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LUBRICATING OIL COMPOSITIONS AND ADDITIVES FOR LUBRICATING OILS

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The present invention relates to new compositions of products suitable for lubricating purposes as well as to compositions suitable as additives for lubricating oils.

Oil-soluble salts of sulphonic acids have been added to mineral oils, especially to motor lubricating oils, in order to keep in dispersion the resinous, asphaltic-, and coke-like products formed during the operation of the motor, and thus to prevent the precipitations from causing trouble in the motor. Numerous sulphonates are either soluble with difficulty or even immiscible in hydrocarbon oils, while others are readily soluble. Finally, there are those which only swell to a certain degree. In view of these different physical properties, only a small part of the numerous sulphonates may be added to the hydrocarbon oils in the desired amount.

Whereas the copending application, Serial No. 346,784, relates to a method of forming liquid hydrocarbon oil solutions of naphthenic acid salts, the present invention relates to similar methods where surface-active sulphonates of various kinds may be added to hydrocarbons even in a higher form of concentration without impairing the desired properties of the mixtures.

A further object of the present invention consists in improving the properties of the sulphonates desired in motor oils by supplementing their dispersing action by an improved detergent effect.

It is another object of the present invention to produce highly qualified motor oil additives which are easily soluble and form very stable solutions without any special apparatus or other means being required therefor.

According to the invention it has been found that sulphonates are more easily dissolved and mixed with lubricating oils if polyalkyleneglycol derivatives as well as higher boiling mono-ethers are being added thereto. Furthermore it has been found that the properties of the lubricating oils obtained by such additions comply with the highest requirements of oils for internal combustion engines insofar as their lubricating qualities as well as their chemical and physical stability is concerned. Therefore, the incorporation of said compounds in lubricating oils as prescribed by the invention is also advantageous in those cases in which the dissolving difficulties described above exist only in a minor extent, or not at all. This underlines the expediency of incorporating sulphonates in motor lubricating in general in combination with polyalkyleneglycol derivatives and higher boiling ethers.

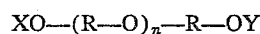
The term "sulphonates" as it is being used herein refers to any salts of surface active sulphonic acids, and particularly polyvalent metal salts of such sulphonic acids. Examples of such salts are sulphonates of alkaline earths, such as calcium, barium, strontium, magnesium, as well as sulphonates of lead, zinc, aluminum, chromium, nickel, copper, tin, and cadmium. Also alkali and ammonium salts may be used.

The following are examples of sulphonic acids suitable for this purpose: Sulphonic acids which are obtained by refining petroleum distillate with sulphuric acid, such as

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mahogani-sulphonic acid and green-oil sulphonic acid, as well as straight-chained or cyclic sulphonic acid, with or without side chains. Such acids are, for example: n-alkyl-sulphonic acid, alkyl-benzolsulphonic acid, dialkyl-naphthalenesulphonic acid, fatty alcohol sulphates, naphthenyl-benzolsulphonic acid. Those sulphonic acids which contain at least 8 and preferably more than 12 carbon atoms in their organic radical have particularly high dispersing properties in motor oils.

The polyalkyleneglycol derivatives to be used according to the present invention are etherified or esterified polyalkyleneglycols of the general formula



in which R represents an alkylene radical having 2 or 3 carbon atoms, n represents a whole number up to 20, preferably from 2 to 7, one of the groups X and Y is selected from the class consisting of hydrogen, alkyl-, aryl-, aralkyl-, alkaryl-, alicyclic and acyl-radicals, while the other is selected from the class consisting of alkyl-, aryl-, aralkyl-, alkaryl-, alicyclic and acyl-radicals having more than 6 and preferably more than 8 carbon atoms.

Examples for hydrocarbon radicals with more than 6 carbon atoms are the following: 2 ethylhexyl-, n-octyl-, dodecyl-, tetradecyl-, octadecyl-, and octadecenyl-radical; further alkyl-radicals of those alcohols which are obtained by hydrogenation of natural or synthetic fatty acids which are produced by reduction of carbon monoxide under normal or increased pressure by the exosynthesis or by the oxidation of paraffin wax; furthermore, the phenyl-, dibutylphenyl-, dodecylphenyl-, naphthyl-, heptylnaphthyl-, hexadecylnaphthyl-, benzyl-, phenylethyl-, phenyloctadecyl-radical, etc.; also the methylcyclohexyl-, butylcyclohexyl-, naphthenyl-radical, etc.; as well as perhydrogenated derivatives of mono- or polysubstituted alkyl- or aralkylphenols or naphthols. Among acyl-radicals, the acid groups of the following carbonic acids will be applicable: Capronic acid, capric acid, lauric acid, myristic acid, oleic acid, rapeseed fatty acid, castor oil fatty acid, oxystearic acid, fatty acids obtained by the oxidation of paraffin wax, benzoic acid, benzylbenzoic acid, alkylbenzoic acid, phthalic acid, naphthenic acid, phenyl-stearic acid, oxyphenylstearic acid, etc.

