

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number:

0 302 149 B1

(12)

EUROPEAN PATENT SPECIFICATION

- (45) Date of publication of patent specification: **02.01.92** (51) Int. Cl.⁵: **C10M 129/02**, C10M 141/06,
C10M 141/10, //(C10M129/02,
(21) Application number: **87306874.6** 129:06,129:36),(C10M141/06,
129:06,133:08),(C10M141/10,
(22) Date of filing: **03.08.87** 129:76,133:08,137:04),
C10N40:00

(54) **Lubricant oil composition with improved friction reducing properties.**

(43) Date of publication of application:
08.02.89 Bulletin 89/06

(45) Publication of the grant of the patent:
02.01.92 Bulletin 92/01

(84) Designated Contracting States:
BE DE FR GB

(56) References cited:
EP-A- 0 093 598
FR-A- 1 047 117
GB-A- 708 017

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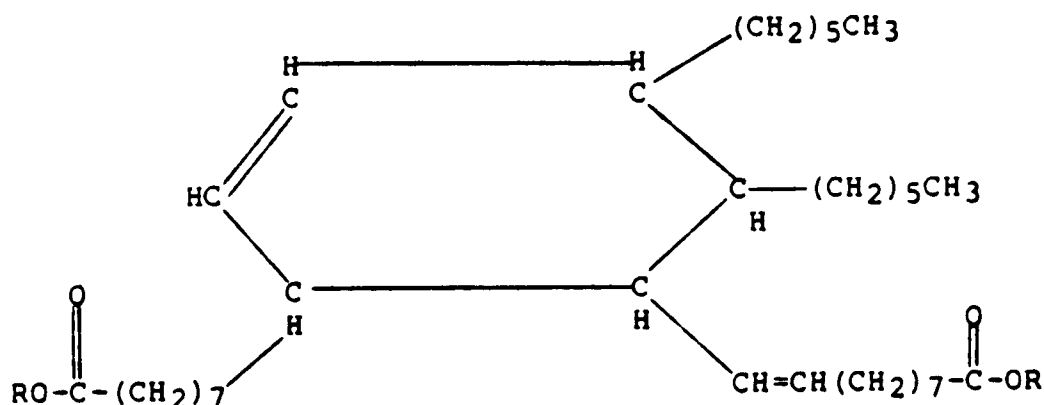
Description

This invention is directed to a lubricating oil composition containing an oxygenated (hydroxy) ester of a dimer acid in combination with an oil soluble alkanol phosphate to provide improved friction reducing properties and to a method of reducing friction in an internal combustion engine by using a lubricating oil composition which contains said additives.

European published patent application 93 598A discloses a lubricating oil composition containing, as a friction reducing additive, the reaction product of a dimer carboxylic acid having a total of 24 to 90 carbon atoms and a polyhydric alcohol having at least three hydroxyl groups and 3 to 18 carbon atoms.

UK patent 708 017 discloses a lubricating oil composition containing a fatty acid ester of an alcohol as an oiliness agent combined with an alkyl phosphate as a film strength improver. The ester is preferably an ester of a fatty acid containing between 10 to 20 carbon atoms and a monohydric alcohol. The alkyl phosphate is preferably a trialkyl phosphate. The two additives act together synergistically to improve the load bearing properties of the lubricating oil composition. The composition is particularly suitable for turbine oils.

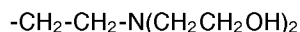
The friction reducing additive which is used in this invention is an oil soluble oxygenated (hydroxy) ester of a dimer acid (HEDA hydroxy ester of dimer acid) in combination with an oil soluble alkanol or alkyl phosphate, wherein the oxygenated (hydroxy) ester is characterized by the formula:



where R is selected from the group consisting of

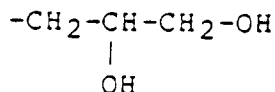


with n being equal to 1 to 5 (hereafter designated as HEDA);



(hereinafter designated as LA214);

and

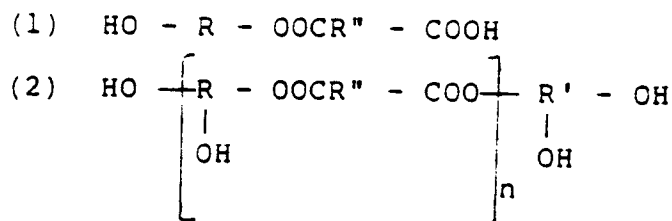


(hereinafter designated as LA200).

