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(71) Applicant: **Monsanto S.A.S.**
69673 Lyon Cedex (FR)

(72) Inventor: **Despeguel, Jean-Pierre**
45140 Ingre (FR)

(74) Representative: **Van Malderen, Joëlle**
pronovem - Office Van Malderen
Avenue Josse Goffin 158
1082 Bruxelles (BE)

(54) **Use of rapeseed oil in biolubricants**

(57) The present invention relates to the use of a rapeseed oil as base fluid in (bio-)lubricant.
The present invention also relates to the use of alkylesters derived from rapeseed oil as base fluid in (bio-)lubricant.

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Description

Field of the invention

[0001] The present invention relates to the use of a rapeseed oil as base fluid in (bio-)lubricant.

[0002] The present invention also relates to the use of alkylesters derived from rapeseed oil as base fluid in (bio-) lubricant.

Background

[0003] Lubricants can be defined as a preparation (composition) made of base fluids and additives. The base fluid, the major ingredient, contributes significantly to the inherent properties of said lubricants such as the viscosity, the lubricity, the pour point, the oxidative and thermal stability, the hydrolytic stability, etc.

[0004] Mineral oil is the most commonly used base fluid for all type of lubricants. Synthetic hydrocarbon such as olefin oligomers are used in a wide range of applications for their better oxidative stability.

[0005] The use of vegetable oils as base fluids for obtaining bio-lubricants, exhibiting rapid biodegradability and low environmental toxicity, is known but currently limited because of their weak performance having regard in particular to their oxidative stability, their hydrolytic stability and their pour point.

Summary of the invention

[0006] The present invention provides a new (bio-)lubricant comprising (or consisting of) rapeseed oil and at least one additive, wherein the saturated fatty acids content of said rapeseed oil is less than (about) 7%, 6,5%, 6% or 5,5%, based upon the total weight of the fatty acids present in the rapeseed oil.

[0007] Preferably, in a (bio-)lubricant according to the invention, said rapeseed oil further comprises more than (about) 72%, 75%, 80%, or 85% of oleic acid, and/or less than (about) 4%, 3,5%, 3%, 2%, or 1% of linolenic acid, based upon the total weight of the fatty acids present in the rapeseed oil.

[0008] A (bio-)lubricant according to the invention may further comprise another oleaginous oil, wherein the ratio rapeseed oil to said other oleaginous oil is such that the resulting oil comprises less than (about) 7%, 6,5%, 6% or 5,5% of saturated fatty acids, based upon the total weight of the fatty acids present in said resulting oil.

[0009] Preferably, said ratio is such that said resulting oil further comprises more than (about) 72%, 75%, 80%, or 85% of oleic acid, and/or less than (about) 4%, 3,5%, 3%, 2%, 1% or 0,5% of linolenic acid, based upon the total weight of the fatty acids present in said oil.

[0010] The ratio rapeseed oil to sunflower oil can be comprised between 5/95 and 95/5.

[0011] In a (bio-)lubricant according to the invention, said other oleaginous oil can be a sunflower oil, preferably a High Oleic sunflower oil, and/or a soybean oil.

[0012] The present invention also provides a (bio-)lubricant consisting of a base-fluid and at least one additive, said base-fluid consisting of a mono-alkyl esters composition derived from (or resulting from the transesterification of) rapeseed oil, comprising less than (about) 7%, 6,5%, 6% or 5,5% of mono-alkyl esters of saturated fatty acids, based upon the total weight of the mono-alkyl esters of fatty acids present in said composition.

[0013] Preferably, said mono-alkyl esters composition further comprises more than (about) 72%, 75%, 80%, or 85% of mono-alkyl ester of oleic acid, and/or less than (about) 4%, 3,5%, 3%, 2%, or 1% of mono-alkyl ester of linolenic acid, based upon the total weight of the mono-alkyl ester of fatty acids present in said composition.

[0014] Another object of the invention is a (bio-)lubricant consisting of a base-fluid and at least one additive, said base-fluid consisting of a mono-alkyl esters composition derived from (or resulting from the transesterification of) rapeseed oil and another oleaginous oil, comprising less than (about) 7%, 6,5%, 6% or 5,5% of mono-alkyl esters of saturated fatty acids, based upon the total weight of the mono-alkyl esters of fatty acids present in said composition.

[0015] Preferably, said base-fluid further comprises more than (about) 72%, 75%, 80%, or 85% of mono-alkyl ester of oleic acid, and/or less than (about) 4%, 3,5%, 3%, 2%, 1% or 0,5% of mono-alkyl ester of linolenic acid, based upon the total weight of the mono-alkyl ester of fatty acids present in said base-fluid (or mono-alkyl esters composition).

[0016] Another object of the invention relates to the use of a rapeseed oil comprising a saturated fatty acids content of less than (about) 7%, 6,5%, 6% or 5,5% based upon the total weight of the fatty acids present in the rapeseed oil, as a base fluid in (bio-)lubricants.

[0017] Preferably, for said use, said rapeseed oil further comprises more than (about) 72%, 75%, 80%, or 85% of oleic acid, and/or less than (about) 4%, 3,5%, 3%, 2%, or 1% of linolenic acid, based upon the total weight of the fatty acids present in the rapeseed oil.

[0018] Another object relates to the use of (a blend of) a rapeseed oil and another oleaginous oil, wherein the ratio rapeseed oil to said other oleaginous oil is such that the resulting oil comprises less than (about) 7%, 6,5%, 6% or 5,5%

of saturated fatty acids, based upon the total weight of the fatty acids present in said resulting oil, as a base fluid in (bio-) lubricants.

[0019] Preferably, said resulting oil (or said blend of oil) further comprises more than (about) 72%, 75%, 80%, or 85% of oleic acid, and/or less than (about) 4%, 3,5%, 3%, 2%, 1% or 0,5% of linolenic acid, based upon the total weight of the fatty acids present in said oil.

[0020] The ratio rapeseed oil to oleaginous oil (more particularly sunflower oil) can vary from 5/95 to 95/5, and is preferably comprised between 50/50 to 95/5, any ratio between these extremes being envisaged for a (bio-)lubricant according to the invention.

[0021] The present invention also relates to the use of a mono-alkyl esters composition derived from (or resulting from the transesterification of) rapeseed oil as a base fluid in (bio-)lubricants. More particularly, said composition comprises less than (about) 7%, 6,5%, 6% or 5,5% of mono-alkyl esters of saturated fatty acids, based upon the total weight of the mono-alkyl esters of fatty acids present in said composition.

[0022] Preferably, said mono-alkyl esters composition further comprises more than (about) 72%, 75%, 80%, or 85% of mono-alkyl ester of oleic acid, and/or less than (about) 4%, 3,5%, 3%, 2%, or 1% of mono-alkyl ester of linolenic acid, based upon the total weight of the mono-alkyl ester of fatty acids present in said composition.

[0023] Another object of the invention is the use of a mono-alkyl esters composition derived from (or resulting from the transesterification of) rapeseed oil and another oleaginous oil. More particularly, said composition comprises less than (about) 7%, 6,5%, 6% or 5,5% of mono-alkyl esters of saturated fatty acids, based upon the total weight of the mono-alkyl esters of fatty acids present in said composition, as a base-fluid in (bio-)lubricants.

[0024] Preferably, said mono-alkyl esters composition derived from said rapeseed and oleaginous oils further comprises more than (about) 72%, 75%, 80%, or 85% of mono-alkyl ester of oleic acid, and/or less than (about) 4%, 3,5%, 3%, 2%, 1% or 0,5% of mono-alkyl ester of linolenic acid, based upon the total weight of the mono-alkyl ester of fatty acids present in said composition.

[0025] The additives used in a (bio-)lubricant according to the invention can be bactericides, fongicides, metal deactivators, friction reducers, viscosity modifiers, antioxidants, antiwear agents, anti-scuff agents, pourpoint depressants, rust inhibitors, dispersants, detergents, and/or antifoam agents, etc.

[0026] Said rapeseed oil is preferably extracted from one, two or more of the following varieties: CARACAS, CONTACT, CABRIOLET, CALIDA, SPIRAL, MSP05, MSP11 and MSP13.

[0027] Said other oleaginous oil is preferably extracted from sunflower. Preferably the oil is extracted from AURASOL and/or ELANSOL varieties seeds.

Detailed description of the invention

[0028] The present invention provides a new (bio-)lubricant comprising (or consisting of) a rapeseed oil and at least one additive, wherein the saturated fatty acids content of said rapeseed oil is less than (about) 7%, 6,5%, 6% or 5,5%, preferably between (about) 7% and (about) 5%, more preferably between (about) 7% and (about) 5,5%, based upon the total weight of the fatty acids present in the rapeseed oil.

[0029] Another object of the present invention relates to the use of a rapeseed oil as a base fluid for the preparation of a (bio-)lubricant, wherein said rapeseed oil comprises less than (about) 7%, 6,5%, 6% or 5,5%, preferably between (about) 7% and (about) 5%, more preferably between (about) 7% and (about) 5,5% of saturated fatty acids, based upon the total weight of the fatty acids present in the rapeseed oil.

[0030] Preferably, said rapeseed oil further comprises more than (about) 72%, 75%, 80%, 81%, 82%, 83%, 84%, 85%, 86%, 87%, 88%, 89% or 90%, preferably between (about) 70% and (about) 90%, more preferably between (about) 72% and (about) 89% of oleic acid, and/or less than (about) 4%, 3,5%, 3%, 2%, or 1%, preferably between (about) 4% and (about) 1% of linolenic acid, based upon the total weight of the fatty acids present in the rapeseed oil.

[0031] More preferably, said rapeseed oil comprises more than (about) 72%, 75%, 80%, or 85%, preferably between (about) 72% and (about) 89% of oleic acid, less than (about) 4%, 3,5%, 3%, 2%, 1,5% or 1%, preferably between (about) 4% and (about) 1% of linolenic acid, and less than (about) 7%, 6,5%, 6% or 5,5%, preferably between (about) 7% and (about) 5%, more preferably between (about) 7% and (about) 5,5% of saturated fatty acids, based on the total weight of fatty acids in the oil.

[0032] Said rapeseed oil may further comprise less than 15%, 14%, 13%, 12%, 11%, 10%, 9% or 8%, preferably less than about 7% or 6% of linoleic acid, and/or less than 20%, 19%, 18%, 17% or 16%, preferably less than about 7,5% of poly-unsaturated fatty acids, based on the total weight of fatty acids in the oil.

[0033] In said rapeseed oil, said saturated fatty acids may comprise less than 4,5%, preferably less than about 4%, more preferably less than about 3,5% of palmitic acid based upon the total weight of fatty acids present in the oil. More particularly, said saturated fatty acids can comprise between about 4,5% and about 3%, more preferably between about 4,1% and about 3,5% of palmitic acid based upon the total weight of fatty acids present in the oil.

[0034] As used in the context of the present invention, the term "about" means +/- 0,3%, unless the context clearly

dictates otherwise. For example, "about 7%" includes 6,7%, 6,8%, 6,9%, 7,1%, 7,2%, 7,3% and any real number comprised between 6,7% and 7,3%.

[0035] In the context of the present invention, the term "base-fluid" refers to a lubricating fluid whose properties, in particular its flow, ageing, lubricity and antiwear properties as well as its properties regarding contaminant suspension, have not been improved by the inclusion of additives.

[0036] The additives used in a (bio-)lubricant according to the invention (or in a process of the invention) can be bactericides, fongicides, metal deactivators, friction reducers, viscosity modifiers, antioxidants, antiwear agents, anti-scuff agents, pourpoint depressants, rust inhibitors, dispersants, detergents, and/or antifoam agents, etc.

[0037] Depending on the effect sought and on the additive(s) used, a (bio-)lubricant according to the invention comprises preferably less than (about) 20 wt.%, more preferably less than (about) 10 wt.%, and even more preferably less than (about) 5 wt.% of additive(s), based on the total weight of the (bio-)lubricant.

[0038] For example, a few ppm of silicone is commonly used as foam inhibitor. Silicone can be used also to reduce surface tension.

[0039] Examples of oxidation inhibitor additives that can be used are zinc dithiophosphates, aromatic amines, alkyl sulfides, hindered phenols, etc. In particular, BHA (butylated hydroxyanisole) and/or BHT (butylated hydroxytoluene) can be used, in an amount which is less than (about) 1 wt.%.

[0040] Typical anti-rust compounds are e.g. highly basic compounds, sulfonates, phosphates, organic acids, esters or amines.