The following compounds are examples for those corresponding to the general formula stated above, and are mentioned only for the purpose of illustration, and therefore are not to be regarded as a limitation as to the compounds which may be used:

Dodecylpentaethylene glycol, octadecenyl-hexaethylene glycol, 2-ethylhexyl-pentaethylene glycol, nonylheptaethylene glycol, phenyl-ethyl-pentaethylene glycol, methyl-cyclohexyl-octaethylene glycol, p-octylphenyltetrapropylene glycol, dodecylcyclohexapropylene glycol, hexylnaphthyltetra-ethylene or propylene glycol; furthermore, dodecyl- or lauryl-pentaethyleneglycolmethyl ether (the term lauryl is to be understood as designating the radical from fatty alcohol produced from coconut fatty acids), p-methyl-cyclohexyl-tetraethyleneglycol-octyl-ether, p-octylphenyl-tetraethylene-glycol-isopropyl-ether, octadecenyl-hexaethylene-glycol-phenylethyl-ether, octadecyldiol-pentaethylene-glycol-isopropylether, 2-ethylhexyl-heptaethyleneglycol-benzyl-ether, etc.; dodecylbenzyl-penta-propyleneglycol-oleate, benzoylpentaethyleneglycol-oleate, benzoyl-heptaethylene- or propylene-glycol-butyl-ether, pentaethyleneglycol-monosterate.

It is understood that in lieu of single polyglycol derivatives, mixtures thereof may also be used.

The viscosity-reducing effect of polyalkyleneglycol derivatives upon solutions of sulphonates in hydrocarbon oils may be demonstrated by a model using turpentine substitute. The following experiment was carried out:

10 parts by weight of barium salt of a petroleum-sulphonic acid could only be dissolved with difficulty in 100 parts by weight of a technical test gasoline (turpentine substitute) having a flash point higher than 21° C. and with 18% of aromatics. The solution had a viscosity of 90.65 cst. at 50° C. However, the same ingredients were easily dissolved in the presence of 4 parts of a reaction product of 1 mol. of oleinalcohol with 15 mol. of ethyleneoxide. The solution thus formed had a viscosity of 1.33 cst. at 50° C. A corresponding reduction in viscosity was obtained with a reaction product of 1 mol. of decylalcohol with 2.2 mol. of ethyleneoxide.

In addition to the polyalkyleneglycol derivatives, the invention further includes the use of higher boiling ethers comprising at least one radical with more than 6 carbon atoms. The presence of such ethers in the mixtures improves their storage stability. These ethers are also good solvents and softening agents for resinification and other decomposition products of the liquid hydrocarbon oils formed during the combustion process.

The extraordinary chemical and physical resistance of the ether structure renders the ethers much superior to esters, already proposed for the same purpose.

It should be noted, that it is important to select such ethers, the volatility of which is sufficiently low even at higher temperatures and which, on the other hand, remain liquid at room temperature and even at lower outside temperatures in winter time.

In comparison with the above-mentioned polyalkyleneglycol-alkyl-ethers, the high boiling ethers dealt with in the last paragraphs are distinctly different in so far as they contain only one, and no more than two, oxygen atoms which have ether-like linkages within the molecule, and thus are free of polyalkylene-glycol groups.

The high boiling ethers may be either of symmetrical or unsymmetrical structure, and they may be used either singly or in a mixture of two or more.