The use of an oxygenated (hydroxy) ester of the dimer acid as a friction-reducing agent for oils in a gasoline engine can be limited by poor solubility in the lubricating oil and adverse interactions with other lubricating oil components, wherein some of these interactions show up as sediment formation. The present invention teaches that the solubilization and stabilization of the dimer acid esters in the lubricating oils is improved by the addition of an oil-soluble alkanol or alkyl phosphate.

The oxygenated (hydroxy) esters of the dimer acid are classified as reaction products of a dimer

carboxylic acid and a polyhydric alcohol. Such a reaction product may be a partial, di- or polyester, with typical formulae represented as follows when using a trihydric alcohol:



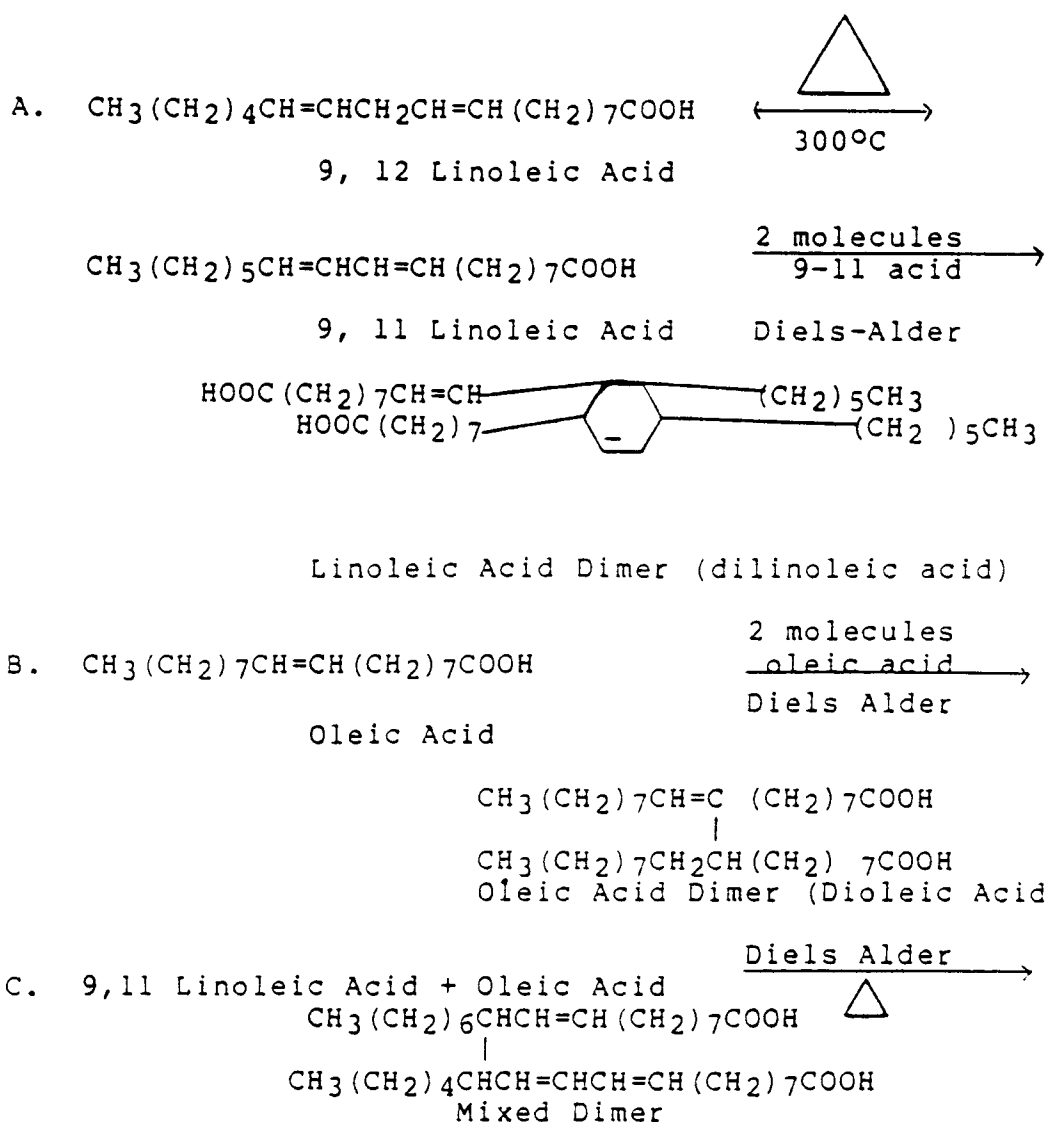
wherein R'' is the hydrocarbon radical of the dimer acid; each R and R' may be the same or different hydrocarbon radicals associated with a trihydric alcohol; and n is an integer which typically is 1 to 5 or higher. It will, of course, be appreciated that the ester reaction products can be obtained by reacting a dimer carboxylic acid or a mixture of such acids with a trihydric alcohol or other polyhydric alcohol or mixtures of such alcohols.