[0041] Detergents and dispersants can be used in a (bio-)lubricant of the invention for keeping sludge, fine solid, and semi-solid contaminants dispersed in the oil (preventing deposits). Examples are compounds such as succinimides, neutral calcium and barium sulfonates, phenates, polymeric detergents and amine compounds. They can also be basic calcium sulfonates / phenates which neutralize sludge precursors.

[0042] Examples of anti-friction agents that can be used are long chain (greater than 12 carbon atoms) alcohols, amines and/or fatty acids (in particular oleic acid).

[0043] Antiwear agents are for example zinc dialkyldithiophosphates (ZDDP) (the most commonly used), carbamates, organic phosphates such as tricresyl phosphates, organic phosphates, chlorine compounds, etc.

[0044] Common anti-scuff additives are e.g. sulphur or phosphorous compounds more chemically active than antiwear additives. Common gear oil anti-scuff additive is a mixture of an organic sulphur compound and an organic phosphorous compound usually identified as S/P.

[0045] Examples of pour point depressants are ethylene-vinyl-acetate- copolymers, vinyl-acetate-olefin copolymers, alkyl-esters of styrene-maleic-anhydride copolymers, alkyl-esters of unsaturated-carboxylic acids, polyalkylacrylates, polyalkylmethacrylates, alkyl phenols, and/or alpha-olefin copolymers, more particularly polyacylate compounds and/or synthetic polyalphaolefin (PAO). They are usually added in an amount less than (about) 5 wt.%, preferably less than (about) 1 wt.%, typically between (about) 0,1 wt.% and (about) 0,5 wt.%.

[0046] A rapeseed oil can be extracted from Brassica napus, Brassica rapa, Brassica carinata and/or Brassica juncea seeds varieties.

[0047] Preferably, said rapeseed oil is extracted from the seeds of Brassica napus CV oleifera Metzger.

[0048] In particular it can be extracted from varieties chosen from the group consisting of CONTACT, CABRIOLET, CALIDA, MSP05, MSP11 and MSP13 varieties, which are registered varieties, MSP11 and MSP13 excepted.

[0049] MSP11 variety is maintained as a Budapest Treaty patent deposit with NCIMB under accession number NCIMB 41234 made July 9, 2004.

[0050] MSP13 variety is maintained as a Budapest Treaty patent deposit with NCIMB under accession number NCIMB 41237 made July 23, 2004.

[0051] MSP05 and CALIDA varieties are also maintained as a Budapest Treaty patent deposit with NCIMB respectively under accession number NCIMB 41233 and 41235 made July 9, 2004.

[0052] A mixture of the oil extracted from two, three, four, five or six of these varieties can also be used to prepare a (bio-)lubricant according to the invention.

[0053] A preferred rapeseed oil comprises more than about 73% of oleic acid and/or less than about 3,5% of linolenic acid, and less than about 7% of saturated fatty acids, based upon the total weight of fatty acids present in the oil.

[0054] A more preferred rapeseed oil comprises more than about 75% of oleic acid and/or less than about 3% of linolenic acid, and less than about 7% of saturated fatty acids, based upon the total weight of fatty acids present in the oil.

[0055] A more preferred rapeseed oil comprises more than about 75% of oleic acid and less than about 2,5% of linolenic acid, and less than about 7% of saturated fatty acids, based upon the total weight of fatty acids present in the oil.

[0056] A more preferred rapeseed oil comprises between about 75% and about 85% of oleic acid and/or between about 2,5% and about 1% of linolenic acid, and between about 7% and about 5%, preferably between about 7% and about 5,5% of saturated fatty acids, based upon the total weight of fatty acids present in the oil.

[0057] A variety from which such oil can be extracted may be chosen from the group consisting of MSP05, MSP11 and MSP13 varieties.

[0058] A more preferred rapeseed oil comprises more than about 80% of oleic acid and less than about 2% of linolenic acid, and less than about 7%, preferably less than about 6% of saturated fatty acids, based upon the total weight of fatty acids present in the oil.

[0059] A more preferred rapeseed oil comprises more than about 85% of oleic acid and/or less than about 2% of linolenic acid, and less than 6,5% of saturated fatty acids, based upon the total weight of fatty acids present in the oil.

[0060] A variety from which such oil can be extracted is for example MSP11 variety or MSP13 variety.

[0061] Another object of the invention relates to a new (bio-)lubricant comprising (or consisting of) a rapeseed oil and another oleaginous oil (more particularly sunflower oil) and at least one additive, wherein the saturated fatty acids content of the resulting oil is less than (about) 7%, 6,5%, 6% or 5,5%, preferably between (about) 7% and (about) 5%, more preferably between (about) 7% and (about) 5,5%, based upon the total weight of the fatty acids present in the rapeseed oil

[0062] Another object of the invention relates to the use of (a blend of) rapeseed oil and another oleaginous oil (in particular sunflower oil) as base fluid in a (bio-)lubricant, wherein the ratio of rapeseed oil to said other oleaginous oil is selected so that a blend of both oils (the resulting oil) comprises less than (about) 7%, 6,5%, 6% or 5%, preferably between (about) 7% and (about) 5%, more preferably between (about) 7% and (about) 5,5% of saturated fatty acids, based on the total weight of fatty acids in the blend.

[0063] Preferably the ratio of rapeseed oil to said other oleaginous oil (more particularly sunflower oil) is selected so that a blend of both oils further comprises at least (about) 72%, 75%, 80%, 81%, 82%, 83%, 84%, 85%, 86%, 87%, 88%, 89% or 90%, preferably between (about) 72% and (about) 90%, more preferably between (about) 75% and (about) 89% of oleic acid and/or less than (about) 4%, 3,5%, 3%, 2%, 1,5% 1% or 0,5%, preferably between (about) 4% and 0,2% of linolenic acid, based on the total weight of fatty acids in the blend.

[0064] Preferably the ratio of rapeseed oil to said other oleaginous oil (more particularly sunflower oil) is selected so that a blend of both oils further comprises less than 4,5%, preferably less than (about) 4%, more preferably less than (about) 3,5%, more preferably between (about) 4% and (about) 3%, of palmitic acid based upon the total weight of fatty acids present in the blend.

[0065] Preferably the ratio of rapeseed oil to said other oleaginous oil (more particularly sunflower oil) is selected so that a blend of both oils further comprises less than (about) 20%, 19%, 18%, 17% or 16%, more preferably less than (about) 7,5% of poly-unsaturated fatty acids, based on the total weight of fatty acids in the blend.

[0066] The present invention also provides a new (bio-)lubricant comprising (or consisting of) a mono-alkyl esters composition derived from a rapeseed oil and at least one additive, said composition comprising less than (about) 7%, 6,5%, 6% or 5,5%, preferably between (about) 7% or 6% and (about) 5%, more preferably between (about) 7% or 6% and (about) 5,5% of mono-alkyl ester(s) of saturated fatty acids, based upon the total weight of the mono-alkyl esters of fatty acids present in the mono-alkyl esters composition.

[0067] Another object of the present invention is the use as a base fluid of a mono-alkyl esters composition derived from a rapeseed oil, said composition comprising less than (about) 7%, 6,5%, 6% or 5,5%, preferably between (about) 7% or 6% and (about) 5%, more preferably between (about) 7% or 6% and (about) 5,5% of mono-alkyl ester(s) of saturated fatty acids, based upon the total weight of the mono-alkyl esters of fatty acids present in the mono-alkyl esters composition.

[0068] Preferably, said mono-alkyl esters composition derived from a rapeseed oil further comprises more than (about) 72%, 75%, 80%, or 85%, preferably between (about) 70% and (about) 90%, more preferably between (about) 75% and (about) 85% of mono-alkyl ester of oleic acid and/or not more than (about) 4%, 3,5%, 3%, 2%, 1,5%, 1% or 0,5% preferably between (about) 4% and 0,2% of mono-alkyl ester of linolenic acid, based on the total weight of mono-alkyl ester of fatty acids in the mono-alkyl esters composition.

[0069] Preferably, said mono-alkyl esters composition derived from said rapeseed further comprises less than about 15%, 14%, 13%, 12%, 11%, 10%, 9% or 8%, preferably less than about 7% or 6% of mono-alkyl ester(s) of linoleic acid, and/or less than about 20%, 19%, 18%, 17% or 16%, preferably less than about 7,5% of mono-alkyl ester(s) of poly-unsaturated fatty acids, based on the total weight of mono-alkyl-esters of fatty acids in the composition.

[0070] Preferably, the mono-alkyl esters of said saturated fatty acids comprise less than 4,5%, preferably less than about 4%, and more preferably less than about 3,5% of alkyl-ester(s) of palmitic acid, based on the total weight of mono-alkyl-esters of fatty acids in the composition.

[0071] Preferably, the mono-alkyl esters of said saturated fatty acids comprise between about 4,5% and about 3%, preferably between about 4,1% and about 3,5% of alkylester(s) of palmitic acid, based on the total weight of mono-alkyl-esters of fatty acids in the composition.

[0072] The present invention also provides a new (bio-)lubricant comprising (or consisting of) a mono-alkyl esters composition derived from rapeseed oil and another oleaginous oil (more particularly sunflower oil) and at least one additive, said composition comprising less than (about) 7%, 6,5%, 6% or 5,5%, preferably between (about) 7% or 6% and (about) 5%, more preferably between (about) 7% or 6% and (about) 5,5% of mono-alkyl ester(s) of saturated fatty acids, based upon the total weight of the mono-alkyl esters of fatty acids present in the mono-alkyl esters composition.

[0073] Another object of the invention relates to the use of a mono-alkyl esters composition derived from rapeseed

oil and another oleaginous oil (more particularly sunflower oil) as base fluid in a (bio-)lubricant composition, said composition comprising less than (about) 7%, 6,5%, 6% or 5%, preferably between (about) 7% and (about) 5%, more preferably between (about) 7% and (about) 5,5% of saturated fatty acids, based on the total weight of mono-alkyl esters in said composition.

[0074] Preferably, said mono-alkyl esters composition derived from rapeseed oil and said other oleaginous oil (more particularly sunflower oil) further comprises more than (about) 72%, 75%, 80%, 81%, 82%, 83%, 84%, 85%, 86%, 87%, 88%, 89%, 90%, preferably between (about) 72% and (about) 90%, more preferably between (about) 75% and (about) 85% of mono-alkyl ester of oleic acid and/or less than (about) 4%, 3,5%, 3%, 2%, 1,5%, 1% or 0,5% preferably between (about) 4% and 0,2% of mono-alkyl ester of linolenic acid, based on the total weight of mono-alkyl ester of fatty acids in said mono-alkyl esters composition.

[0075] Preferably, said mono-alkyl esters composition derived from said rapeseed and oleaginous oils (more particularly sunflower oil) further comprises less than (about) 15%, 14%, 13%, 12%, 11%, 10%, 9% or 8%, preferably less than (about) 7% or 6% of mono-alkyl ester(s) of linoleic acid, and/or less than (about) 20%, 19%, 18%, 17% or 16%, preferably less than (about) 7,5% of mono-alkyl ester(s) of poly-unsaturated fatty acids, based on the total weight of mono-alkyl-esters of fatty acids in the composition.

[0076] In a preferred composition of the invention, the mono-alkyl esters of said saturated fatty acids comprise less than 4,5%, preferably less than about 4%, and more preferably less than about 3,5% of alkyl-ester(s) of palmitic acid, based on the total weight of mono-alkyl-esters of fatty acids in the composition.

[0077] In a preferred composition of the invention, the mono-alkyl esters of said saturated fatty acids comprise between about 4,5% and about 3%, preferably between about 4,1% and about 3,5% of alkyl-ester(s) of palmitic acid, based on the total weight of mono-alkyl-esters of fatty acids in the composition.

[0078] Said mono-alkyl esters composition can result from the transesterification of a blend of rapeseed oil and said other oleaginous oil (more particularly sunflower oil), wherein the ratio of rapeseed oil to said other oleaginous oil (more particularly sunflower oil) is selected so that a blend of both oils comprises less than (about) 7%, 6,5%, 6% or 5%, preferably between (about) 7% and (about) 5%, more preferably between (about) 7% and (about) 5,5% of saturated fatty acids, based on the total weight of fatty acids in the blend.

[0079] Alternatively, said mono-alkyl esters composition can result from the transesterification of each oil separately, the transesterified oils being mixed afterwards, wherein the ratio of rapeseed oil to said other oleaginous oil (more particularly sunflower oil) is selected so that a blend of both oils would comprise (if they were mixed) less than (about) 7%, 6,5%, 6% or 5%, preferably between (about) 7% and (about) 5%, more preferably between (about) 7% and (about) 5,5% of saturated fatty acids, based on the total weight of fatty acids in the blend.

