide, (6) tetrabutylammonium tribromide, (7) tetrabutylammonium acetate, (8) tetrabutylammonium thiocyanate, (9) tetrapentylammonium bromide, (10) tetrahexylammonium bromide, (11) tetrahexylammonium chloride, (12) tetrahexylammonium hydrogensulfate, (13) tetraheptylammonium chloride, (14) tetraheptylammonium bromide, (15) tetraoctylammonium bromide, (16) tetrakisdecylammonium bromide, (17) tetrahexadecylammonium bromide, (18) tetramethyl ammonium bromide, (19) tetramethyl ammonium chloride, (20) tetramethyl ammonium iodide, (21) tetraethyl ammonium bromide, (22) tetraethyl ammonium chloride, (23) tetraethyl ammonium iodide, (24) tetrapropyl ammonium bromide, (25) tetrapropyl ammonium iodide, (26) tetrabutyl ammonium iodide, (27) tetrapentyl ammonium chloride, (28) tetrahexyl ammonium bromide, (29) tetrahexyl ammonium iodide, (30) tetradecyl ammonium bromide, (31) tetradodecyl ammonium bromide, (32) tetraoctadecyl ammonium bromide, (33) methyltrioctylammonium bromide, (34) tridodecylmethylammonium chloride, (35) tridodeylmethylammonium iodide, (36) N-dodecyl-N-methylephedrinium bromide, (37) phenyltrimethylammonium tribromide, (38) tricapryl methyl ammonium chloride, (39) tridodecyl methyl ammonium chloride, (40) tridecyloxypropyl dihydroxy ethyl methyl ammonium chloride, (41) N-tetradecyl dimethyl-naphthyl methyl ammonium chloride, (42) octadecyl diethanol methyl ammonium chloride, (43) octadecyl dihydroxyethyl methyl ammonium chloride, (44) dihydrogenated tallow benzyl methyl ammonium chloride, (45) 2-aminoethyl trimethyl ammonium chloride hydrochloride, (46) 2-bromoethyl trimethyl ammonium bromide, (47) 2-chloroethyl trimethyl ammonium chloride, (48) 3-carboxypropyl trimethyl ammonium chloride, (49) [3-(methacryloyl amino) propyl] trimethyl ammonium chloride, (50) phenyl trimethyl ammonium bromide, (51) phenyl trimethyl ammonium chloride, (52) phenyl trimethyl ammonium iodide, (53) benzyl trimethyl ammonium chloride, (54) benzyl trimethyl ammonium bromide, (55) 4-nitrobenzyl trimethyl ammonium chloride, (56) [2-(4-nitrophenyl) allyl] trimethyl ammonium iodide, (57) coco trimethyl ammonium chloride, (58) palmityl trimethyl ammonium chloride, (59) myristyl trimethyl ammonium bromide, (60) oleyl trimethyl ammonium chloride, (61) soya trimethyl ammonium chloride, (62) tallow trimethyl ammonium chloride, (63) hydrogenated tallow trimethyl ammonium chloride, (64) stearyl trimethyl ammonium chloride, (365) behenyl trimethyl ammonium chloride, (66) guar hydroxypropyl trimethyl ammonium chloride, (67) benzyl triethyl ammonium bromide, (68) butyl tripropyl ammonium bromide, (69) methyl tributyl ammonium chloride, (70) methyl tributyl ammonium bromide, (71) methyl tributyl ammonium iodide, (72) benzyl tributyl ammonium chloride, (73) benzyl tributyl ammonium bromide, (74) benzyl tributyl ammonium iodide, (75) heptyl tributyl ammonium bromide, (76) benzyldodecyldimethylammonium bromide, (77) benzyltetradecyldimethylammonium chloride dihydrate, (78) benzylcetyldimethylammonium chloride monohydrate, (79) benzylstearyldimethylammonium chloride monohydrate, (80) N,N-dimethyl methylene ammonium chloride, (81) N,N-dimethyl methylene ammonium iodide, (82) chloromethylene dimethyl ammonium chloride, (83) dichloromethylene dimethyl ammonium chloride, (84) dimethyl amino methylene amino methylene dimethyl ammonium chloride, (85) benzethonium chloride, (86) methyl benzethoniumchloride, (87) 1-propanaminium 2,3-dihydroxy-N-dimethyl-N-[3(oxococoyl) amino]propyl]-chloride, (88) cetyl dimethyl ethyl ammonium bromide, (89) octyl dodecyl dimethyl ammonium chloride, (90) dodecyl (2-hydroxy-