The following are examples of high boiling ethers according to the present invention. It is to be understood that these are illustrative only of the numerous compounds which may be used. Specific compounds to be mentioned are:

Di-n-hexylether, di-n-octylether, di-n-nonylether, di-2-ethyl-hexylether, lauryl-2-ethylhexylether, octadecen-9-yl-1-isobutylether, butandiol-(1,3)-monoctylether, butandiol-(1,4)-isobutyl-dodecylether, lauryl-cyclohexylether, nonyl-4-methylcyclohexylether, nonylbenzylether, tetrahydro-naphthylmethyl-2-ethylhexylether, dodecylphenylether, octyl- β -tetralolether, 4-octylphenyl-2-ethylhexylether, etc.; octadecenyl-4-methylbenzylether, tetrahydro-naphthylmethyl-phenyl- or benzyl-ether, dibenzylether, and butandiol-(1,4)-dibenzylether.

Ethers from paraffin fatty alcohols or their first runnings, as well as the oxo- or naphthentic alcohols are particularly suitable. The term "first running" is to be understood as meaning the first distillate of a mixture of alcohols obtained from high pressure hydrogenation of paraffin fatty acids wherein the alcohols of the mixture have a chain length of 6-9 carbon atoms.

Naphthenic acids as obtainable by raffination of mineral oils may be transformed into the corresponding naphthentic alcohols by high pressure reduction or by the process of Bouveault-Blanc. These alcohols may be easily reacted to form ethers, as, for instance, dinaphthenylether, naphthenyl-benzyl- and -2-ethylhexylether.

Solutions of sulphonic acid salts in hydrocarbons according to the invention may be produced in any desired order of succession, and may thus be adapted to the requirements in each particular case. Thus, a mixture of sulphonate with one or more of the inventive additions may be added to a hydrocarbon or a hydro-carbon oil. Also, it is possible to incorporate the inventive additions to a solution, a gel, or a suspension of sulphonates in hydrocarbons. The sulphonic acid salt may also be added to a solution of the inventive additions in hydrocarbons

in the same manner as mixtures of sulphonates with hydrocarbons, on the one hand, and of the inventive additions with hydrocarbons, on the other hand, may be dissolved within each other. Often it is recommendable to carry out the mixing at higher temperatures of, for example, 50 to 250° C., and preferably between 100 and 200° C. When speaking herein of "inventive addition," both the polyalkyleneglycol derivatives, as well as the higher boiling ethers, both of which have been previously mentioned, are to be included, either individually or combined.

The lubricating oils compounded as above described may, according to another feature of the invention, be further improved by the addition of naphthenates. The difficulties in dissolving them do not occur in mixtures of the polyalkyleneglycol derivatives and higher boiling ethers. These naphthenates, and especially the basic alkaline earth naphthenates, also contribute in the mixture according to the invention to an improved detergent, dispersing, and neutralizing effect.

Finally, in some cases it is advisable to add inhibitors to the additive or the lubricating oils in a manner known as such.

For practical reasons it is most advisable to realize the invention by producing a mixture of salts of the surface-active sulphonic acids, the etherized and/or esterized polyalkyleneglycol derivatives and the higher boiling ethers without the polyglycol group. Such a mixture forms a so-called additive, a suitable amount of which should be added in each respective case to the particular motor oil in question. When using such additives, it has been found that a content in the higher boiling ethers improves the miscibility of the additive with the basic oil extraordinarily. A sufficient amount of polyalkyleneglycol derivatives and higher boiling ethers readily permits the additive which contains normally oil-insoluble sulphonates, to dissolve in a basic oil at room temperature without any stirring apparatus.

The required amount in polyalkyleneglycol derivatives may vary within wide limits, for example, from one percent by weight relative to sulphonate to equal parts by weight or more. The particular amount to be added depends upon the kind of sulphonate applied, the kind of hydrocarbons used, and the desired viscosity of the solution or the degree of the desired improvement of a motor oil.

Generally speaking, motor oils will be improved sufficiently by an addition of 2 to 7% of an additive consisting of the inventive combination of the mentioned additions. Very often an addition of 1% will be found to suffice, whereas in certain special cases up to 25% or more of such an additive will be of advantage.

The following examples may further elucidate the invention without, however, limiting the scope thereof.

EXAMPLE 1

From the watery solution of the sodium salt of a petroleum sulphoacid with the average molecular weight of 325 to which calcium chloride was added, the corresponding calcium salt was produced. After drying the same, an attempt was made to dissolve 10 parts of this calcium salt at a temperature of 100 to 110° C. in 200 parts by weight of a lubricating oil of a specific gravity at 20° C. of 0.882, a viscosity index of 81, a coking number according to Conradson of 0.11, and without any gasoline-insoluble constituents. After cooling, however, a partial separation of the calcium salt again occurred.