The alcohol used in preparing the friction reducing reaction product additive of this invention is a polyhydric alcohol having at least 2 hydroxy groups and from 3 to 18 carbon atoms. Generally, such compounds will be aliphatic and may contain branched or unbranched hydrocarbon groups, as well as other functional groups, such as nitrogen, sulfur and phosphorus. Such polyhydric alcohols will contain at least 2 hydroxyl groups and may contain more, generally from 3 to 6 hydroxyl groups, with the upper amount limited by the degree of solubility and effectiveness of the reaction product in the lubricating oil composition. Preferably, such polyhydric alcohol will contain 2 to 4 hydroxyl groups and 3 to 12 carbon atoms. More preferably, such polyhydric alcohol will be saturated, contain 3 hydroxyl groups and 3 to 8 carbon atoms. Compounds of this type include diethylene glycol, glycerol (i.e., 1, 2, 3, propane triol), 1, 2, 6-trihydroxyhexane and 2, 2', 2'' nitrilotriethanol.

The carboxylic acid used in preparing the oxygenated (hydroxy) esters of the dimer acid friction reducing reaction product of this invention will be a dimer of an aliphatic saturated or unsaturated carboxylic acid, said dimer acid having a total of 24 to 90 carbon atoms, and from 9 to 42 carbon between the carboxylic acid groups. Preferably, the dimer acid will have a total of 24 to 60 carbon atoms and 12 to 42 carbon atoms between the carboxylic acid groups, and more preferably a total of 24 to 44 carbon atoms and 16 to 22 carbon atoms between the carboxylic acid groups.

The molar quantities of the dimer acid and polyhydric alcohol reactants may be adjusted so as to secure either a complete ester or partial ester and generally from 1 to 3 or more moles of polyhydric alcohol will be used per mole of dimer acid and preferably from 2 to 3 moles of alcohol per mole of acid.

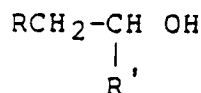
While any of the dimer acids and polyhydric alcohols described above may be used in preparing the friction reducing additive of this invention, the most preferred esters, as set forth above, are those wherein the carboxyl groups are separated from the closest carboxyl group by from 2 to 12 carbon atoms. Particularly useful ester additives are obtained when the acid used is a dimer of a fatty acid, preferably those fatty acids containing 12 to 22 carbon atoms. Such dimers are, of course, clearly taught in U. S. Patent No. 3,180,832, which was granted on April 27, 1965, and U. S. Patent No. 3,429,817, which was granted on February 25, 1969, and as here indicated the hydrocarbon portion of the dimer carboxylic acid thus obtained may contain a 6 member ring. The formation of the dimer from linoleic acid, oleic acid and mixtures of these acids is illustrated by the following reactions:



It will, of course, be appreciated that while the reactions illustrated produce the dimers, commercial application of the reactions will generally also lead to trimer formation and, in some cases, the product thus obtained will contain minor amounts of unreacted monomer or monomers. As a result, commercially available dimer acids may contain as much as 25% trimer and the use of such mixtures is within the scope of the present invention. It is also noted that prepared dimer acids may be saturated or unsaturated. While in some instances the unsaturated dimer acids are preferred, it is also contemplated that if desired dimer acids formed having one or more saturated bonds may have such unsaturation removed, e.g., by hydrogenation.

The ester friction reducing additive of this invention will generally be used at a concentration level of from 0.1 to 2.0 parts by weight per 100 parts of lubricating oil composition, more preferably from 0.1 to 1.0, and most preferably from 0.2 to 1.0 parts.

The oil soluble alkanols which are added to the lubricating base oil and the oxygenated (hydroxy) ester of the dimer acid are:



wherein R = 2-16 carbon atoms and is straight chained or branched and R' is H or a straight or branched

hydrocarbon chain containing 1 to 5 carbon atoms.

The oil-soluble alkanol will generally be used at a concentration of from 1 to 10 parts by weight per part of the ester friction reducing additive, more preferably 1 to 5, and most preferably about 2 to about 4.