1-methyl-2-phenyl-ethyl) dimethyl ammonium bromide, (91) dodecyl dimethyl 2-phenoxyethyl ammonium bromide, (92) dodecanoyl-N-methylamino ethyl-(phenyl carbamyl methyl) dimethyl ammonium chloride, (93) 3-chloro-2-hydroxypropyl N,N,N-dimethyl dodecyl ammonium chloride, (94) 3-chloro-2-hydroxypropyl N,N,N-dimethyl octadecyl ammonium chloride, (95) dodecyl benzyl dimethyl ammonium bromide, (96) dodecyl benzyl dimethyl ammonium chloride, (97) coco benzyl dimethyl ammonium chloride, (98) benzyl tetradecyl dimethyl ammonium chloride, (99) benzyl cetyl dimethyl ammonium chloride, (100) benzyl octadecyl dimethyl ammonium chloride, (101) benzyl tallow dimethyl ammonium chloride, (102) benzyl hydrogenated tallow dimethyl ammonium chloride, (103) benzyl behenyl dimethyl ammonium chloride, (104) dioctyl dimethyl ammonium chloride, (105) didecyl dimethyl ammonium chloride, (106) didecyl dimethyl ammonium bromide, (107) dicoco dimethyl ammonium chloride, (108) dicetyl dimethyl ammonium chloride, (109) disoya dimethyl ammonium chloride, (110) ditallow dimethyl ammonium chloride, (111) dihydrogenated tallow dimethyl ammonium chloride, (112) dibehenyl/diarachidyl dimethyl ammonium chloride, (113) soya amido propyl benzyl dimethyl ammonium chloride, (114) soya dicoco quaternary ammonium chloride, (115) gluconamidopropyl dimethyl-2-hydroxyethyl ammonium chloride, (116) N-alkyl-N-N-dimethyl-N(dodecyl acetate) ammonium chloride, wherein alkyl has from 14 to 20 carbon atoms, (117) mink amidopropyl dimethyl-2-hydroxyethyl ammonium chloride, (118) N-rapeseed-(3-amidopropyl)-N-N-dimethyl-N-(2,3 epoxy propyl) ammonium chloride, (119) N-stearyl-(3-amido propyl)-N-benzyl dimethyl ammonium chloride, (120) rapeseed amido propyl benzyl dimethyl ammonium chloride, (121) rapeseed amido propyl ethyl dimethyl ammonium chloride, (122) cocamidopropyl polyethylene glycol dimethyl ammonium chloride phosphate, (123) butyrylcholine chloride, and (124) mixtures thereof; or wherein the transparentizing agent is selected from the group consisting of piperidine thiocyanate, 2-piperidine methanol, bis(pentamethylene) urea, 4,4'-trimethylene bis(1-piperidine propionitrile), tripiperidino phosphine oxide, homopiperazine, 1-piperonyl piperazine, hexacyclentrisulfate, 5,10,15,20-tetraphenyl-21H,23Hporphine, 5,10,15,20-tetrakis(4-methoxyphenyl)-2H,23H-porphine, pyrrole-2-carboxaldehyde, 3-pyrrolidino-1,2-propanediol, pyrazole, 3-aminopyrazole, imidazole, 2-ethylimidazole, 2-(2-piperidinoethyl) pyridine, 1-dodecyl pyridinium chloride, pyridinium bromide perbromide, 3-aminoquinoline, 