If, however, 10 parts of the calcium petroleum-sulphonate are being stirred up with 10 parts of heptapropyleneglycolether and 10 parts of hexadecylhexylether, such mixture could be easily dissolved in 200 parts of the lubricating oil. This solution when cooled remained absolutely clear.

EXAMPLE 2

The calcium salt was formed of a Twitchell sulphonic acid which had been obtained in a known manner by a sulphonizing condensation of 1 mol. of oleic acid, 1 mol. of naphthalene, and 6 mol. of fuming sulphuric acid. 30 parts of such calcium salt, which otherwise is practically oil-insoluble, were stirred at 90° C. into a mixture of 650 parts of a paraffin base motor oil having a viscosity of 61 cst. at 50° C., a viscosity index of 100, 30 parts of octadecenylhexapropyleneglycolether and five parts of di-tert.-butyl-p-cresol as an inhibitor. A motor oil was thus formed of high lubricating quality which strongly suppresses the normal wear and tear of the engine as compared with analogous oils. Furthermore, when such compounded oil was in use, it had a strong dispersing effect upon residues of combustion.

EXAMPLE 3

In 20 parts of cocolaurylpentaglycolether and 27 parts of laurylethylhexylether

were dissolved under stirring and heating up to 150° C.:

35 parts bariummononaphthenate and
15 parts bariumalkylbenzolsulphonate,

wherein the alkyl radical corresponded to a chain with 14 C-atoms. Thereafter,

3 parts of di-tert.-butyl-p-cresol were added.

5 parts of this mixture were added to 95 parts of a basic oil which had been produced by a suitable mixture of Brightstock-, machine-, and spindle-oils and had the following characteristics:

Density at 20° C.	0.905
Solidifying point	° C. 37
Viscosity at 50° C.	cst. 44.9
Viscosity index	73
Coke constituents according to Conradson	percent 0.29

This oil mixture was subjected to a practical test in a passenger car, a Mercedes-Benz Model 170 V. Before the test, the pistons were removed from the engine and completely cleaned. The test run extended over 5500 km. during which the oil was changed at 500, 1500 and 3500 km.

At the end of the test run, the pistons had a perfect metallic appearance, all rings moved freely, and only small sludge traces showed in the piston ring grooves.

EXAMPLE 4

5% of an additive consisting of

20 parts by weight of zincpetroleumsulphonate,
10 parts by weight of magnesiumoctadecylbenzolsulphonate,
10 parts by weight of bariummononaphthenate,
10 parts by weight of a reaction product of 1 mol. behenealcohol with 12 mol. propyleneoxide,
20 parts by weight of a reaction product of 1 mol. dodecylphenol with 12 mol. ethyleneoxide
25 parts by weight of naphthenealcoholbutylether, and
5 parts by weight of calciumdihexylthiophosphate

was dissolved in the oil described in detail in Example 3 and subjected to a practical test in a passenger car of the "Volkswagen" type, wherein the test conditions and oil change periods were the same as mentioned in Example 1. Also in this case, all piston rings were found to be freely movable after the test. However, as compared with Example 3, the ring grooves were practically spotless, whereas parts of the piston skirt and the inside of the piston looked darker.

EXAMPLE 5

For comparing the stability in storage of compounded oils, the lubricating qualities of two oils were measured on an Almen-Wieland apparatus. This well-known testing apparatus substantially consists of two halves of a bearing bushing which embrace a revolving shaft under a gradually increasing pressure. This rather complicated machine is designed so that every feature or characteristic of the object to be tested is carefully considered. Thus, for example, a recorded measurement may be obtained of the load to which the bearings may be subjected until they are welded together with the shaft.

Two differently compounded oils were stored in vessels of larger size. At intervals of several days, specimens were simultaneously withdrawn from both oils from the top as well as from the bottom for determining the lubricating qualities.

A basic oil with the following characteristics:

D ₂₀	0.923.
Viscosity at 20° C.	460 cst.
Viscosity at 98.9° C.	10 cst.
Viscosity index	44.
Solidifying point	19° C.
Flash point	237° C., and
Coking residue according to Conradson	0.60%.

was mixed with 5% of an additive containing, aside from unsaponifiable organic compounds containing phosphorous and sulphur, an oil-soluble bariumpetroleum-sulphonate in which the molecular weight of the acid was approx. 300. The additive had 10.5% of ash, 12.1% of sulphate ash, Ba 5.6%, S 4.4%. The compounded oil showed the following lubricating values in accordance with the storage periods mentioned:

	Oil from the top, kg.	Oil from the bottom, kg.
2 days	750	1,150
7 days	550	700

The different values measured indicate that the concentration of the additive has been reduced in the upper strata during storage.