The lubricating base oil will generally comprise a major amount of the lubricating composition, i.e., at least 50% by weight thereof, and will include liquid hydrocarbons, such as the mineral lubricating oils and the synthetic lubricating oils, and mixtures thereof. The synthetic oils which can be used include diester oils, such as di(2-ethylhexyl) sebacate, azelate and adipate; complex ester oils, such as those formed from dicarboxylic acids, glycols and either monobasic acids or monohydric alcohols; silicone oils; sulfide esters; organic carbonates; and other synthetic oils known in the art.

Other additives, known in the art, may be added to the oil composition of the present invention to form a finished oil. Such additives include dispersants, antiwear agents, antioxidants, corrosion inhibitors, detergents, pour point depressants, extreme pressure additives, viscosity index improvers, etc. These additives are typically disclosed, for example, in Lubricant Additives by C. V. Smalheer and R. Kennedy Smith, 1967, pages 1-11, and in U. S. Patent No. 4,105,571.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The following Examples are further illustrative of this invention and are not to be construed as limitations thereof.

Example 1

Oils A and B are fully formulated SF quality SAE 10W-30 passenger car engine oils. Each oil is formulated with standard additives used in the industry to meet the requirements of current gasoline engines. Oils A and B contain the same viscosity index improvers, dispersants, detergents, antioxidants, pour depressants and antifoamant additives. Oil A contains a zinc dialkyl dithiophosphate antiwear additive made with primary alcohols, while oil B contains a zinc dialkyl dithiophosphate antiwear additive made with secondary alcohols. This is the only difference between oils A and B.

Oil A and oil B, each formulated with 0.5 weight percent HEDA solubilized with C_8O_h at a 3/1 alcohol/HEDA weight ratio were tested for relative friction using a ball on cylinder test, described in the Journal of the American Society of Lubricating Engineers, entitled ASLE Transactions, Volume 4, pages 1-11, 1961. In essence, the apparatus consists basically of a fixed metal ball loaded against a rotating cylinder. The weight on the ball and the rotation of the cylinder can be varied during any given test or from test to test. Also, the time of any given test can be varied. Generally, however, steel on steel is used at a constant load, constant rpm, and a fixed time and in each of the tests of these examples a 4 Kg load, 0.26 rpm and 70 minutes was used.

Ball-on-Cylinder (BOC) TestTest Conditions

Load on Ball, kg = 4
 Cylinder Speed, rpm = .26
 Oil Sump Temp., °C = 104
 Test Duration, Minutes = 70

BOC Coefficient of Friction (COF)
at 70 Minutes (0 = Best)

20	Oil	Fresh Oil	After 3 Hours LST*
	Reference	0.260	0.280
25	Oil A + HEDA/OXOC ₈ OH = 1/3)	0.050	0.065
	Reference	0.250	--
30	Oil B + HEDA/OXOC ₈ OH = 1/3)	0.055	0.070
	Reference	0.220	--
	Oil A	0.090	--
35	Oil B	0.125	0.105

*See U. S. Patent No. 4,479,883, column 6, lines 55-60.

As summarized above, oil A and oil B, each with 0.5 weight percent HEDA and 1.5 weight percent C₈OH, gave lower BOC friction than the base case oils without HEDA/C₈ alcohol (oil A or oil B). As indicated in U. S. Patent No. 4,479,883, the BOC data on the oxidized oil from the 3 hour Lube Stability Test (LST) is a better predictor of fuel economy differences during field service than fresh oil data.

Example 2

Table I lists the surfactants and alcohols tested as solubilizers for dimer acid esters. The designation CO for the solubilizer refers to a series of ethoxylated nonyl phenols produced by GAF Corp. under the trademark name Igepal®. The prefix OXO refers to oil soluble alcohols manufactured by the OXO process. The designation DM refers to the Igepal DM® series of ethoxylated dinonyl phenols manufactured by the GAF Corp. Spans® are products of ICI Americas, Inc.; Tetronics® are products of BASF Wyandott Corp.; Tritons® are products of Rohm and Haas, Inc.; Aerosol® are products of American Cyanamid; and Emphos® designates a series of alkyl phosphates manufactured by Witco Chemical Corp. Of all the materials tested, only the alkanols and alkyl phosphates formed clear solutions, with HEDA in oil A at the ratios of solubilizer/ester indicated in the second column of Table I.