[0080] Preferably the ratio of rapeseed oil to said other oleaginous oil (more particularly sunflower oil) is selected so that a blend of both oils further comprises (or would further comprise) more than (about) 72%, 75%, 80%, 81%, 82%, 83%, 84%, 85%, 86%, 87%, 88%, 89% or 90%, preferably between (about) 70% and (about) 90%, more preferably between (about) 75% and (about) 85% of oleic acid and/or less than (about) 4%, 3,5%, 3%, 2%, 1,5%, 1%, or 0,5%, preferably between (about) 4% and 0,2% of linolenic acid, based on the total weight of fatty acids in the blend.

[0081] Preferably the ratio of rapeseed oil to said other oleaginous oil (more particularly sunflower oil) is selected so that a blend of both oils (would) further comprise(s) less than 4,5%, preferably less than (about) 4%, more preferably less than (about) 3,5%, more preferably between (about) 4% and (about) 3%, of palmitic acid based upon the total weight of fatty acids present in the blend.

[0082] Preferably the ratio of rapeseed oil to said other oleaginous oil (more particularly sunflower oil) is selected so that a blend of both oils (would) further comprise(s) less than (about) 20%, 19%, 18%, 17% or 16%, more preferably less than (about) 7,5% of poly-unsaturated fatty acids, based on the total weight of fatty acids in the blend.

[0083] The mono-alkyl esters of fatty acids in the mono-alkyl esters compositions (derived from rapeseed oil and/or said other oleaginous oil), used in a (bio-)lubricant according to the invention, are methyl ester, ethyl ester, propyl ester, or butyl ester of fatty acids. They may also consist of a mixture of two, three or four of said esters.

[0084] Preferably, the mono-alkyl esters of fatty acids are ethyl ester and / or methyl ester of fatty acids, and more preferably methyl ester of fatty acids.

[0085] It is to be understood that a (bio-)lubricant of the present invention comprises further fatty acids (transesterified or not) that are characteristic of the rapeseed oil used (extracted from one or more varieties) or of the blend of rapeseed oil and said other oleaginous oil used (possibly extracted from one or more species and/or varieties).

[0086] Another object of the invention is a process for preparing a (bio-)lubricant according to the present invention comprising the step of (1) extracting the oil from the seeds of rapeseed varieties such as CONTACT, CABRIOLET, CALIDA, MSP05, MSP11 and/or MSP13, and optionally from the seeds of another oleaginous species, in particular from the seed of sunflower varieties, such as ELANSOL or AURASOL, and (2) the step of adding at least one additive selected from the group consisting of bactericides, fungicides, metal deactivators, friction reducers, viscosity modifiers (e.g. viscosity index improvers), antioxidants, antiwear agents, anti-scuff agents, pour point depressants, rust inhibitors, dispersants, detergents, and antifoam agents.

[0087] Oil extraction methods are well known and can be mechanical, via solvents (generally hexane), via enzymes and/or by means of high pressure CO_2.

[0088] Preferably, a process of the invention further comprises the step of degumming the crude oil.

[0089] Crude oil is degummed to remove bulk of certain phosphatides such as lecithin.

[0090] The degumming treatment can consist of mixing the oil with water or steam during a certain period of time, preferably about 30 min. to about 60 min., at a temperature between about 50° and about 90°C, preferably in presence of phosphoric acid, citric acid or other acidic materials. The gummy residue is dehydrated and the precipitated gums are removed by decantation or centrifugation.

[0091] The degumming step may also consist of a chemical process.

[0092] Preferably, a process of the invention further comprises the step of refining the degummed oil.

[0093] The oil is refined (or neutralized) in order to reduce the free fatty acids, phospholipids, carbohydrates or proteins.

[0094] The most widely practiced form of refining method is an alkali treatment, usually sodium hydroxide, by which the free fatty acids are converted into water soluble soaps. Phospholipids, carbohydrates and proteins can also be changed to water soluble substances with hydration.

[0095] After the alkali treatment, the oil is washed with (hot) water to remove residual water soluble soaps that can reduce stability of the oil. In addition, pigments of the oil, such as chlorophyll, also undergo partial decomposition during this step.

[0096] The refining step can also be referred to as a neutralization step.

[0097] Preferably, a process of the invention further comprises a bleaching step, after the refining step.

[0098] In fact, a large amount of the colouring materials, such as chlorophyll and carotene, is already removed during the refining process. And the bleaching step aims to finalize the decolouration process.

[0099] A common method of bleaching is by absorption of the colour producing substances on an adsorbent material such as e.g. bentonite (or acid-activated earth clay), Fuller's earth, TONSIL earth, silica gel, etc.

[0100] A process for preparing a (bio-)lubricant according to the present invention can further comprise the transesterification step of the oil.

[0101] Said transesterification step may consist of a base catalysed transesterification of the oil. This reaction is more commonly used today, since it requires low temperature and pressure conditions, and it yields very high conversion with minimal side reactions and minimal reaction time. Moreover, it is a direct conversion to mono-alkyl ester with no intermediate compounds.

[0102] The catalyst is generally sodium hydroxide or potassium hydroxide. It is generally dissolved in the alcohol(s) using a standard agitator or mixer.

[0103] The alcohol(s) can be methanol, ethanol, propanol and/or butanol. Excess alcohol is normally used to ensure total conversion of the oil to its esters.

[0104] The alcohol(s) / catalyst mix is then charged into a closed reaction vessel and the oil is added.

[0105] The system should be closed to the atmosphere to prevent the loss of the alcohol(s).

[0106] The reaction time may vary, generally from 1 to 8 hours, depending on the temperature. The temperature is preferably chosen in the range consisting of the room temperature up to the temperature just above the boiling point of the alcohol used.

[0107] The conversion can be repeated (twice, three times or more) in order to raise the yield and obtain the required degree of purity, and to get very low glycerides content.

[0108] Once the reaction is complete, two phases containing respectively glycerin and alkyl esters can be separated. The glycerin phase being much more dense than the other, the two phases can be separated using merely the gravity, or faster by using a centrifuge.

[0109] Each of the phases has substantial amount of the excess alcohol(s) that was used in the reaction. This excess alcohol(s) can be removed by any appropriate process, for example with a flash evaporation process or by distillation.

[0110] The products of the reaction can be neutralized before or after the two phases, containing respectively glycerin and esters, are separated. This neutralization step can also take place before or after the alcohol(s) is (are) removed in each phase.

[0111] The alkyl esters composition thus obtained can be washed gently with warm water to remove residual catalyst or soaps.

[0112] It can also be distilled in an additional step to remove small amounts of colour bodies to produce a colourless composition.

[0113] The glycerin by-product can be submitted to further steps depending on the applications envisaged and the degree of purity required.

[0114] In a preferred embodiment, the alcohol used is methanol or ethanol. A mixture of both can be used and the ester composition obtained is thus a mixture of methyl ester and ethyl ester of fatty acids.

[0115] In a more preferred embodiment, methanol is used. And when methanol is used the transesterification step can be referred to as a methanolyse step.

[0116] The transesterification may also consist of a direct acid catalysed transesterification of the oil.

[0117] The alcohol can be methanol, ethanol, propanol and/or butanol.

[0118] In a preferred embodiment, the alcohol used is methanol, ethanol or a mixture of both.

[0119] Where methanol is used, the transesterification step can also be referred to as a methanolyse step.

[0120] The transesterification may also consist of a two steps reaction, the first being the conversion of the oil to its fatty acids, and then the conversion of the fatty acids to alkyl esters with acid catalysis.

[0121] The alcohol can be methanol, ethanol, propanol and/or butanol.

[0122] In a preferred embodiment, the alcohol used is methanol, ethanol or a mixture of both. The transesterification step can also be referred to as a methanolyse step where methanol is used.

[0123] Whatever are the catalysts used and/or the alcohols used, the oil used in a process of the invention comes from either rapeseed oil extracted from the seeds of one or more varieties of rapeseed and exhibiting the features mentioned in the present invention, or from rapeseed oil and another oleaginous oil (more particularly sunflower oil), the blend of which exhibits the features mentioned in the present invention.

[0124] Said rapeseed oil and said other oleaginous oil (preferably sunflower oil) can be submitted to the transesterification step separately and the esters obtained mixed afterwards. In that case, a process according to the invention comprises the step of transesterification of each (kind of) oil (from each variety, from each species or from each genus) and the step of mixing the alkyl-esters obtained.

[0125] Alternatively, said rapeseed oil and said oleaginous oil (preferably sunflower oil) can be submitted to the transesterification step as a blend of oil. In that case, a process according to the invention comprises the step of mixing the different oils and the step of transesterification of the blend of oil.

[0126] The oils used as base-fluids and the (bio-)lubricants obtained have been analysed to ensure they meet the different specifications established by the European Union, the American Society for Testing and Materials (ASTM) or other national or international instances.

[0127] The most important parameters (or specifications) can be summed up in the following table (Table I), together with the methods used in the examples section to measure said parameters.

Table I

Parameters	Abbreviation	Method	Units
Density at 20 °C	D^{20}	ISO 3675	g/l
Kinematic Viscosity at 40 °C	V^{40}, mm^2/s	ISO 3104	mm^2/s
Kinematic Viscosity at 100 °C	V^{100}, mm^2/s	ISO 3104	mm^2/s
Viscosity Index	VI	ISO 3104	-
Pour point	PP, °C	ISO 3016	°C
Accelerated oxidation test	Rancimat (98 °C, 20 1/h), h	ISO 6886	h
Resistance to oxidation	JDQ16	NF T 60-219	-
Resistance to hydrolyse	Res-Hydro	ASTM D 26 19-95	-
Acid number	AN, mg KOH/g	NF T 60-204	mg KOH/g
Saponification number	SN, mg KOH/g	NF ISO 3657	mg KOH/g
Iodine value	IV, g I_2/100 g	NF ISO 3961	g I_2/100 g
Peroxide value	PV, meq O_2/kg	NF T 60 220	meq O_2/kg
Phosphorous content	P content, ppm	Dir. 71/393/CEE mod.05.12.72	ppm
Unsaponifiable matter	Uns	NF T 60-205-1	%

[0128] A preferred oil to be used as base-fluid comprises about 6% of saturated fatty acids based on the total weight of the fatty acids present in the oil.

[0129] Preferably, said oil further comprises about 85% of oleic acid based on the total weight of the fatty acids present in the oil.

[0130] Preferably, said oil further comprises about 2% of linolenic acid based on the total weight of the fatty acids present in the oil.

[0131] Preferably, said oil further comprises about 3,5% of palmitic acid based on the total weight of the fatty acids

present in the oil.

[0132] Preferably, said oil further comprises about 7,5% of poly-unsaturated acids based on the total weight of the fatty acids present in the oil.

[0133] Said preferred oil to be used as base-fluid can comprise (or consist of) an oil extracted from MSP11 seeds.

[0134] Said preferred oil (more particularly an oil extracted from MSP11 seeds) can be mixed with an oil extracted from another rapeseed varieties and/or from another oleaginous (in particular from high oleic sunflower varieties) in a ratio such that the resulting oil comprises between (about) 6,5% and (about) 5%, more preferably between (about) 6% and (about) 5,5% of saturated fatty acids, based on the total weight of the fatty acids present in said resulting oil.

[0135] Preferably, said ratio is such that the resulting oil further comprises between (about) 82% and (about) 89%, more preferably between (about) 84% and (about) 87% of oleic acid, and/or between (about) 2% and (about) 0,5%, more preferably between (about) 2% and (about) 1% of linolenic acid , based on the total weight of the fatty acids present in said resulting oil.

[0136] Preferably, said ratio is such that the resulting oil further comprises between (about) 5% and (about) 9%, more preferably between (about) 6% and (about) 8% of poly-unsaturated fatty acids, based on the total weight of the fatty acids present in said resulting oil.

[0137] Preferably, said ratio is such that the resulting oil further comprises between (about) 3% and (about) 4%, more preferably about 3,5% of palmitic acid , based on the total weight of the fatty acids present in said resulting oil.

[0138] More preferably, said ratio is such that the resulting oil comprises more than about 85% of oleic acid and/or less than about 2% of linolenic acid, and less than 6,5% of saturated fatty acids, based upon the total weight of fatty acids present in the oil.

EXAMPLES

Example 1: Oil extraction

a). Mechanical extraction

[0139] The seeds are pressed in a single screw press, Täby 40A press, with a diameter of 6,5 mm, at a temperature comprised between about 40° and about 60°C.