In a parallel test, to 100 parts of this compounded oil, one part of dodecylpentaethyleneglycolether and 1 part of di-n-octylether was added. This oil showed at the simultaneous measurements of its lubricating qualities a load capacity of more than 1500 kg. (i. e. the maximum measuring value of the testing machine).

EXAMPLE 6

The quality of the motor oils as improved according to the invention was likewise determined on the test stand which consisted primarily of a one-cylinder, 12 H. P. diesel engine, Model KDW 415 E, made by the Motoren-Werke Mannheim, and which, for measuring the output, was coupled with an electric generator. For each test run, the engine was provided with new pistons and new cylinder liners. Before each test run, the engine was tuned up by running it for 6 hours with the particular oil in question. Before the actual test run, the oil was removed and the piston once more taken out and examined. The test run lasted 120 hours and 60 hours, respectively, under full load. During this time, all necessary data was determined, such as the output, the fuel consumption, the temperatures of the oil which were held constant by means of a thermostat, the cooling water and the exhaust gases, etc. After the test run, the pistons, bearings, etc. were examined, and the difference in weight of the piston rings before and after each test run was de-

terminated. Furthermore, the qualities of the oil were examined before, during, and after the test run.

The examples described as follows were carried out with a fuel from the Middle East having 0.96% sulphur, and a paraffin base oil S. A. E. 30 with a

Viscosity at 20° C. of 330 cst.
Viscosity at 98.9° C. of 11 cst.
Viscosity index of 91.
Density at 20° C. of 0.889.
Solidifying point of 24° C.
Flash point of 242° C.
Ash, acidity, and saponification degree of 0%.
Coking residue according to Conradson of 0.04%.

To this oil were added 5% of each of the following additives:

(a)

20 parts of oleinalcoholsulphuric acid ester,
30 parts of naphthenic acid,
67.5 parts of $\text{Ba}(\text{OH})_2 \cdot 8\text{H}_2\text{O}$,
45 parts of an oxethylation product of 1 mol. of technical lauryl alcohol with 90% dodecyl alcohol and 10% of higher-boiling fatty alcohols plus 5 mol. of ethyleneoxide,
25 parts of laurylethylhexylether, and
3 parts of ethylhexylphenol;

(b)

20 parts of barium salt of a monoalkylbenzolsulphonic acid (molecular weight approx. 360),
30 parts of bariumdinaphthenate,
30 parts of an oxethylation product of 1 mol. of technical lauryl alcohol with 90% of dodecyl alcohol and 10% of higher-boiling fatty alcohols plus 5 mol. of ethyleneoxide,
17 parts of dodecylethylhexylether, and
3 parts of ethylhexylphenol.

The results attained from the additives (a) and (b), respectively, were as follows:

	(a)	(b)
Length of time of the actual test run.....	60.....	120.
Average driving load.....	102%.....	93%.
Average fuel consumption.....	185 g./H. P. eff. .hr.	200 g./H. P. eff. .hr.
Average exhaust temperature.....	449° C.	452° C.
Piston ring wear:		
First Ring.....	0.20%.....	0.18%.
Second Ring.....	0.10%.....	0.05%.
Third Ring.....	0.09%.....	0.03%.
Lubricating capacity of the oil:		
Before the test run.....	1,200 Kg.	1,300 Kg.
After the test run.....	1,500 Kg.	1,150 Kg.
(Measured on the Almen-Wieland machine and stated in load in kg. up to welding together with test bearing.)		
Viscosity of the compounded Lubricating Oil measured at 98.9° C.—		
Before the test run.....	11.05 cst.	10.80 cst.
After the test run.....	12.80 cst.	12.30 cst.
Viscosity index—		
Before the test run.....	93.....	89.
After the test run.....	104.....	99.

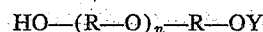
The cleanliness of the piston, and particularly the ring grooves, furnished a valuable indication as to the performance of the oil additive. In order to evaluate the numerous test runs objectively, a special system of evaluation was created whereby subjective inaccuracies in determining the results, as repeatedly found, were excluded. Individual parts of the piston were thus evaluated at degrees of 0 to 10, in which 10 indicated the value which could not be surpassed even theoretically.