TABLE I
Solubilization of Dimer Acid Esters

CONCENTRATES			OILS PLUS CONCENTRATES		
Solubilizer/Additive	Ratio	Appearance (l)	SI50N	Oil A	Oil B
C9Phenol/HEDA	2:1,4:1	1, 1	- , 2	4, 3	5, 3
CO210/HEDA	2:1,4:1	1, 1	- , 3	3, 2	5, 2
CO430/HEDA	2:1,4:1	1, 1	- , -	3, 3	5, 3
CO530/HEDA	- , 4:1	- , 1	- , 5	- , 4	- , 4
CO630/HEDA	- , 4:1	- , 1	- , 5	- , 5	- , 5
CO710/HEDA	- , 4:1	- , 1	- , 5	- , 5	- , 5
C9Phenol/LA200	2:1,4:1	1, 1	- , -	5, 5	5, 5
CO210/LA200	2:1,4:1	1, 1	- , -	5, 5	5, 5
CO430/LA200	2:1,4:1	1, 1	- , -	5, 5	5, 5
C9Phenol/LA214	2:1,4:1	1, 1	- , -	5, 5	5, 5
CO210/LA214	2:1,4:1	1, 1	- , -	5, 5	5, 5
CO430/LA214	2:1,4:1	1, 1	- , -	5, 5	5, 5
OXOC6OH/HEDA	2:1,3:1,4:1	1, 1, 1	- , - , -	1, 1, 1	2, 1, 1
OXOC8OH/HEDA	2:1,3:1,4:1	1, 1, 1	- , - , -	1, 1, 1	2, 2, 1
OXOC13OH/HEDA	- , - , 4:1	- , - , 1	- , - , 2	- , - , 2	- , - , 2
OXOC6OH/LA200	2:1,3:1,4:1	1, 1, 1	- , - , -	5, 5, 5	5, 5, 5
OXOC8OH/LA200	- , - , 4:1	- , - , 1	- , - , -	- , - , 5	- , - , 5
OXOC10OH/LA200	2:1,3:1,4:1	1, 1, 1	- , - , -	5, 5, 5	5, 5, 5
OXOC13OH/LA200	2:1,3:1,4:1	1, 1, 1	- , - , -	5, 5, 5	5, 5, 5
OXOC6OH/LA214	2:1,3:1,4:1	1, 1, 1	- , - , -	5, 5, 5	5, 5, 5
OXOC8OH/LA214	2:1,3:1,4:1	- , - , 1	- , - , -	5, 5, 5	5, 5, 5
OXOC10OH/LA214	2:1,3:1,4:1	1, 1, 1	- , - , -	5, 5, 5	5, 5, 5
OXOC13OH/LA214	2:1,3:1,4:1	1, 1, 1	- , - , -	5, 5, 5	5, 5, 5

TABLE I - Continuation 1

CONCENTRATES			OILS PLUS CONCENTRATES		
Solubilizer/Additive	Ratio	Appearance (l)	SL50N	Oil A	Oil B
C8OH/HEDA	2:1,3:1,4:1	1, 1, 1	-	5, -	-
C8OH/LA200	2:1,3:1,4:1	1, 1, 1	-	5, 5, 5	-
C8OH/LA214	2:1,3:1,4:1	1, 1, 1	-	5, 5, 5	-
OXOC8ACET/HEDA	4:1	1	3	4	4
OXOC9ACET/HEDA	2:1,3:1	1, 1	2, 2	-	-
OXOC13ACET/HEDA	4:1	1	1	5	5
OXOC9ACET/LA200	2:1,3:1	5, 4	5, 5	-	-
OXOC9ACET/LA214	2:1,3:1	5, 4	5, 5	-	-

TABLE I - Continuation 2

CONCENTRATES		OILS PLUS CONCENTRATES			
Solubilizer/Additive	Ratio	Appearance	Sl50N	Oil A	Oil B
DM430/HEDA	4:1	1	5	3	
DM530/HEDA	4:1	1	5	4	4
DM710/HEDA	4:1	1	5	5	5
OXOC8OH/(HEDA/LA200) = (95/5)	4:1	-	-	1	-
= (90/10)	4:1	-	-	1	-
= (85/15)	4:1	-	-	2	-
= (80/20)	4:1	-	-	3	-
= (75/25)	4:1	-	-	4	-
= (70/30)	4:1	-	-	5	-
= (60/40)	4:1	-	-	5	-
= (50/50)	4:1	-	-	5	-
Butyl Cellulose/LA200	4:1	1	-	5	-
Oleic Acid/LA200	4:1	1	-	5	-
Span 80/LA214	4:1	1	-	5	-
Span 85/LA214	4:1	1	-	5	-
Tetronic 1501/LA214	4:1	5	-	-	-
Tetronic 6101/LA214	4:1	5	-	-	-