[0140] The following varieties are pressed: CARACAS, CONTACT, CABRIOLET, CALIDA, SPIRAL, MSP05, MSP11, MSP13, ELANSOL and AURASOL varieties.

[0141] The result of that step is summarized in Table II.

[0142] In this example and in the following examples, the CARACAS variety is used as a point of reference.

[0143] It can be noted that the yields are very high, between about 70% and about 75%, except for CALIDA variety.

b). Hexane extraction

Material of extraction

[0144] Extractor 5L, a thermic bath and an extraction cartridge 13L.

Conditions of the extraction

[0145] The temperature of the bath is set at 82,5°C for a flow rate of hexane of about 2 L/h. The extraction process lasts about 16 hours. Because of the important amount of oil cake, the extraction process is repeated twice. The hexane contained in the cartridge is used again for second extraction, which lasts 17 hours.

[0146] The oil extracted mechanically, and the oil extracted with hexane are mixed and filtered on a settling in order to remove the solid particles. The oil is then distilled on a "R10" at a temperature of 90°C, 100 mbar during 1 hour. The flow rate of hexane is about 2 1/h. The residual content of hexane is about 4% to about 6%, which will facilitate the further steps of purification process.

[0147] The results of the extraction steps are summarized in Table III.

Example 2: Degumming step.

[0148] The degumming and the neutralization are both carried out in 10 litres temperature controlled reaction vessel.

[0149] In order to facilitate the degumming, mainly the decantation, the residual hexane content is adjusted at 6%.

[0150] The degumming step aims to remove the phospholipids naturally present in the crude oil.

[0151] The oil is introduced in the reaction vessel, then the temperature is raised up to 65°C while the oil is agitated.

At 65°C, phosphoric acid (1,5‰) and water (6% based on the oil weight) are added. The mixture is agitated during 10 min. and then the temperature is raised up to 75°C. The mixture is agitated at this temperature of 75°C during 30 min. Then, the decantation is allowed to proceed during 30 min. Finally, the heavier phase is removed.

[0152] The results of this step are summarized in Table IV.

Example 3: Refining or neutralization step.

[0153] This step aims to remove the free fatty acids present in the degummed oil.

[0154] The degummed oil is maintained at 75°C in a reaction vessel in which sodium hydroxide is added in excess of 10% compared to theoretical amount needed and the mixture is agitated during 5 min.

[0155] Then the temperature is raised up to 95°C and maintained at 95°C during 30 min. The reaction vessel is cooled down at 65°C and the two phases of the reaction mixture are allowed to separate by gravity during 20 min.

[0156] Then the aqueous phase is withdrawn (pH of 11-12) and the oil is washed with demineralized water until the used water is neutral.

[0157] The oil is then dried at 110°C under vacuum during 30 min.

[0158] The process and the results are summarized respectively in Table V and Table VI.

[0159] The varieties have all a low acid number: below 1 mg KOH/g. Usually, the acid number of common rapeseed oil is about 2 to about 3,5 mg KOH/g.

[0160] With an acid number below 0,3 mg KOH/g, the degumming and refining steps are regarded as very efficient.

Example 4: Bleaching step.

[0161] The refined oil is introduced in the reaction vessel with 3%, based on the weight of the oil, of TONSIL® earth.

[0162] The temperature is raised up to 95°C under vacuum with a pressure of 200 mbar. After 15 min. the pressure is diminished to 100 mbar and then to 15 mbar after 10 min.

[0163] The decolouration continues at 95°C, 15 mbar during 2 hours, and then the temperature is reduced to a temperature of 60°C. At 60°C, 0,5% of promosil, based on the weight of the oil, is added to improve the filtration, which is carried out on a filter ("cloche" filter), at a flow rate of about 20L/h.

[0164] The oil is then cooled down with the ambient temperature during 1 hour and stored under nitrogen atmosphere.

[0165] The results of the bleaching step are summarized in Table VII.

[0166] The bleaching step using TONSIL earth has a small impact on the acid numbers, which are slightly higher in comparison with the acid numbers before this bleaching step.

Example 5: Fatty acids content.

[0167] The fatty acids content of the oils extracted from the different rapeseed and sunflower varieties have been evaluated by gas chromatography and the results are summarized in Table VIII.

Example 6: Methanolyse.

[0168] Approximately 2000 g of oil extracted from rapeseed seeds.

[0169] The oil is degummed and refined according to the process described in examples 2 and 3, and then mixed with 300 g of methanol in a reaction vessel. About 5 to 10 g of sodium hydroxide added to the same reaction vessel.

[0170] The methanolyse takes place during about 2 hours, at a temperature comprised between approximately 40° C and 60° C, under atmospheric pressure.

[0171] These conditions provide essentially about 95 % conversion of added triglycerides to fatty acids methyl esters.

[0172] After the settling, the two phases of the reaction mixture are allowing to stand and separate to provide methyl esters in the upper phase, and a mixture of glycerol and approximately 2% wt. residual methyl esters, methanol, and base in the lower phase. The upper phase is used in a second conversion.

[0173] The same amount as in the first conversion of methanol and of alkaline catalyst is then introduced in the reaction vessel. The same conditions of temperature and pressure are applied (between about 40° and 60° C, atmospheric pressure). In these conditions more than 98 % of triglycerides are converted to fatty acids methyl esters.

[0174] The fatty acids methyl esters are washed and dried. More than 1900 g of fatty acids methyl esters are weighted, with a purity of higher than 98%. The mass yield, methyl esters / refined oil, is good.

[0175] The methyl esters content of the methyl ester composition obtained by the process as described has been evaluated by gas chromatography and the results are summarized in Table IX.

Example 7: **Test of hydrolyse resistance.**

[0176] A copper strip is dipped into a mixture of oil and water contained in a glass bottle. The bottle is placed in an oven at about 93°C (+/- 0,5°C) during about 48 hours, with a rotation of about 5 rev/min.

[0177] The mixture is then filtrated and the acidity measured.

[0178] In parallel, the copper strip is examined having regard to its mass and colour. A mark (or scoring) of less than 2B means that there is no corrosion ("2C" indicates the occurrence of corrosion).

[0179] The conditions of the test are summarized in Table X and the results obtained for different oils are summarized in Table XI.

Example 8: **JDQ16 method.**

[0180] The mass, viscosity and acid number of the oil to be examined are measured.

[0181] The oil is then placed into an oven at (about) 150°C during (about) 100 hours.

[0182] After this treatment, mass, viscosity and acid number are measured again.

[0183] The changes of mass, viscosity and acid number of the oil can thus be determined.

[0184] The results obtained can be compared to standard transmission and hydraulic oils. They are summarized in Table XII (for different rapeseed oils and sunflower oils) and also in Tables XXI to XXVII (for different blends of different oils in different ratios).

Example 9: **Specifications of different oils for use as base-fluids in (bio-)lubricants.**

[0185] The rapeseed oils and sunflower oils have been analyzed and compared with the specifications of a (bio-) lubricant as established by the European Union. The results of such analysis are summed up in Table XIII.

[0186] The results obtained for different blends of different oils (in different ratios) are summarized in Tables XIV to XX.

TABLES

[0187]

Table II: Mechanical extraction

Varieties	CARACAS	CONTACT	CABRIOLET	CALIDA	SPIRAL	MSP05	MSP11	ELANSOL	AURASOL
Seeds, kg	19,4	19,2	19,5	14,9	14,6	19,3	19,5	19,3	19,0
Dry matter, kg	18,3	17,8	18,3	14,0	13,8	18,2	18,3	18,2	17,8
Theoretical oil, kg	8,9	8,3	8,7	6,4	6,2	8,6	8,3	8,0	7,9
Non filtered oil, kg	6,8	6,7	6,5	3,8	4,7	6,4	6,6	6,6	6,6
Yield, %	76,1	80,2	74,5	59,4	75,7	74,7	79,7	83,0	83,2
Oil cake, kg	11,9	12,3	12,8	10,3	9,7	12,7	13,0	12,2	12,4
Easy to press / Difficult to press	Easy	Easy	Easy	Not easy	Easy	Easy	Easy	Easy	Easy

Table III : Hexane extraction

Varieties	CARACAS	CONTACT	CABRIOLET	CALIDA	SPIRAL	MSP05	MSP11	ELANSOL	AURASOL
Crude oil, kg	9,3	8,5	8,8	6,2	6,4	8,7	8,3	8,3	8.6
Hexane content, %	6,03	1,9	1,3	3,2	3,4	4,4	2,6	10,1	9,4
Yield, % (*)	97,9	99,9	99,5	93,8	99,6	97,1	97,6	93,2	98,3
(*) based on the total oil content in the seeds.									

Table IV: Degumming

Variety	CARACAS	CONTACT	CABRIOLET	CALIDA	SPIRAL	MSP05	MSP11	ELANSOL	AURASOL
Dry crude oil, g	8,7	8,3	8,5	5,7	6,1	8,2	7,7	7,3	7,6
H_3PO_4 at 75%, g	17,4	16,7	17,1	11,4	12,3	16,5	15,5	14,5	15,3
H_2O, g	521	500	512	343	369	494	464	435	459
Decantation	Very good	correct	good	correct	good	correct	correct	good	good

Table V: Refining or neutralization

Variety:	CARACAS	CONTACT	CABRIOLET	CALIDA	SPIRAL	MSP05	MSP11	ELANSOL	AURASOL
NaOH 98,63 %, g	4,0	8,3	2,8	3,5	2,6	2,7	3,3	8,8	3,1
H_2O, g	521	500	512	343	369	494	464	435	459
Washing steps	3	5	4	4	5	3	4	5	8

Table VI: Yield of degumming and refining

	CARACAS	CONTACT	CABRIOLET	CALIDA	SPIRAL	MSP05	MSP11	ELANSOL	AURASOL
Degummed Oil, kg	8,7	8,3	8,5	5,7	6,1	8,2	7,7	7,3	7,6
Acid number of the degummed oil, mg KOH/g	0,26	0,96	0,37	0,55	0,62	0,33	0,32	0,89	0,49
Refined Oil, kg	8,3	7,3	7,9	5,1	5,7	7,5	7,6	7,0	7,1
Acid number of the refined oil, mg KOH/g	0,17	0,27	0,14	0,17	0,15	0,12	0,13	0,15	0,14
Yields, %	95,4	87,9	92,9	89,5	93,4	91,5	98,1	95,2	93,5

Table VII : Bleaching

	CARACAS	CONTACT	CABRIOLET	CALIDA	SPIRAL	MSP05	MSP11	ELANSOL	AURASOL
Oil before bleaching, g Acid number of the refined oil, mg de KOH/g	5160	4230	4806	4990	5600	4880	3684	3158	3530
	0,17	0,27	0,14	0,17	0,15	0,12	0,13	0,15	0,14
Oil after bleaching, g Acid number of the bleached oil, mg de KOH/g	4930	4100	4514	4800	5430	4650	3508	2939	3204
	0,22	0,32	0,22	0,20	0,25	0,20	0,20	0,27	0,27
Yield, %	95,5	96,9	93,9	96,2	97,0	95,3	95,2	93,0	90,8

Table VIII : Fatty acids contents (Gas Chromatography)

Fatty acids	CARACAS	CONTACT	CABRIOLET	CALIDA	SPIRAL	MSP05	MSP11	MSP13	ELANSOL	AURASOL
C16:0 Palmitic	5,0	3,9	3,8	3,6	4,5	4,3	3,4	3,0	3,2	3,5
C16:1 Palmitoleic	-	-	0,2	0,1	-	0,3	0,3	-	-	-
C18:0 Stearic	1,6	1,6	1,6	1,6	1,9	1,6	2,1	1,5	4,6	4,1
C18:1 Oleic	63,2	73,4	76,9	63,2	64,1	75,9	84,9	81,9	88,0	89,6
C18:2 Linoleic	17,7	9,3	8,0	28,7	25,0	12,8	5,5	9,6	2,5	1,8
C18:3 (n-6) γ-Linolenic	-	-	-	-	-	-	-	-	-	-
C18:3 (n-3) α-Linolenic	10,6	9,8	7,9	0,8	2,4	2,8	2,0	1,9	-	-
C20:0 Arachidic	0,6	0,5	0,2	0,5	0,6	0,6	0,6	0,5	0,2	-
C20:1 Eicosenoic	1,0	1,1	1,0	1,1	0,9	1,1	1,1	1,3	0,1	-
C22:0 Behenic	0,3	0,4	0,5	0,3	0,4	0,4	-	0,3	0,8	0,8
C22:1 Erucic	-	0,1	-	0,2	0,2	0,2	-	-	-	-
C24:0 Lignoceric	-	-	-	-	0,2	-	-	-	-	-
C24:1 Nervonic	-	-	-	-	-	-	-	-	-	-
Others	-	-	-	-	-	-	0,2	-	0,6	0,2
Total	100	100	100	100	100	100	100	100	100	100
Saturated acid	7,5	6,3	6,0	5,9	7,4	6,9	6,1	5,3	8,8	8,4
Mono-unsaturated acid	64,2	74,6	78,1	64,6	65,2	77,6	86,3	83,2	88,1	89,6
Poly-unsaturated acid	28,4	19,1	15,9	29,5	27,3	15,5	7,5	11,5	2,5	1,8