	(a)	(b)
Movability of the rings.....	10.0	10.0
Deposit in the ring grooves.....	8.1	9.6
Deposit in the grooves of the oil control ring.....	10.0	9.9
Deposit in the slots of the oil control ring.....	10.0	10.0
Metallic appearance of the outside of the piston.....	9.4	9.6
Metallic appearance of the inside of the piston.....	10.0	9.8

While we have described our invention with reference to the preferred embodiments thereof, we wish to have it understood that our invention is in no way limited to the details of such embodiments or to the specific examples described, but is capable of numerous modifications within the scope of the appended claims.

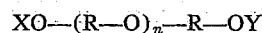
What we claim is:

1. A new composition of matter suitable as an additive for mineral lubricating oils, said composition consisting essentially of a metal salt of a surface-active sulphonic acid of at least 8 carbon atoms, an etherified polyalkylene glycol of the general formula



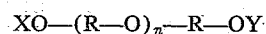
wherein R is an alkylene radical having a minimum of 2 and a maximum of 3 carbon atoms, n is a whole number between 1 and 20 and Y is an alkyl radical having at least 12 carbon atoms, and a high boiling mono ether having a total of at least 12 carbon atoms and at least one of the radicals of which has more than 6 carbon atoms, said polyalkylene glycol derivative being present in an amount of 1% to equal the weight of said sulfonic acid salt and said polyalkylene glycol derivative and said high boiling ether being present in an amount sufficient to cause dissolution of said sulfonic acid salt in a lubricating oil.

2. A new product consisting essentially of a hydrocarbon lubricating oil having dissolved therein at least one metal salt of a surface active sulphonic acid of at least 8 carbon atoms in an amount sufficient to prevent deposition of resins, asphalts and carbon in the oil, at least one polyalkylene glycol derivative having the following general formula:



wherein R is an alkylene radical having a minimum of 2 and a maximum of 3 carbon atoms, n is a whole number between 1 and 20, and wherein one of the groups X and Y is hydrogen and the other of said groups X and Y is selected from the class consisting of alkyl, aryl, aralkyl, alkaryl and acyl radicals having at least 6 carbon atoms, and at least 1 high boiling mono ether having a total of at least 12 carbon atoms and at least one of the radicals of which has at least 6 carbon atoms, said polyalkylene glycol derivative being present in an amount of 1% to equal the weight of said sulfonic acid salt and said sulfonic acid salt, said polyalkylene glycol derivative and high boiling ether being present in an amount of 1-25% of said product and in an amount sufficient of said polyalkylene glycol derivative and said high boiling ether to form a solution of said sulphonic acid salt in said lubricating oil.

3. A new product consisting essentially of a hydrocarbon lubricating oil having dissolved therein at least one metal salt of a surface active sulphonic acid of at least 8 carbon atoms in an amount sufficient to prevent deposition of resins, asphalts and carbon in the oil, at least one polyalkylene glycol derivative having the following general formula:

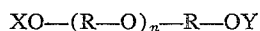


wherein R is an alkylene radical having a minimum of 2 and a maximum of 3 carbon atoms, n is a whole number between 1 and 20, and wherein one of the groups X and Y is hydrogen and the other of said groups X and Y is selected from the class consisting of alkyl, aryl,

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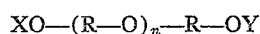
aralkyl, alkaryl and acyl radicals having at least 6 carbon atoms in an amount of 1% to equal the weight of said sulphonic acid salt, and at least 1 high boiling mono ether having a total of at least 12 carbon atoms and at least one of the radicals of which has at least 6 carbon atoms, said sulfonic acid salt, said polyalkylene glycol derivative and said high boiling ether being present in an amount of 2-7% of said product and in an amount sufficient of said polyalkylene glycol derivative and said high boiling ether to form a solution of said sulphonic acid salt in said lubricating oil, said polyalkylene glycol derivative and said high boiling ether being present in an amount of 1-25% of said product.