TABLE I - Continuation 3

CONCENTRATES		OILS PLUS CONCENTRATES			
Solubilizer/Additive	Ratio	Appearance	Sl50N	Oil A	Oil B
Triton X-15/LA214	4:1	1	-	5	-
Aerosol MA80/LA200	4:1	1	-	5	-
Siloxane/LA200	4:1	5	-	-	-
Emphos PS121/HEDA	4:1	1	-	1	-
Emphos PS220/HEDA	4:1	1	-	1	-
Emphos CS1361/HEDA	4:1	1	-	1	-
Emphos CS1361/LA200	4:1	1	-	5	-
Emphos PS220/LA200	4:1	1	-	5	-
Emphos PS121/LA200	4:1	1	-	5	-

(1) 1-Excellent; 2-Very good; 3-Good; 4-Fair; 5-Poor. The friction reducing dimer acid product is used in all cases at the 0.5 weight percent level.

Example 3

A series of alkanols, including C₆, C₈ and C₁₃, were used as solubilization agents with HEDA in lubricating oils A and B. Shown in Table II is the appearance of the oils using 0.5 weight percent HEDA

solubilized by the alkanols. As illustrated, solubilization of HEDA in oil B requires more alkanol than required by oil A to obtain a bright and clear oil. To test the stability of these systems, oil A, containing 0.5 weight percent of HEDA, solubilized with 3 parts of C₈OH per part of HEDA was stored two months at 22 °C with no apparent change. In addition, this oil was temperature cycled for one-half hour at 100 °C, one and one-half hours at -14 °C, one-half hour at -40 °C and one hour at 100 °C with no apparent change in clarity. Also indicated is the criticality of the chain length in the alkanol. C₁₃OH is less effective in solubilizing HEDA in both oil A and oil B relative to C₈OH and C₆OH.

TABLE II

Solubilization of 0.5 Wt.% HEDA by Oxo-Alcohols				
			Appearance ⁽¹⁾	
Alcohol	B. P. °C	Alcohol Ester Ratio	Oil A	Oil B
C ₆ OH	151 °	2/1	1	2
		3/1	1	1
		4/1	1	1
C ₈ OH	183 °	2/1	1	2
		3/1	1	
		4/1	1	1
C ₁₃ OH	260 °	4/1	2	2

(1) 1-Bright and Clear; 2-Clear

Claims

1. A lubricating oil composition comprising:

- (a) a lubricating base oil;
- (b) from 0.1 to 2.0 parts by weight per 100 parts by weight of said lubricating oil composition of the reaction product of a dimer carboxylic acid having a total of 24 to 90 carbon atoms with 9 to 42 carbon atoms between carboxylic acid groups and a polyhydric alcohol having at least 3 to 18 carbon atoms, said reaction product being formed using from 1 to 3 moles of alcohol per mole of dimer acid; and
- (c) from 1 to 10 parts by weight of an oil soluble compound per part of the reaction product of (b) wherein said oil soluble compound is selected from the alkanols and alkyl phosphates.

2. The composition of claim 1 wherein said dimer carboxylic acid has 24 to 60 carbon atoms and said polyhydric alcohol has 3 to 12 carbon atoms.

3. The composition of claim 1 or claim 2 wherein said polyhydric alcohol has 2 or more hydroxyl groups.

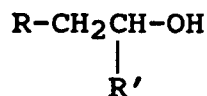
4. The composition of any one of claims 1 to 3 wherein from 0.1 to 1.0 parts by weight of said reaction product is used per 100 parts by weight of lubricating oil composition.

5. The composition of any one of claims 1 to 4 wherein said alcohol is selected from diethylene glycol, glycerol, 1, 2, 6 trihydroxyhexane and 2, 2', 2" nitrilotriethanol.

6. The composition of any one of claims 1 to 5 wherein said carboxylic acid is a fatty acid which contains 12 to 22 carbon atoms.

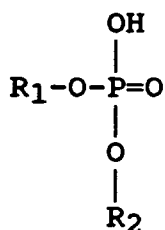
7. The composition of any one of claims 1 to 6 wherein from 0.1 to 1.0 parts by weight (pbw) of said reaction product is used per 100 pbw of the composition, and said alcohol is selected from diethylene glycol, glycerol, 1, 2, 6 trihydroxyhexane and 2, 2', 2" nitrilotriethanol.