Table IX : Methyl-esters of fatty acids contents (Gas Chromatography)

Methyl ester	CARACAS	CONTACT	CABRIOLET	CALIDA	MSP05	MSP11	MSP13	ELANSOL	AURASOL
C16:0 Palmitic	4,7	4,0	4,1	4,3	5,6	4,3	4,4	3,4	3,2
C16:1 Palmitoleic		0,3	0,2	0,1	0,2	0,2	0,3	-	-
C18:0 Stearic	1,7	1,7	1,5	1,6	1,9	1,6	1,8	1,6	4,3
C18:1 Oleic	63,4	73,0	76,7	64,0	64,5	76,3	85,3	83,4	89,5
C18:2 Linoleic	17,7	9,2	8,1	27,3	23,7	12,7	5,3	8,6	2,5
C18:3 (n-6) gamma Linolenic	-	-	-	-	-	-	-	-	-
C18:3 (n-3) alpha Linolenic	10,5	9,6	7,6	0,8	2,2	2,6	2,0	1,4	-
C20:0 Arachidic	0,6	0,6	0,3	0,5	0,6	0,5	0,2	0,4	-
C20:1 Eicosenoic	0,9	1,1	1,0	1,1	0,9	1,1	0,6	1,1	-
C22:0 Behenic	0,6	0,6	0,6	0,3	0,3	0,6		0,2	0,5
C22:1 Erucic	-	0,1	-	-	-	-	-	-	-
C24:0 Lignoceric	-	-	-	-	-	-	-	-	-
C24:1 Nervonic	-	-	-	-	-	-	-	-	-
Others	-	-	-	-	-	-	-	-	-
Total	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
Saturated acids	7,6	6,9	6,4	6,7	8,4	7,0	6,4	5,5	8,0
Mono-unsaturated acids	64,3	74,3	77,9	65,2	65,7	77,6	86,3	84,5	89,5
Poly-unsaturated acids	28,1	18,8	15,7	28,1	25,9	15,4	7,3	9,9	2,5

Table X : Conditions of hydrolyse tests

	CARACAS	CONTACT	CABRIOLET	CALIDA	SPIRAL	MSP05	MSP11	ELANSOL	AURASOL
Oil, g	75	75	75	75	75	75	75	75	75
Water, g	25	25	25	25	25	25	25	25	25
Copper, g	2.90	2.91	2.90	2.92	2.87	2.85	2.86	2.91	2.89
Copper strip length, mm	51.0	50.9	51.0	51.2	51.2	51.2	50.2	50.4	50.3
Copper strip width, mm	13.0	13.1	13.0	13.1	13.1	13.0	13.2	13.4	13.3
Copper strip area, cm^2	13.4	13.2	13.4	13.4	13.4	13.4	13.2	13.5	13.4

Table XI : Results of hydrolyse tests.

Parameters	Units	Reference	CARA CAS	CONTACT	CABRIOLET	CALIDA	SPIRAL	MSP05	MSP11	ELAN SOL	AURASOL
Loss of copper, mg/cm^2	mg/cm^2	1 max	0.037	0.030	0.037	0.060	0.037	0.061	0.038	0.037	0.052
Colour of copper strip (mark)	mark	2B max	1B	1B	1B	2A	1B	1B	2B	2C	2C
AN change, mg KOH/g	Mg KOH/g	1 max	0.08	0.02	0.05	0.00	0.00	0.00	0.07	0.01	0.02
Acidity of aqueous phase, mg KOH	Mg KOH	3 max	2.04	2.73	2.20	0.70	1.14	1.60	0.09	0.03	0.04

Table XII : JDQ 16 method

	Trans mission	Hydraulic	CARA CAS	CONTACT	CABRIOLET	CALIDA	SPIRAL	MSP05	MSP11	ELAN SOL	AURASOL
V40 initial. mm^2/s	33.8	46	35.4	36.8	37.3	36.4	36.3	38.3	39.0	40.2	40.3
V40 final. mm^2/s	-	-	64.4	58.7	56.3	54.1	51.6	44.0	42.5	42.9	42.5
(V40fi-V40in) /V40in. %	< 10	< 10	82.1	59.5	50.8	48.9	42.1	14.9	9.1	6.7	5.4
V100 initial. mm^2/s	-	-	8.1	8.2	8.4	8.2	8.2	8.4	8.4	8.6	8.6
V100 final. mm^2/s	-	-	11.9	10.9	10.8	10.8	10.2	9.0	9.0	9.0	8.9
(V100fi-V100in) /V100in. %	-	< 10	46.5	32.6	29.2	31.8	25.0	7.0	7.7	4.4	3.7
Mass variation %	1	1	0.22	0.12	0.12	0.05	0.00	0.00	0.04	0.00	-0.05
AN initial. mg KOH/g	-	-	0.22	0.32	0.22	0.20	0.25	0.20	0.20	0.27	0.27
AN final. mg KOH/g	2 max	2 max	2.00	0.94	0.82	0.69	0.63	0.32	0.34	0.36	0.35

Table XIII

	Trans-mission	Hydrau-lic	CARACAS	CONTACT	CABRIO-LET	CALIDA	SPIRAL	MSP05	MSP11	ELANSOL	AURASOL
D^{20}, g/l	0.9 – 0.92	0.9 – 0.92	0.915-0.925	0.915-0.925	0.915-0.925	0.915-0.925	0.915-0.925	0.915-0.925	0.915-0.925	-	-
V^{40}, mm^2/s	33,8	46,0	35,4	36,8	37,3	36,4	36,3	38,3	39,0	40,2	40,3
V^{100}, mm^2/s	-	-	8,1	8,2	8,4	8,2	8,2	8,4	8,4	8,6	8,6
VI	> 150	> 200	214	207	210	209	209	204	198	200	198
PP, °C	< -21	< -18	-25,0	-22,5	-21,5	-22,0	-22,0	-19,0	-21,0	-11	-14
Rancimat (98 °C, 20 l/h), h	-	-	7,4	9,1	10,8	14	14	15,4	47,8	54,5	47,8
AN, mg KOH/g	< 0.5	< 0.5	0,2	0,3	0,2	0	0	0,2	0,2	0,3	0,3
SN, mg KOH/g	-	-	192,8	191,4	193,6	192	192	190,8	190,9	190,8	190
IV, g I_2/100 g	-	-	113,9	105,7	102,8	107	106	96,6	91,1	82,6	82,3
PV, meq O_2/kg	< 10	< 10	7,1	2,8	3,4	3	1	4,4	0,8	0,5	0,9
P content, ppm	-	-	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	-	-
Uns, %	-	-	0,89	0,79	0,77	0,87	0,78	0,8	0,63	0,57	0,59

Table XIV

	ELANSOL + CARACAS					ELANSOL + CONTACT				
	95+5%	75+25%	50+50%	25+75%	5+95%	95+5%	75+25%	50+50%	25+75%	5+95%
D^{20}, g/l	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915-0.925
V^{40}, mm^2/s	40,0	39,0	37,8	36,6	35,6	40,0	39,3	38,5	37,7	37,0
V^{100}, mm^2/s	8,6	8,5	8,4	8,2	8,1	8,6	8,5	8,4	8,3	8,2
VI	201	204	207	211	213	200	202	204	205	207
PP, °C	-11,7	-14,5	-18,0	-21,5	-24,3	-11,6	-13,9	-16,8	-19,6	-21,9
Rancimat (98 °C, 20 l/h), h	52,1	42,7	31,0	19,2	9,8	52,2	43,2	31,8	20,5	11,4
AN, mg KOH/g	0,3	0,3	0,2	0,2	0,2	0,3	0,3	0,3	0,3	0,3
SN, mg KOH/g	190,9	191,3	191,8	192,3	192,7	190,8	191,0	191,1	191,3	191,4
IV, g I_2/100 g	84,2	90,4	98,3	106,1	112,3	83,8	88,4	94,2	99,9	104,5
PV, meq O_2/kg	0,9	2,2	3,8	5,5	6,8	0,6	1,1	1,7	2,2	2,7
P content, ppm	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10
Uns, %	0,59	0,65	0,73	0,81	0,87	0,58	0,63	0,68	0,74	0,78

Table XV

	ELANSOL + CABRIOLET					ELANSOL + CALIDA				
	95+5%	75+25%	50+50%	25+75%	5+95%	95+5%	75+25%	50+50%	25+75%	5+95%
D^{20}, g/l	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915-0.925
V^{40}, mm^2/s	40,0	39,5	38,7	38,0	37,4	40,0	39,2	38,3	37,3	36,5
V^{100}, mm^2/s	8,6	8,6	8,5	8,4	8,4	8,6	8,5	8,4	8,3	8,2
VI	201	203	205	208	210	200,5	202,3	204,5	206,8	208,6
PP, °C	-11,5	-13,6	-16,3	-18,9	-21,0	-11,6	-13,8	-16,5	-19,3	-21,5
Rancimat (98 °C, 20 l/h), h	52,3	43,6	32,7	21,7	13,0	52,5	44,4	34,2	24,1	15,9
AN, mg KOH/g	0,3	0,3	0,2	0,2	0,2	0,3	0,3	0,2	0,2	0,2
SN, mg KOH/g	190,9	191,5	192,2	192,9	193,5	190,9	191,2	191,6	192,0	192,3
IV, g I_2/100 g	83,6	87,7	92,7	97,8	101,8	83,8	88,8	94,9	101,1	106,0
PV, meq O_2/kg	0,7	1,2	2,0	2,7	3,3	0,6	1,1	1,6	2,2	2,6
P content, ppm	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10
Uns, %	0,58	0,62	0,67	0,72	0,76	0,59	0,65	0,72	0,80	0,86

Table XVI

	ELANSOL + SPIRAL					ELANSOL + MSP05				
	95+5%	75+25%	50+50%	25+75%	5+95%	95+5%	75+25%	50+50%	25+75%	5+95%
D^{20}, g/l	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915-0.925
V^{40}, mm^2/s	40,0	39,2	38,3	37,3	36,5	40,1	39,7	39,2	38,8	38,4
V^{100}, mm^2/s	8,6	8,5	8,4	8,3	8,2	8,6	8,6	8,5	8,4	8,4
VI	200,5	202,3	204,5	206,8	208,6	200	201	202	203	204
PP, °C	-11,6	-13,8	-16,5	-19,3	-21,5	-11,4	-13,0	-15,0	-17,0	-18,6
Rancimat (98 °C, 20 l/h), h	52,5	44,4	34,4	24,3	16,2	52,5	44,7	35,0	25,2	17,4
AN, mg KOH/g	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,2	0,2	0,2
SN, mg KOH/g	190,8	191,0	191,3	191,5	191,7	190,8	190,8	190,8	190,8	190,8
IV, g I_2/100 g	83,8	88,4	94,2	99,9	104,5	83,3	86,1	89,6	93,1	95,9
PV, meq O_2/kg	0,5	0,6	0,7	0,8	0,9	0,7	1,5	2,5	3,4	4,2
P content, ppm	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10
Uns, %	0,58	0,62	0,68	0,73	0,77	0,58	0,63	0,69	0,74	0,79