8-hydroxyquinoline, 7,8-benzoquinoline, 8-hydroxyquinaldine, quinoxaline, 4,5-dihydro-6-methyl-3(2H)-pyridazinone monohydrate, phthalazine, 1,10-phenanthroline, 1,3,5-triazine, trichloromelamine, trichloroisocyanouric acid, norbornane, tricyclo[5.2.1.0] decane, norcamphor, tropolone, 1-indanol, trans,trans,cis-1,5,9-cyclododecatriene, cyclodecane epoxide, 2,3-cyclododecane pyridine, 1,2,5,6,9,10-hexabromo-cyclododecane, 1,4,4a,8a-tetrahydro-endo-1,4-methano-naphthalene-5,8-dione, γ-butyrolactone, β,β-dimethyl-γ-(hydroxymethyl)-γ-butyrolactone, 2,5-dimethyl-4-hydroxy-3 (2H)-furanone, hydrindantin dihydrate, 2,4,8,10-tetraoxaspiro [5.5]undecane, 1,3,5-trioxane, cyclooctanone, piperonal, piperonylalcohol, piperonyl nitrile, 3,4(methylenedioxy) phenylacetonitrile, maleic anhydride, s-acetylmercapto succinic anhydride, 2-octadecen-1-yl succinic anhydride, 18-crown-6, benzo-18 crown-6, dibenzo-18 crown-6, dibenzo-24 crown-8, 5-amino-3-methyl isooxazole, 2-oxazolidone, 5,5-dimethyl oxazolidine-2,4-dione, 3-ethyl-2-thioxo-4-oxazolidinone, 3-morpholino-1,2-propandiol, 4-phenyl morpholine, N,N'-dibenzyl-1,4,10,13- tetraoxa-7,16 diazacycloocta-decane, 4,7,13,16,21,24-hexaoxa-1,10-diazabicyclo [8.8.8] hexacosane, γ-valerolactam, ε-caprolactam, 2-azacyclooctanone, 2-azacyclononanone, maleimide, n-methylsuccinimide, phthalimide DBU salt, 1-allyl-2-thiourea, 1,3-dithiane, 1-benzyl-3-methyl-2-thiourea, 2-imino-4-thiobiuret, butyl sulfone, 2,2'-bithiophene, 2-phenyl-1,3-dithiane, 3,6,9,14-tetrathiabicyclo [9.2.1] tetradeca-11,13-diene, 1,5,9,13-tetra-thiacyclohexadecane-3,11-diol, 1,4,7,10,13-penta-thiacyclopentadecane, 2-aminothiazole, 2-amino-2-thiazoline, 3-methyl rhodanine, 3-ethyl-5-(2-hydroxy-ethyl)-4-methylthiazolium bromide, triphenylphosphine, tricyclohexylphosphine, 1,3-bis (diphenylphosphino) propane, 1,5-bis(diphenyl phosphino) pentane, isopropyldiphenyl phosphine, triethyl phosphite, triphenyl phosphite, triethyl phosphite copper iodide, dipropyl phosphite, bis(2-ethylhexyl) phosphite, bis (4-nitrobenzyll phosphite, diphenyl phosphine oxide, diphenyl(2,4,6-trimethylbenzoyl) phosphine oxide, vinyl phosphonic acid, cyanoaceto-hydrazide, cyanomethyl N,N-dimethyl dithiocarbamate, 4'-pentyl-4'-biphenyl carbonitrile, 4'-(octyloxy)-4-biphenyl carbonitrile, 1,4-dicyano-2-butene, benzylidene malononitrile, 1-isothiocyanato-4-(trans-4-propylcyclohexyl)benzene, formamidoxime, ethyl chlorooximido acetate, acetohydroxamic acid, tetrahexylammonium chloride, tetraheptylammonium chloride, tetraheptylammonium bromide, and mixtures thereof.