8. The composition of any one of claims 1 to 7 wherein said alkanol is characterized by the formula:



where R = 2-16 carbon atoms and can be linear or branched and R' is H or a straight or branched hydrocarbon chain containing 1 to 5 carbon atoms.

9. The composition of any one of claims 1 to 8 wherein said alkyl phosphate is characterized by the formula:



where R₁ is an alkyl or alkyl aryl group of 6-18 carbons on the alkyl chain and R₂ is the same as R₁ or H.

10. A method of reducing friction in an internal combustion engine comprising lubricating said engine using a lubricating oil composition containing from 0.1 to 2 parts by weight per 100 parts by weight of said lubricating oil composition of an additive which is the reaction product of a dimer carboxylic acid having 24 to 90 carbon atoms and a polyhydric alcohol having at least 2 hydroxyl groups and 3 to 18 carbon atoms, in combination with an oil soluble compound selected from the group consisting of alkanols and alkyl phosphates.

Revendications

1. Composition d'huile lubrifiante, comprenant :

- (a) une huile de base lubrifiante;
- (b) de 0,1 à 2,0 parties en poids pour 100 parties en poids de ladite composition d'huile lubrifiante, du produit de réaction d'un acide carboxylique dimère comportant un total de 24 à 90 atomes de carbone, 9 à 42 atomes de carbone étant répartis entre les groupes acides carboxyliques, et d'un polyalcool comportant au moins 3 à 18 atomes de carbone, ledit produit de réaction étant formé au moyen de 1 à 3 moles d'alcool par mole d'acide dimère; et
- (c) de 1 à 10 parties en poids d'un composé oléosoluble par partie du produit de réaction de (b), dans lequel ledit composé oléosoluble est choisi parmi les alcanols et les phosphates d'alkyle.

2. Composition selon la revendication 1, dans laquelle ledit acide carboxylique dimère comporte 24 à 60 atomes de carbone et ledit polyalcool comporte 3 à 12 atomes de carbone.

3. Composition selon la revendication 1 ou 2, dans laquelle le polyalcool comporte 2 groupes hydroxyle ou plus.

4. Composition selon l'une quelconque des revendications 1 à 3, dans laquelle on utilise de 0,1 à 1,0 partie en poids dudit produit de réaction pour 100 parties en poids de composition d'huile lubrifiante.

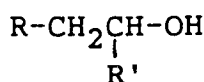
5. Composition selon l'une quelconque des revendications 1 à 4, dans laquelle ledit alcool est choisi parmi le diéthylèneglycol, le glycérol, le 1,2,6-trihydroxyhexane et le 2,2',2"-nitrilotriéthanol.

6. Composition selon l'une quelconque des revendications 1 à 5, dans laquelle ledit acide carboxylique

est un acide gras qui contient 12 à 22 atomes de carbone.

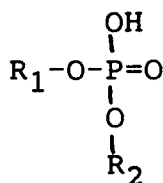
7. Composition selon l'une quelconque des revendications 1 à 6, dans laquelle on utilise de 0,1 à 1,0 parties en poids dudit produit de réaction, pour 100 parties en poids de la composition, et ledit alcool est choisi parmi le diéthylèneglycol, le glycérol, le 1,2,6-trihydroxyhexane et le 2,2',2"-nitrilotriéthanol.

8. Composition selon l'une quelconque des revendications 1 à 7, dans laquelle ledit alcool est caractérisé par la formule :



dans laquelle R = 2-16 atomes de carbone et peut être linéaire ou ramifié et R' est H ou une chaîne hydrocarbonée linéaire ou ramifiée contenant 1 à 5 atomes de carbone.

9. Composition selon l'une quelconque des revendications 1 à 8, dans laquelle ledit phosphate d'alkyle est caractérisé par la formule :



dans laquelle R₁ est un groupe alkyle ou alkylaryle de 6-18 atomes de carbone sur la chaîne alkyle et R₂ est identique à R₁ ou est H.

10. Procédé pour réduire le frottement dans un moteur à combustion interne, comprenant la lubrification dudit moteur au moyen d'une composition d'huile lubrifiante contenant de 0,1 à 2 parties en poids, pour 100 parties en poids de ladite composition d'huile lubrifiante, d'un additif qui est le produit de réaction d'un acide carboxylique dimère comportant 24 à 90 atomes de carbone et d'un polyalcool comportant au moins 2 groupes hydroxyle et 3 à 18 atomes de carbone, en combinaison avec un composé oléosoluble choisi dans le groupe constitué par les alcanols et les phosphates d'alkyle.