Table XVII

	ELANSOL + MSP11					AURASOL + CARACAS				
	95+5%	75+25%	50+50%	25+75%	5+95%	95+5%	75+25%	50+50%	25+75%	5+95%
D^{20}, g/l	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915-0.925
V^{40}, mm^2/s	40,1	39,9	39,6	39,3	39,0	40,1	39,1	37,9	36,6	35,6
V^{100}, mm^2/s	8,6	8,6	8,5	8,4	8,4	8,6	8,5	8,4	8,2	8,1
VI	200	200	199	199	198	199	202	206	210	213
PP, °C	-11,5	-13,5	-16,0	-18,5	-20,5	-14,6	-16,8	-19,5	-22,3	-24,5
Rancimat (98 °C, 20 l/h), h	54,2	52,8	51,2	49,5	48,1	45,8	37,7	27,6	17,5	9,4
AN, mg KOH/g	0,3	0,3	0,2	0,2	0,2	0,3	0,3	0,2	0,2	0,2
SN, mg KOH/g	190,8	190,8	190,9	190,9	190,9	190,1	190,7	191,4	192,1	192,7
IV, g I_2/100 g	83,0	84,7	86,9	89,0	90,7	83,9	90,2	98,1	106,0	112,3
PV, meq O_2/kg	0,5	0,6	0,7	0,7	0,8	1,2	2,4	4,0	5,5	6,8
P content, ppm	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10
Uns, %	0,57	0,59	0,60	0,62	0,63	0,6	0,7	0,7	0,8	0,9

Table XVIII

	AURASOL + CONTACT					AURASOL + CABRIOLET				
	95+5%	75+25%	50+50%	25+75%	5+95%	95+5%	75+25%	50+50%	25+75%	5+95%
D^{20}, g/l	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915-0.925
V^{40}, mm^2/s	40,1	39,4	38,6	37,7	37,0	40,2	39,6	38,8	38,0	37,4
V^{100}, mm^2/s	8,6	8,5	8,4	8,3	8,2	8,6	8,5	8,5	8,4	8,4
VI	198	200	203	205	207	199	201	204	207	209
PP, °C	-14,4	-16,1	-18,3	-20,4	-22,1	-14,4	-15,9	-17,8	-19,6	-21,1
Rancimat (98 °C, 20 l/h), h	45,9	38,1	28,5	18,8	11,0	46,0	38,6	29,3	20,1	12,7
AN, mg KOH/g	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,2	0,2	0,2
SN, mg KOH/g	190,1	190,4	190,7	191,1	191,3	190,2	190,9	191,8	192,7	193,4
IV, g I_2/100 g	83,5	88,2	94,0	99,9	104,5	83,3	87,4	92,6	97,7	101,8
PV, meq O_2/kg	1,0	1,3	1,8	2,3	2,7	1,0	1,5	2,1	2,8	3,3
P content, ppm	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10
Uns, %	0,6	0,6	0,7	0,7	0,8	0,6	0,6	0,7	0,7	0,8

Table XIX

	AURASOL + CALIDA					AURASOL + SPIRAL				
	95+5%	75+25%	50+50%	25+75%	5+95%	95+5%	75+25%	50+50%	25+75%	5+95%
D^{20}, g/l	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915-0.925
V^{40}, mm^2/s	40,1	39,3	38,3	37,3	36,5	40,1	39,3	38,3	37,3	36,5
V^{100}, mm^2/s	8,6	8,5	8,4	8,3	8,2	8,6	8,5	8,4	8,3	8,2
VI	199	201	204	206	208	199	201	204	206	208
PP, °C	-14,4	-16,0	-18,0	-20,0	-21,6	-14,4	-16,0	-18,0	-20,0	-21,6
Rancimat (98 °C, 20 l/h), h	46,1	39,3	30,9	22,4	15,6	46,1	39,4	31,0	22,6	15,9
AN, mg KOH/g	0,3	0,3	0,2	0,2	0,2	0,3	0,3	0,3	0,3	0,3
SN, mg KOH/g	190,1	190,6	191,2	191,8	192,3	190,1	190,4	190,9	191,3	191,6
IV, g I_2/100 g	83,5	88,5	94,8	101,0	106,0	83,5	88,2	94,0	99,9	104,5
PV, meq O_2/kg	1,0	1,3	1,8	2,2	2,6	0,9	0,9	0,9	0,9	0,9
P content, ppm	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10
Uns, %	0,60	0,66	0,73	0,80	0,86	0,60	0,64	0,69	0,73	0,77

Table XX

	AURASOL + MSP05					AURASOL + MSP11				
	95+5%	75+25%	50+50%	25+75%	5+95%	95+5%	75+25%	50+50%	25+75%	5+95%
D^{20}, g/l	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915- 0.925	0.915-0.925
V^{40}, mm^2/s	40,2	39,8	39,3	38,8	38,4	40,3	40,0	39,6	39,3	39,0
V^{100}, mm^2/s	8,6	8,5	8,5	8,4	8,4	8,6	8,5	8,5	8,4	8,4
VI	198	200	201	203	204	198	198	198	198	198
PP, °C	-14,3	-15,3	-16,5	-17,8	-18,8	-14,4	-15,8	-17,5	-19,3	-20,7
Rancimat (98 °C, 20 l/h), h	46,2	39,7	31,6	23,5	17,0	47,8	47,8	47,8	47,8	47,8
AN, mg KOH/g	0,3	0,3	0,2	0,2	0,2	0,3	0,3	0,2	0,2	0,2
SN, mg KOH/g	190,0	190,2	190,4	190,6	190,8	190,0	190,2	190,5	190,7	190,9
IV, g I_2/100 g	83,0	85,9	89,5	93,0	95,9	82,7	84,5	86,7	88,9	90,7
PV, meq O_2/kg	1,0	1,7	2,6	3,5	4,2	0,9	0,8	0,8	0,8	0,8
P content, ppm	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10	≤ 10
Uns, %	0,60	0,64	0,70	0,75	0,79	0,59	0,60	0,61	0,62	0,63

Table XXI

	AURASOL+ CARACAS					AURASOL+ CONTACT				
	95+5%	75+25%	50+50%	25+75%	5+95%	95+5%	75+25%	50+50%	25+75%	5+95%
V40 initial. mm^2/s	40,1	39,1	37,9	36,6	35,6	40,1	39,4	38,6	37,7	37,0
V40 final. mm^2/s	43,6	48,0	53,5	58,9	63,3	43,3	46,6	50,6	54,7	57,9
(V40fi - V40in) /V40in. %	9,2	24,6	43,7	62,9	78,2	8,1	18,9	32,5	46,0	56,8
V100 initial. mm^2/s	8,6	8,5	8,4	8,2	8,1	8,6	8,5	8,4	8,3	8,2
V100 final. mm^2/s	9,0	9,6	10,4	11,1	11,7	9,0	9,4	9,9	10,4	10,8
(V100fi - V100in) /V100in. %	5,8	14,4	25,1	35,8	44,3	5,1	10,9	18,1	25,3	31,1
Mass variation %	0,0	0,0	0,1	0,2	0,2	0,0	0,0	0,0	0,1	0,1
AN initial. mg KOH/g	0,3	0,3	0,2	0,2	0,2	0,3	0,3	0,3	0,3	0,3
AN final. mg KOH/g	0,4	0,8	1,2	1,6	1,9	0,4	0,5	0,6	0,8	0,9

Table XXII

	AURASOL+CABRIOLET					AURASOL+ CALIDA				
	95+5%	75+25%	50+50%	25+75%	5+95%	95+5%	75+25%	50+50%	25+75%	5+95%
V40 initial. mm^2/s	40,2	39,6	38,8	38,0	37,4	40,1	39,3	38,3	37,3	36,5
V40 final. mm^2/s	43,2	45,9	49,4	52,8	55,6	43,1	45,4	48,3	51,2	53,6
(V40fi - V40in) /V40in. %	7,7	16,8	28,1	39,5	48,6	7,6	16,3	27,2	38,1	46,8
V100 initial. mm^2/s	8,6	8,5	8,5	8,4	8,4	8,6	8,5	8,4	8,3	8,2
V100 final. mm^2/s	9,0	9,4	9,9	10,3	10,7	9,0	9,4	9,8	10,3	10,7
(V100fi - V100in) /V100in. %	5,0	10,1	16,4	22,8	27,9	5,1	10,7	17,8	24,8	30,4
Mass variation %	0,0	0,0	0,0	0,1	0,1	0,0	0,0	0,0	0,0	0,0
AN initial. mg KOH/g	0,3	0,3	0,2	0,2	0,2	0,3	0,3	0,2	0,2	0,2
AN final. mg KOH/g	0,4	0,5	0,6	0,7	0,8	0,4	0,4	0,5	0,6	0,7

Table XXIII

	AURASOL+SPIRAL					AURASOL+MSP05				
	95+5%	75+25%	50+50%	25+75%	5+95%	95+5%	75+25%	50+50%	25+75%	5+95%
V40 initial. mm^2/s	40,1	39,3	38,3	37,3	36,5	40,2	39,8	39,3	38,8	38,4
V40 final. mm^2/s	43,0	44,8	47,1	49,3	51,2	42,6	42,9	43,2	43,6	43,9
(V40fi - V40in) /V40in. %	7,2	14,6	23,8	32,9	40,3	5,9	7,8	10,1	12,5	14,4
V100 initial. mm^2/s	8,6	8,5	8,4	8,3	8,2	8,6	8,5	8,5	8,4	8,4
V100 final. mm^2/s	9,0	9,2	9,6	9,9	10,1	8,9	8,9	8,9	9,0	9,0
(V100fi - V100in) /V100in. %	4,8	9,0	14,4	19,7	23,9	3,9	4,5	5,4	6,2	6,9
Mass variation %	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
AN initial. mg KOH/g	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,2	0,2	0,2
AN final. mg KOH/g	0,4	0,4	0,5	0,6	0,6	0,3	0,3	0,3	0,3	0,3

Table XXIV

	AURASOL+MSP11					ELANSOL+ CARACAS				
	95+5%	75+25%	50+50%	25+75%	5+95%	95+5%	75+25%	50+50%	25+75%	5+95%
V40 initial. mm^2/s	40,3	40,0	39,6	39,3	39,0	40,0	39,0	37,8	36,6	35,6
V40 final. mm^2/s	42,5	42,5	42,5	42,5	42,5	44,0	48,3	53,7	59,0	63,3
(V40fi - V40in) /V40in. %	5,6	6,3	7,2	8,1	8,9	10,5	25,5	44,4	63,2	78,3
V100 initial. mm^2/s	8,6	8,5	8,5	8,4	8,4	8,6	8,5	8,4	8,2	8,1
V100 final. mm^2/s	8,9	8,9	9,0	9,0	9,0	9,1	9,7	10,4	11,2	11,7
(V100fi - V100in) /V100in. %	3,9	4,7	5,7	6,7	7,5	6,5	14,9	25,4	36,0	44,4
Mass variation %	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,2	0,2
AN initial. mg KOH/g	0,3	0,3	0,2	0,2	0,2	0,3	0,3	0,2	0,2	0,2
AN final. mg KOH/g	0,3	0,3	0,3	0,3	0,3	0,4	0,8	1,2	1,6	1,9

Table XXV

	ELANSOL + CONTACT					ELANSOL + CABRIOLET				
	95+5%	75+25%	50+50%	25+75%	5+95%	95+5%	75+25%	50+50%	25+75%	5+95%
V40 initial. mm^2/s	40,0	39,3	38,5	37,7	37,0	40,0	39,5	38,7	38,0	37,4
V40 final. mm^2/s	43,7	46,9	50,8	54,8	57,9	43,6	46,2	49,6	52,9	55,6
(V40fi - V40in) /V40in. %	9,3	19,9	33,1	46,3	56,9	8,9	17,7	28,8	39,8	48,6
V100 initial. mm^2/s	8,6	8,5	8,4	8,3	8,2	8,6	8,6	8,5	8,4	8,4
V100 final. mm^2/s	9,1	9,5	9,9	10,4	10,8	9,1	9,5	9,9	10,4	10,7
(V100fi - 100in) /V100in. %	5,8	11,4	18,5	25,5	31,2	5,6	10,6	16,8	23,0	28,0
Mass variation %	0,0	0,0	0,1	0,1	0,1	0,0	0,0	0,1	0,1	0,1
AN initial. mg KOH/g	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,2	0,2	0,2
AN final. mg KOH/g	0,4	0,5	0,7	0,8	0,9	0,4	0,5	0,6	0,7	0, 8

Table XXVI

	ELANSOL + CALIDA					ELANSOL + SPIRAL				
	95+5%	75+25%	50+50%	25+75%	5+95%	95+5%	75+25%	50+50%	25+75%	5+95%
V40 initial. mm^2/s	40,0	39,2	38,3	37,3	36,5	40,0	39,2	38,3	37,3	36,5
V40 final. mm^2/s	43,5	45,7	48,5	51,3	53,6	43,3	45,1	47,3	49,4	51,2
(V40fi - V40in) /V40in. %	8,8	17,3	27,8	38,4	46,8	8,5	15,6	24,4	33,3	40,4
V100 initial. mm^2/s	8,6	8,5	8,4	8,3	8,2	8,6	8,5	8,4	8,3	8,2
V100 final. mm^2/s	9,1	9,4	9,9	10,3	10,7	9,1	9,3	9,6	9,9	10,1
(V100fi - 100in) /V100in. %	5,8	11,3	18,1	25,0	30,4	5,4	9,6	14,7	19,9	24,0
Mass variation %	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
AN initial. mg KOH/g	0,3	0,3	0,2	0,2	0,2	0,3	0,3	0,3	0,3	0,3
AN final. mg KOH/g	0,4	0,4	0,5	0,6	0,7	0,4	0,4	0,5	0,6	0,6