4. A new product consisting essentially of a hydrocarbon lubricating oil having dissolved therein at least one metal salt of a surface active sulphonic acid of at least 8 carbon atoms and at least one salt of a naphthenic acid in an amount sufficient to prevent deposition of resins, asphalts and carbon in the oil, at least one polyalkylene glycol derivative having the following general formula:



wherein R is an alkylene radical having a minimum of 2 and a maximum of 3 carbon atoms, n is a whole number between 1 and 20, and wherein one of the groups X and Y is hydrogen and the other of said groups X and Y is selected from the class consisting of alkyl, aryl, aralkyl, alkaryl and acyl radicals having at least 6 carbon atoms, and at least 1 high boiling mono ether having a total of at least 12 carbon atoms and at least one of the radicals of which has at least 6 carbon atoms, said polyalkylene glycol derivative and said high boiling ether being present in an amount sufficient to form a solution of said sulphonic acid salt and said naphthenic acid salt in said lubricating oil and to maintain said sulphonic acid and naphthenic acid salts in solution, thereby increasing the dispersing power for resins, asphalts and carbon of said sulphonic acid and naphthenic acid salts.

5. A new product consisting essentially of a hydrocarbon lubricating oil having dissolved therein at least one alkaline earth salt of a surface active sulphonic acid of at least 8 carbon atoms in an amount sufficient to prevent deposition of resins, asphalts and carbon in the oil, at least one polyalkylene glycol derivative having the following general formula:

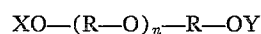


wherein R is an alkylene radical having a minimum of 2 and a maximum of 3 carbon atoms, n is a whole number between 1 and 20, and wherein one of the groups X and Y is hydrogen and the other of said groups X and Y is selected from the class consisting of alkyl, aryl, aralkyl, alkaryl and acyl radicals having at least 6 carbon atoms, and at least 1 high boiling mono ether having a total of at least 12 carbon atoms and at least one of the radicals of which has at least 6 carbon atoms, said polyalkylene glycol derivative being present in an amount of 1% to equal the weight of said sulfonic acid salt and said sulfonic acid salt, said polyalkylene glycol derivative

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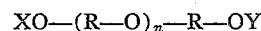
and high boiling ether being present in an amount of 1-25% of said product and in an amount sufficient of said polyalkylene glycol derivative and said high boiling ether to form a solution of said sulphonic acid salt in said lubricating oil.

6. A new composition of matter suitable as an additive for hydrocarbon lubricating oils, said composition consisting essentially of at least one metal salt of a surface active sulphonic acid of at least 8 carbon atoms, at least one polyalkylene glycol derivative having the following general formula:



wherein R is an alkylene radical having a minimum of 2 and a maximum of 3 carbon atoms, n is a whole number between 1 and 20, and wherein one of the groups X and Y is hydrogen and the other of said groups X and Y is selected from the class consisting of alkyl, aryl, aralkyl, alkaryl and acyl radicals having at least 6 carbon atoms, and at least 1 high boiling monoether having a total of at least 12 carbon atoms and at least one of the radicals of which has at least 6 carbon atoms, said polyalkylene glycol derivative being present in an amount of 1% to equal the weight of said sulfonic acid salt and said polyalkylene glycol derivative and high boiling ether being present in an amount sufficient to cause dissolution of said sulphonic acid salt in a hydrocarbon lubricating oil.

7. A new composition of matter suitable as an additive for hydrocarbon lubricating oils, said composition consisting essentially of at least one metal salt of a surface active sulphonic acid of at least 8 carbon atoms, at least one salt of a naphthenic acid, at least one polyalkylene glycol derivative having the following general formula:



wherein R is an alkylene radical having a minimum of 2 and a maximum of 3 carbon atoms, n is a whole number between 1 and 20, and wherein one of the groups X and Y is hydrogen and the other of said groups X and Y is selected from the class consisting of alkyl, aryl, aralkyl, alkaryl and acyl radicals having at least 6 carbon atoms, and at least 1 high boiling monoether having a total of at least 12 carbon atoms and at least one of the radicals of which has at least 6 carbon atoms, said polyalkylene glycol derivative being present in an amount of 1% to equal the weight of said sulfonic acid salt and said polyalkylene glycol derivative and high boiling ether being present in an amount sufficient to cause dissolution of said sulphonic acid salt and said naphthenic acid salt in a hydrocarbon lubricating oil.

References Cited in the file of this patent

UNITED STATES PATENTS

2,565,403 Sproule et al. _____ Aug. 21, 1951

FOREIGN PATENTS

676,625 Great Britain _____ July 30, 1952