Patentansprüche

1. Schmierölzusammensetzung, die

a) ein Basisschmieröl;

b) 0,1 bis 2,0 Gewichtsteile pro 100 Gewichtsteile der Schmierölzusammensetzung des Reaktionsprodukts einer dimeren Carbonsäure mit insgesamt 24 bis 90 Kohlenstoffatomen und 9 bis 42 Kohlenstoffatomen zwischen den Carbonsäuregruppen und einem mehrwertigen Alkohol mit mindestens 3 bis 18 Kohlenstoffatomen, wobei das Reaktionsprodukt unter Verwendung von 1 bis 3 Molen Alkohol pro Mol dimerer Säure gebildet worden ist; und

c) ein bis 10 Gewichtsteile einer öllöslichen Verbindung pro Teil des Reaktionsprodukts aus b), wobei die öllösliche Verbindung ausgewählt ist aus den Alkanolen und Alkylphosphaten, umfaßt.

2. Zusammensetzung nach Anspruch 1, bei der die dimere Carbonsäure 24 bis 60 Kohlenstoffatome aufweist und der mehrwertige Alkohol 3 bis 12 Kohlenstoffatome aufweist.

3. Zusammensetzung nach Anspruch 1 oder 2, bei der der mehrwertige Alkohol 2 oder mehr Hydroxylgruppen aufweist.

4. Zusammensetzung nach einem der Ansprüche 1 bis 3, bei der 0,1 bis 1,0 Gewichtsteile des

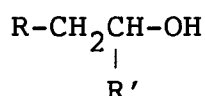
Reaktionsprodukts pro 100 Gewichtsteile der Schmierölszusammensetzung eingesetzt worden sind.

5. Zusammensetzung nach einem der Ansprüche 1 bis 4, bei dem der Alkohol ausgewählt ist aus Diethylenglykol, Glycerin, 1,2,6-Trihydroxyhexan und 2,2',2"-Nitrilotriethanol.

6. Zusammensetzung nach einem der Ansprüche 1 bis 5, bei dem die Carbonsäure eine Fettsäure ist, die 12 bis 22 Kohlenstoffatome enthält.

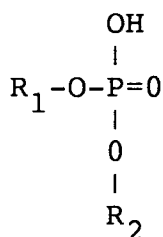
7. Zusammensetzung nach einem der Ansprüche 1 bis 6, bei der 0,1 bis 1,0 Gewichtsteile (pbw) des Reaktionsprodukts pro 100 pbw der Zusammensetzung eingesetzt worden sind und der Alkohol ausgewählt ist aus Diethylenglykol, Glycerin, 1,2',6-Trihydroxyhexan und 2,2',2"-Nitrilotriethanol.

8. Zusammensetzung nach einem der Ansprüche 1 bis 7, bei der das Alkanol durch die Formel:



gekennzeichnet ist, wobei R 2 bis 16 Kohlenstoffatome enthält und linear oder verzweigt sein kann und R' Wasserstoff oder eine gerade oder verzweigte Kohlenwasserstoffkette ist, die 1 bis 5 Kohlenstoffatome enthält.

9. Zusammensetzung nach einem der Ansprüche 1 bis 8, bei der das Alkylphosphat durch die Formel



gekennzeichnet ist, wobei R₁ ein Alkyl- oder eine Alkylarylgruppe mit 6 bis 18 Kohlenstoffen in der Alkylkette ist und R₂ das gleiche wie R₁ oder H ist.

10. Verfahren zur Reibungsminderung in einem Verbrennungsmotor, bei dem der Motor geschmiert wird, indem eine Schmierölszusammensetzung verwendet wird, die 0,1 bis 2 Gewichtsteile pro 100 Gewichtsteile der Schmierölszusammensetzung eines Additivs enthält, daß das Reaktionsprodukt in der dimeren Carbonsäure mit 24 bis 90 Kohlenstoffatomen und eines mehrwertigen Alkohols mit mindestens zwei Hydroxylgruppen und 3 bis 18 Kohlenstoffatomen ist, in Kombination mit einer öl-löslichen Verbindung ausgewählt aus der Gruppe bestehend aus Alkanolen und Alkylphosphaten.