Table XXVII

	ELANSOL + MSP05					ELANSOL + MSP11				
	95+5%	75+25%	50+50%	25+75%	5+95%	95+5%	75+25%	50+50%	25+75%	5+95%
V40 initial. mm^2/s	40,1	39,7	39,2	38,8	38,4	40,1	39,9	39,6	39,3	39,0
V40 final. mm^2/s	43,0	43,2	43,4	43,7	43,9	42,9	42,8	42,7	42,6	42,5
(V40fi - V40in) /V40in. %	7,1	8,7	10,8	12,8	14,5	6,8	7,3	7,9	8,5	8,9
V100 initial mm^2/s	8,6	8,6	8,5	8,4	8,4	8,6	8,6	8,5	8,4	8,4
V100 final. mm^2/s	9,0	9,0	9,0	9,0	9,0	9,0	9,0	9,0	9,0	9,0
(v100fi - V100in) /V100in. %	4,5	5,1	5,7	6,4	6,9	4,6	5,2	6,1	6,9	7,5
Mass variation %	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
AN initial. mg KOH/g	0,3	0,3	0,2	0,2	0,2	0,3	0,3	0,2	0,2	0,2
AN final. mg KOH/g	0,4	0,4	0,3	0,3	0,3	0,4	0,4	0,4	0,3	0,3

BUDAPEST TREATY ON THE INTERNATIONAL
RECOGNITION OF THE DEPOSIT OF MICROORGANISMS
FOR THE PURPOSES OF PATENT PROCEDURE

Monsanto S.A.S
Centre de Recherche de Boissay
28310 Toury
France

INTERNATIONAL FORM

RECEIPT IN THE CASE OF AN ORIGINAL DEPOSIT
issued pursuant to Rule 7.1 by the
INTERNATIONAL DEPOSITARY AUTHORITY
identified at the bottom of this page

NAME AND ADDRESS
OF DEPOSITOR

I. IDENTIFICATION OF THE MICROORGANISM

Identification reference given by the DEPOSITOR:	Accession number given by the INTERNATIONAL DEPOSITARY AUTHORITY:
Brassica napus CV Oleifera (METZG) MSP13	NCIMB 41237

II. SCIENTIFIC DESCRIPTION AND/OR PROPOSED TAXONOMIC DESIGNATION

The microorganism identified under I above was accompanied by:

[ ] a scientifie description

[X] a proposed taxonomic designation

(Mark with a cross where applicable)

III. RECEIPT AND ACCEPTANCE

This International Depositary Authority accepts the microorganism identified under I above, which was received by it on 23 July 2004 (date of the original deposit)[1]

IV. RECEIPT OF REQUEST FOR CONVERSION

The microorganism identified under I above was received by this International Depositary Authority on (date of the original deposit) and a request to convert the original deposit to a deposit under the Budapest Treaty was received by it on (date of receipt of request for conversion)

V. INTERNATIONAL DEPOSITARY AUTHORITY

Name: NCIMB Ltd.,

Address: 23 St Machar Drive,
Aberdeen,
AB24 3RY,
Scotland.

Signature(s) of person(s) having the power to represent the International Depositary Authority or of authorised official(s): Terence Dando

Date: 11 August 2004

[1] Where Rule 6/4(d) applies, such date is the date on which the status of International Depositary Authority was acquired.

BUDAPEST TREATY ON THE INTERNATIONAL
RECOGNITION OF THE DEPOSIT OF MICROORGANISMS
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Monsanto S.A.S
Centre de Recherche de Boissay
28310 Toury
France

NAME AND ADDRESS OF THE PARTY
TO WHOM THE VIABILITY STATEMENT
IS ISSUED

INTERNATIONAL FORM

VIABILITY STATEMENT
issued pursuant to Rule 10.2 by the
INTERNATIONAL DEPOSITARY AUTHORITY
identified on the following page

I. DEPOSITOR	II. IDENTIFICATION OF THE MICROORGANISM
Name: AS ABOVE Address:	Accession number given by the INTERNATIONAL DEPOSITARY AUTHORITY: NCIMB 41237 Date of the deposit or of the transfer[1]: 23 July 2004

III. VIABILITY STATEMENT

The viability of the microorganism identified under II above was tested on 23 July 2004 [2]. On that date, the said microorganism was:

[3] [X] viable

[3] [ ] no longer viable

1 Indicate the date of the original deposit or, where a new deposit or a transfer has been made, the most recent relevant date (date of the new deposit or date of the transfer).

2 In the cases referred to in Rule 10.2(a)(ii) and (iii), refer to the most recent viability test.

3 Mark with a cross the applicable box.

IV. CONDITIONS UNDER WHICH THE VIABILITY TEST HAS BEEN PERFORMED[4]

V. INTERNATIONAL DEPOSITARY AUTHORITY	
Name: NCIMB Ltd., Address: 23 St Machar Drive, Aberdeen, A24 3RY, Scotland.	Signature(s) of person(s) having the power to represent the International Depositary Authority or of authorised official(s): Terence Dowds Date: 11 August 2004

[4] Fill in if the information has been requested and if the results of the test were negative.

BUDAPEST TREATY ON THE INTERNATIONAL RECOGNITION OF THE DEPOSIT OF MICROORGANISMS FOR THE PURPOSES OF PATENT PROCEDURE

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Centre de Recherche de Boissay
28310 Toury
France

NAME AND ADDRESS OF DEPOSITOR

I. IDENTIFICATION OF THE MICROORGANISM

Identification reference given by the DEPOSITOR:	Accession number given by the INTERNATIONAL DEPOSITARY AUTHORITY:
Brassica napus. CV Oleifera (METZG) MSP05	NCIMB 41233

II. SCIENTI FIC DESCRIPTION AND/OR PROPOSED TAXONOMIC DESIGNATION

The microorganism identified under I above was accompanied by:

[ ] a scientific description

[X] a proposed taxonomic designation

(Mark with a cross where applicable)

III. RECEIPT AND ACCEPTANCE

This International Depositary Authority accepts the microorganism identified under I above, which was received by it on 9 July 2004 (date of the original deposit)[1]

IV. RECEIPT OF REQUEST FOR CONVERSION

The microorganism identified under I above was received by this International Depositary Authority on (date of the original deposit) and a request to convert the original deposit to a deposit under the Budapest Treaty was received by it on

(date of receipt of request for conversion)

V. INTERNATIONAL DEPOSITARY AUTHORITY

Name: NCIMB Ltd.,

Address: 23 St Machar Drive
Aberdeen
AB24 3RY
Scotland, UK.

Signature(s) of person(s) having the power to represent the International Depositary Authority or of authorised official(s):

Date: 19 July 2004

[1] Where Rule 6/4(d) applies, such date is the date on which the status of International Depositary Authority was acquired.

BUDAPEST TREATY ON THE INTERNATIONAL RECOGNITION OF THE DEPOSIT OF MICROORGANISMS FOR THE PURPOSES OF PATENT PROCEDURE

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Monsanto SAS
Centre de Recherche de Boissay
28310 Toury
France

NAME AND ADDRESS OF THE PARTY TO WHOM THE VIABILITY STATEMENT IS ISSUED

I. DEPOSITOR	II. IDENTIFICATION OF THE MICROORGANISM
Name: AS ABOVE Address:	Accession number given by the INTERNATIONAL DEPOSITARY AUTHORITY: NCIMB 41233 Date of the deposit or of the transfer[1]: 9 July 2004
III. VIABILITY STATEMENT	
The viability of the microorganism identified under II above was tested on 9 July 2004 [2]. On that date, the said microorganism was:	
[X][3] viable	
[ ] no longer viable	

1 Indicate the date of the original deposit or, where a new deposit or a transfer has been made, the most recent relevant date (date of the new deposit or date of the transfer).

2 In the cases referred to in Rule 10.2(a)(ii) and (iii), refer to the most recent viability test.

3 Mark with a cross the applicable box.

IV. CONDITIONS UNDER WHICH THE VIABILITY TEST HAS BEEN PERFORMED[4]	
V. INTERNATIONAL DEPOSITARY AUTHORITY	
Name: NCIMB Ltd., Address: 23 St Machar Drive Aberdeen AB24 3RY Scotland	Signature(s) of person(s) having the power to represent the International Depositary Authority or of authorised official(s): Date: 19 July 2004

[4] Fill in if the information has been requested and if the results of the test were negative.

BUDAPEST TREATY ON THE INTERNATIONAL
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Centre de Recherche de Boissay
28310 Toury
France

NAME AND ADDRESS OF DEPOSITOR

I. IDENTIFICATION OF THE MICROORGANISM

Identification reference given by the DEPOSITOR:	Accession number given by the INTERNATIONAL DEPOSITARY AUTHORITY:
Brassica napus. CV Oleifera (METZG) MSP11	NCIMB 41234

II. SCIENTI FIC DESCRIPTION AND/OR PROPOSED TAXONOMIC DESIGNATION

The microorganism identified under I above was accompanied by:

[ ] a scientific description

[X] a proposed taxonomic designation

(Mark with a cross where applicable)

III. RECEIPT AND ACCEPTANCE

This International Depositary Authority accepts the microorganism identified under I above, which was received by it on 9 July 2004 (date of the original deposit)[1]

IV. RECEIPT OF REQUEST FOR CONVERSION

The microorganism identified under I above was received by this International Depositary Authority on (date of the original deposit) and a request to convert the original deposit to a deposit under the Budapest Treaty was received by it on

(date of receipt of request for conversion)

V. INTERNATIONAL DEPOSITARY AUTHORITY

Name: NCIMB Ltd.,

Address: 23 St Machar Drive
Aberdeen
AB24 3RY
Scotland, UK.

Signature(s) of person(s) having the power to represent the International Depositary Authority or of authorised official(s):

Terence Dando

Date: 19 July 2004

[1] Where Rule 6/4(d) applies, such date is the date on which the status of International Depositary Authority was acquired.

BUDAPEST TREATY ON THE INTERNATIONAL
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Centre de Recherche de Boissay
28310 Toury
France

NAME AND ADDRESS OF THE PARTY
TO WHOM THE VIABILITY STATEMENT
IS ISSUED

I. DEPOSITOR	II. IDENTIFICATION OF THE MICROORGANISM
Name: AS ABOVE Address:	Accession number given by the INTERNATIONAL DEPOSITARY AUTHORITY: NCIMB 41234 Date of the deposit or of the transfer[1]: 9 July 2004

III. VIABILITY STATEMENT

The viability of the microorganism identified under II above was tested on 9 July 2004 [2]. On that date, the said microorganism was:

[3] [X] viable

[ ] no longer viable

[1] Indicate the date of the original deposit or, where a new deposit or a transfer has been made, the most recent relevant date (date of the new deposit or date of the transfer).

[2] In the cases referred to in Rule 10.2(a)(ii) and (iii), refer to the most recent viability test.

[3] Mark with a cross the applicable box.

IV. CONDITIONS UNDER WHICH THE VIABILITY TEST HAS BEEN PERFORMED[4]
V. INTERNATIONAL DEPOSITARY AUTHORITY
Name: NCIMB Ltd., Address: 23 St Machar Drive Aberdeen AB24 3RY Scotland Signature(s) of person(s) having the power to represent the International Depositary Authority or of authorised official(s): Terence Dando Date: 19 July 2004

[4] Fill in if the information has been requested and if the results of the test were negative.