9. A process which comprises (1) providing a migration imaging member comprising (a) a substrate, (b) a softenable layer comprising a softenable material and a photosensitive migration marking material, and (c) a transparentizing agent which transparentizes migration marking material in contact therewith contained in at least one layer of the migration imaging member; (2) uniformly charging the imaging member; (3) subsequent to step (2), exposing the charged imaging member to activating radiation at a wavelength to which the migration marking material is sensitive; (4) subsequent to step (3), causing the softenable material to soften and enabling a first portion of the migration marking material to migrate through the softenable material toward the substrate in an imagewise pattern while a second portion of the migration marking material remains substantially unmigrated within the softenable layer, wherein subsequent to migration of the first portion of migration marking material, either (a) the first portion of migration marking material contacts the transparentizing agent and the second portion of migration marking

material does not contact the transparentizing agent; or (b) the second portion of migration marking material contacts the transparentizing agent and the first portion of migration marking material does not contact the transparentizing agent.

10. A process according to claim 9 wherein the first portion of migration marking material contacts the transparentizing agent and the second portion of migration marking material does not contact the transparentizing agent; or wherein the second portion of migration marking material contacts the transparentizing agent and the first portion of migration marking material does not contact the transparentizing agent.

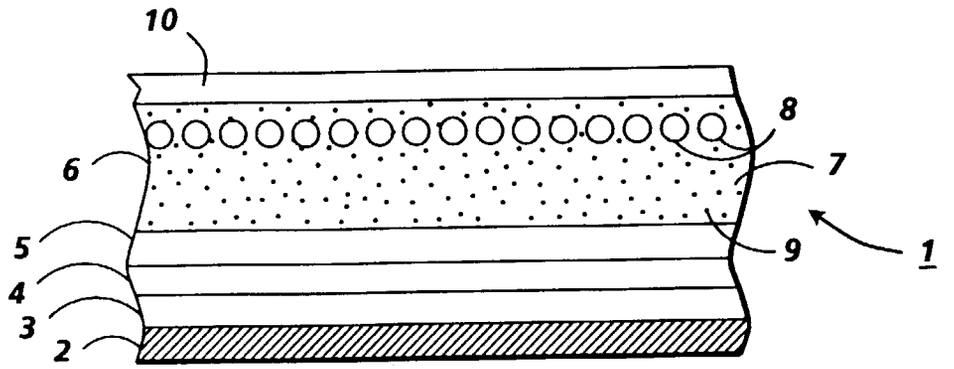


FIG. 1

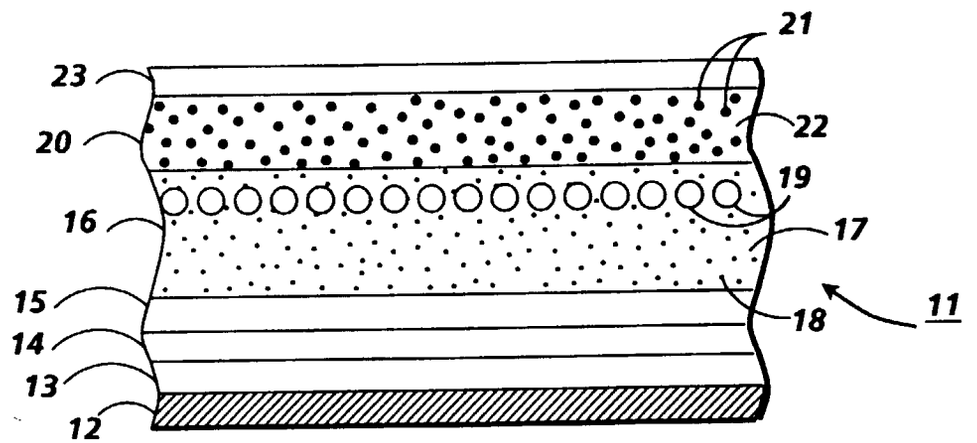


FIG. 2

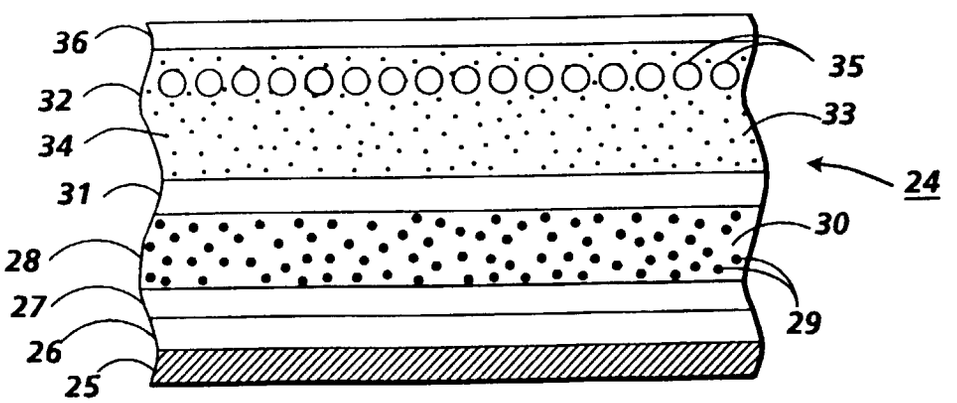


FIG. 3

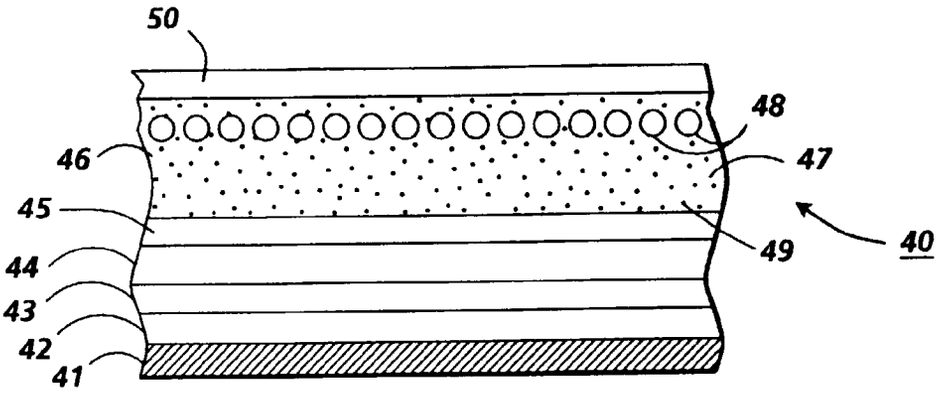


FIG. 4

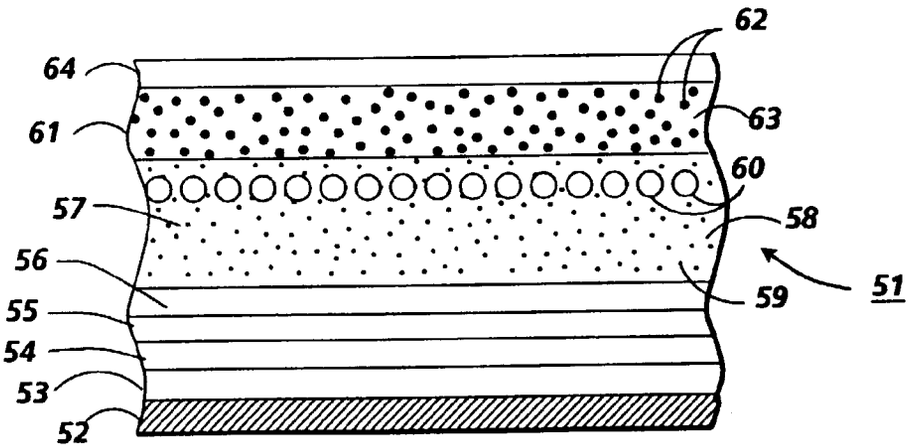


FIG. 5

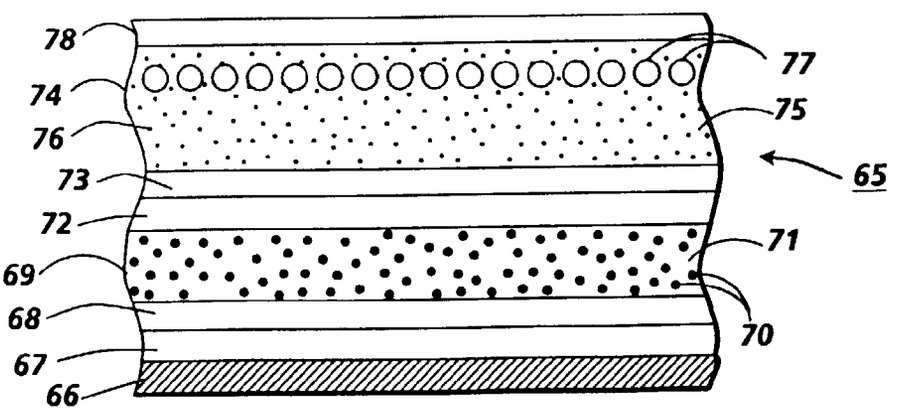


FIG. 6

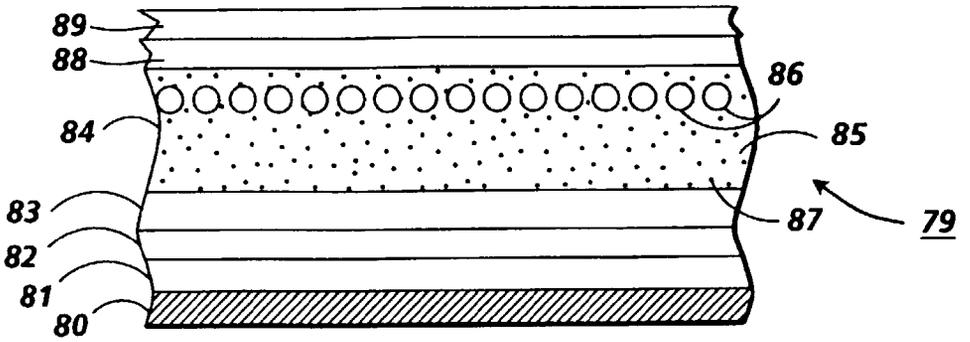


FIG. 7

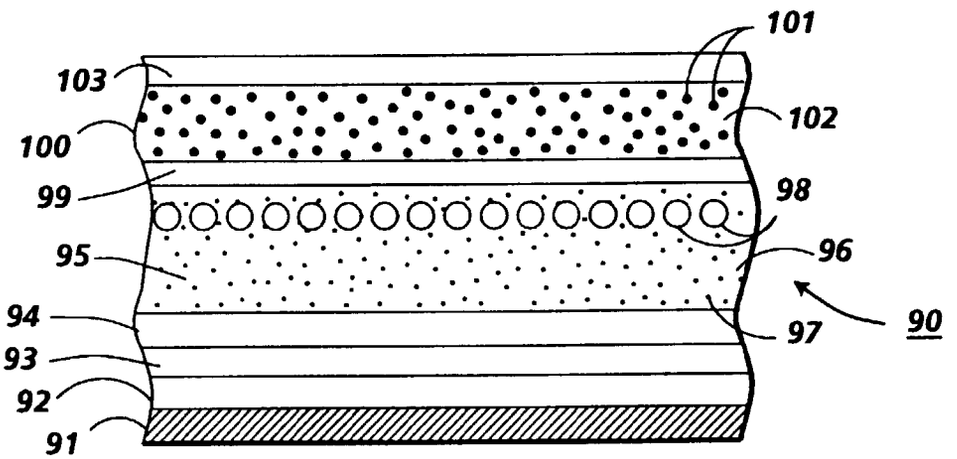


FIG. 8

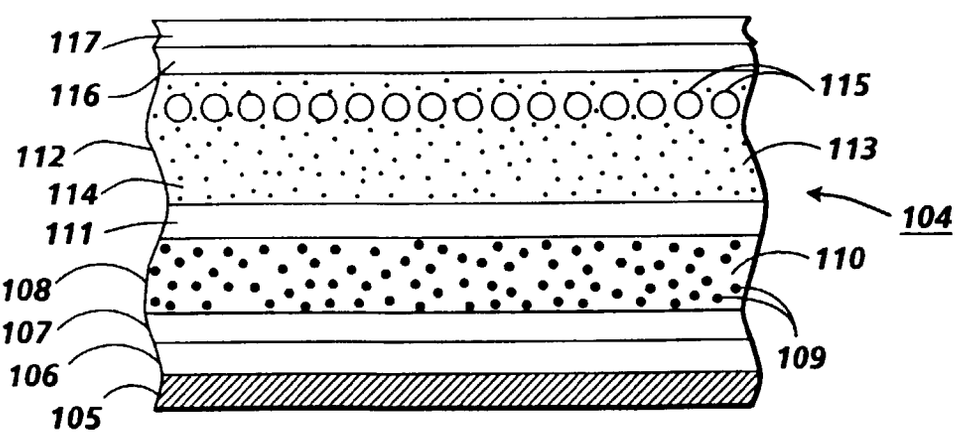


FIG. 9

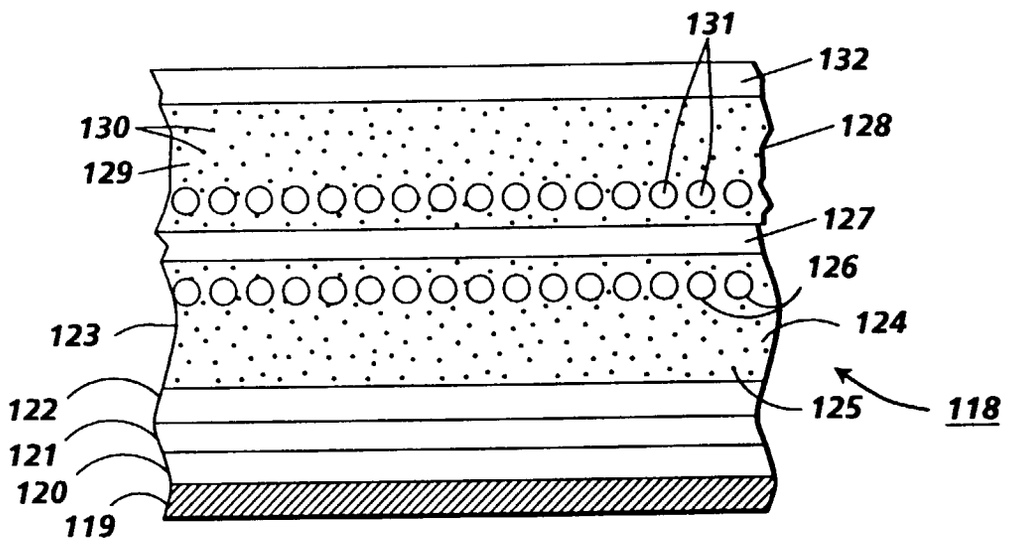


FIG. 10