BUDAPEST TREATY ON THE INTERNATIONAL
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Centre de Recherche de Boissay
28310 Toury
France

NAME AND ADDRESS OF DEPOSITOR

I. IDENTIFICATION OF THE MICROORGANISM

Identification reference given by the DEPOSITOR:	Accession number given by the INTERNATIONAL DEPOSITARY AUTHORITY:
Brassica napus. CV Oleifera (METZG) CALIDA	NCIMB 41235

II. SCIENTI FIC DESCRIPTION AND/OR PROPOSED TAXONOMIC DESIGNATION

The microorganism identified under I above was accompanied by:

[ ] a scientific description

[X] a proposed taxonomic designation

(Mark with a cross where applicable)

III. RECEIPT AND ACCEPTANCE

This International Depositary Authority accepts the microorganism identified under I above, which was received by it on 9 July 2004 (date of the original deposit)[1]

IV. RECEIPT OF REQUEST FOR CONVERSION

The microorganism identified under I above was received by this International Depositary Authority on (date of the original deposit) and a request to convert the original deposit to a deposit under the Budapest Treaty was received by it on

(date of receipt of request for conversion)

V. INTERNATIONAL DEPOSITARY AUTHORITY

Name: NCIMB Ltd.,

Address: 23 St Machar Drive
Aberdeen
AB24 3RY
Scotland, UK.

Signature(s) of person(s) having the power to represent the International Depositary Authority or of authorised official(s):

Terence Dando

Date: 19 July 2004

[1] Where Rule 6/4(d) applies, such date is the date on which the status of International Depositary Authority was acquired.

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Monsanto SAS
Centre de Recherche de Boissay
28310 Toury
France

NAME AND ADDRESS OF THE PARTY TO WHOM THE VIABILITY STATEMENT IS ISSUED

I. DEPOSITOR	II. IDENTIFICATION OF THE MICROORGANISM
Name: AS ABOVE Address:	Accession number given by the INTERNATIONAL DEPOSITARY AUTHORITY: NCIMB 41235 Date of the deposit or of the transfer[1]: 9 July 2004

III. VIABILITY STATEMENT

The viability of the microorganism identified under II above was tested on 9 July 2004 [2]. On that date, the said microorganism was:

[3] [X] [3] viable

[ ] no longer viable

[1] Indicate the date of the original deposit or, where a new deposit or a transfer has been made, the most recent relevant date (date of the new deposit or date of the transfer).

[2] In the cases referred to in Rule 10.2(a)(ii) and (iii), refer to the most recent viability test.

[3] Mark with a cross the applicable box.

IV. CONDITIONS UNDER WHICH THE VIABILITY TEST HAS BEEN PERFORMED[4]	
V. INTERNATIONAL DEPOSITARY AUTHORITY	
Name: NCIMB Ltd., Address: 23 St Machar Drive Aberdeen AB24 3RY Scotland	Signature(s) of person(s) having the power to represent the International Depositary Authority or of authorised official(s): Terence Dondorf Date: 19 July 2004

[4] Fill in if the information has been requested and if the results of the test were negative.

Claims

1. A (bio-)lubricant comprising a rapeseed oil and at least one additive, wherein the saturated fatty acids content of said rapeseed oil is less than (about) 7%, 6,5%, 6% or 5,5%, based upon the total weight of the fatty acids present in the rapeseed oil.

2. A (bio-)lubricant according to claim 1 wherein said rapeseed oil further comprises more than (about) 72%, 75%, 80%, or 85% of oleic acid, and/or less than (about) 4%, 3,5%, 3%, 2%, or 1% of linolenic acid, based upon the total weight of the fatty acids present in the rapeseed oil.

3. A (bio-)lubricant according to claim 1 or 2, wherein said rapeseed oil is extracted from at least one variety selected from the group consisting of CARACAS, CONTACT, CABRIOLET, CALIDA, SPIRAL, MSP05, MSP11 and MSP13.

4. A (bio-) lubricant according to any of claims 1 to 3 further comprising another oleaginous oil, wherein the ratio rapeseed oil to said other oleaginous oil is such that the resulting oil comprises less than (about) 7%, 6,5%, 6% or 5,5% of saturated fatty acids, based upon the total weight of the fatty acids present in said resulting oil.

5. A (bio-)lubricant according to any of claims 1 to 4, wherein said ratio is such that said resulting oil further comprises more than (about) 72%, 75%, 80%, or 85% of oleic acid, and/or less than (about) 4%, 3,5%, 3%, 2%, 1% or 0,5% of linolenic acid, based upon the total weight of the fatty acids present in said resulting oil.

6. A (bio-)lubricant according to any of claims 1 to 5, wherein said other oleaginous oil is high oleic sunflower oil.

7. A (bio-)lubricant consisting of a base-fluid and at least one additive, said base-fluid consisting of a mono-alkyl esters composition resulting from the transesterification of rapeseed oil, comprising less than (about) 7%, 6,5%, 6% or 5,5% of mono-alkyl esters of saturated fatty acids, based upon the total weight of the mono-alkyl esters of fatty acids present in said composition.

8. A (bio-)lubricant according to claim 7 wherein said mono-alkyl esters composition further comprises more than (about) 72%, 75%, 80%, or 85% of mono-alkyl ester of oleic acid, and/or less than (about) 4%, 3,5%, 3%, 2%, or 1% of mono-alkyl ester of linolenic acid, based upon the total weight of the mono-alkyl ester of fatty acids present in said composition.

9. A (bio-)lubricant consisting of a base-fluid and at least one additive, said base-fluid consisting of a mono-alkyl esters composition resulting from the transesterification of rapeseed oil and another oleaginous oil, said composition comprising less than (about) 7%, 6,5%, 6% or 5,5% of mono-alkyl esters of saturated fatty acids, based upon the total weight of the mono-alkyl esters of fatty acids present in said composition.

10. A (bio-)lubricant according to claim 9 wherein said mono-alkyl esters composition further comprises more than (about) 72%, 75%, 80%, or 85% of mono-alkyl ester of oleic acid, and/or less than (about) 4%, 3,5%, 3%, 2%, 1% or 0,5% of mono-alkyl ester of linolenic acid, based upon the total weight of the mono-alkyl ester of fatty acids present in said composition.

11. A (bio-) lubricant according to claim 9 or 10, wherein said other oleaginous oil is high oleic sunflower oil.

12. A (bio-)lubricant according to any of claims 1 to 11, wherein said at least one additive is selected from the group consisting of bactericides, fongicides, metal deactivators, friction reducers, viscosity modifiers, antioxidants, antiwear agents, anti-scuff agents, pourpoint depressants, rust inhibitors, dispersants, detergents, and antifoam agents.

13. Use of a rapeseed oil comprising a saturated fatty acids content of less than (about) 7%, 6,5%, 6% or 5,5% based upon the total weight of the fatty acids present in the rapeseed oil, as a base fluid in (bio-)lubricants.

14. Use of a rapeseed oil according to claim 13, said rapeseed oil further comprising more than (about) 72%, 75%, 80%, or 85% of oleic acid, and/or less than (about) 4%, 3,5%, 3%, 2%, or 1% of linolenic acid, based upon the total weight of the fatty acids present in the rapeseed oil.

15. Use of a rapeseed oil according to claim 13 or 14, wherein said rapeseed oil is extracted from at least one variety selected from the groups consisting of CARACAS, CONTACT, CABRIOLET, CALIDA, MSP05, MSP11 and MSP13.

16. Use of a rapeseed oil and another oleaginous oil, wherein the ratio rapeseed oil to said other oleaginous oil is such that the resulting oil comprises less than (about) 7%, 6,5%, 6% or 5,5% of saturated fatty acids, based upon the total weight of the fatty acids present in said resulting oil, as a base fluid in (bio-)lubricants.

17. Use of a rapeseed oil and another oleaginous oil according to claim 16, wherein said resulting oil further comprises more than (about) 72%, 75%, 80%, or 85% of oleic acid, and/or less than (about) 4%, 3,5%, 3%, 2%, 1% or 0,5% of linolenic acid, based upon the total weight of the fatty acids present in said oil.

18. Use of a rapeseed oil and another oleaginous oil according to claim 16 or 17, wherein said other oleaginous oil is high oleic sunflower oil.

19. Use of a mono-alkyl esters composition resulting from the transesterification of rapeseed oil comprising less than (about) 7%, 6,5%, 6% or 5,5% of mono-alkyl esters of saturated fatty acids, based upon the total weight of the mono-alkyl esters of fatty acids present in said composition, as a base fluid in (bio-)lubricants.

20. Use of a mono-alkyl esters composition according to claim 19, said mono-alkyl esters composition further comprising more than (about) 72%, 75%, 80%, or 85% of mono-alkyl ester of oleic acid, and/or less than (about) 4%, 3,5%, 3%, 2%, or 1% of mono-alkyl ester of linolenic acid, based upon the total weight of the mono-alkyl ester of fatty acids present in said composition.

21. Use of a mono-alkyl esters composition resulting from the transesterification of rapeseed oil and another oleaginous oil, said composition comprising less than (about) 7%, 6,5%, 6% or 5,5% of mono-alkyl esters of saturated fatty

acids, based upon the total weight of the mono-alkyl esters of fatty acids present in said composition, as a base-fluid in (bio-)lubricants.

22. Use of a mono-alkyl esters composition according to claim 21, wherein said composition further comprises more than (about) 72%, 75%, 80%, or 85% of mono-alkyl ester of oleic acid, and/or less than (about) 4%, 3,5%, 3%, 2%, 1% or 0,5% of mono-alkyl ester of linolenic acid, based upon the total weight of the mono-alkyl ester of fatty acids present in said composition.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 29 1453

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	US 5 965 755 A (SERNYK ET AL) 12 October 1999 (1999-10-12) * column 2, lines 10-34; tables 1,4 *	1-3, 12-15 7-12, 19-22	INV. C10M101/04 C10M169/04 C10M105/34
X	PATENT ABSTRACTS OF JAPAN vol. 017, no. 339 (C-1075), 28 June 1993 (1993-06-28) & JP 05 039497 A (TSUKISHIMA SHOKUHIN KOGYO KK), 19 February 1993 (1993-02-19) * abstract; table 1 *	1,2, 12-14	
Y	US 6 312 623 B1 (OOMMEN THOTTATHIL V ET AL) 6 November 2001 (2001-11-06) * column 3, lines 3-63 *	1-6, 12-18	
Y	WO 03/093403 A (RENEWABLE LUBRICANTS, INC) 13 November 2003 (2003-11-13) * page 1, lines 9-16 * * page 3, lines 8-18 * * page 8, lines 23-26 *	1-6, 12-18	
			TECHNICAL FIELDS SEARCHED (IPC)
A	US 4 627 192 A (FICK ET AL) 9 December 1986 (1986-12-09) * tables 2-4 *	1-6, 12-18	C10M
Y	US 5 338 471 A (LAL ET AL) 16 August 1994 (1994-08-16) * claim 1; table II *	7-12, 19-22	
Y	US 5 773 391 A (LAWATE ET AL) 30 June 1998 (1998-06-30) * column 5, line 1 - column 6, line 3 *	1-22	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	6 June 2006	Kazemi, P

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

European Patent Office

Application Number
EP 05 29 1453

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

European Patent Office

LACK OF UNITY OF INVENTION
SHEET B

Application Number
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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-6,12-18

A lubricant comprising a rapeseed oil (and an additive) having a specified saturated fatty acids contents of around below 7% by weight and its use as base fluid, or comprising rapeseed oil and another oil having a saturated fatty acid content of around below 7% by weight and its use as base fluid.

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2. claims: 7-12,19-22

A lubricant consisting of a base fluid (and an additive), the base fluid consisting of a mono-alkyl ester composition resulting from the transesterification of rapeseed oil comprising a specified content of mono-alkyl esters of saturated fatty acids of around below 7% by weight and its use as base fluid, or consisting of a base fluid (and an additive), the base fluid consisting of a mono-alkyl ester composition resulting from the transesterification of rapeseed oil and another oil comprising a content of mono-alkyl esters of saturated fatty acids of around below 7% by weight and its use as base fluid.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 29 1453

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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06-06-2006

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5965755 A	12-10-1999	AU 692791 B2	18-06-1998
		AU 7442894 A	04-05-1995
		CA 2133881 A1	13-04-1995
		DE 69424616 D1	29-06-2000
		DE 69424616 T2	15-02-2001
		EP 0647406 A2	12-04-1995
JP 05039497 A	19-02-1993	NONE	
US 6312623 B1	06-11-2001	US 6274067 B1	14-08-2001
WO 03093403 A	13-11-2003	AU 2003265939 A1	17-11-2003
		CA 2498812 A1	13-11-2003
		EP 1534804 A1	01-06-2005
US 4627192 A	09-12-1986	US 4743402 A	10-05-1988
US 5338471 A	16-08-1994	AU 673104 B2	24-10-1996
		AU 7446694 A	04-05-1995
		CA 2117957 A1	16-04-1995
		EP 0651044 A2	03-05-1995
		JP 7157790 A	20-06-1995
US 5773391 A	30-06-1998	NONE	

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