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LUBRICATING OIL COMPOSITION

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1

This invention relates to lubricating agents, to lubricants utilizing such lubricating agents, and to methods of making such agents and lubricating compositions.

This invention is particularly concerned with the improvement of lubricating compositions by the utilization of multi-functional homogeneous products, which may be utilized as lubricating agents by themselves, or in admixture with various amounts of organic lubricating bodies or other neutral mediums giving lubricating agents and compositions the consistency of which varies from a thin medium to a solid mass, and the transition temperature of which is substantially increased from the non-fluid to the fluid phase. The compositions may be used as a lubricating base which is readily soluble in organic lubricating bodies, or may be utilized to form stable lubricating emulsions with water or water-soluble media.

In accordance with this invention lubricants may be prepared to withstand wide temperature changes without marked changes in consistency. For example, a lubricant may be made which withstands temperatures ranging from about —100° F. to about 400° F. and higher without marked change in consistency or breakdown. Further, stable, high temperature lubricating greases may be prepared without the use of heavy metal soaps, thereby obviating such disadvantages as corrosion, bleeding and soap separation, which usually results in poor lubrication. Such lubricants are especially adaptable for dynamos, pumps, Diesel, truck and airplane engines.

Other objects of this invention include the production of lubricants for tanks, turbines, hypoid gears, and alloy bearings, which are subject to high pressures, high temperatures, excessive friction, oxidation and corrosion.

Still further objects of this invention is in the utilization of lubricating agents as an additive in lubricating oils for internal combustion engines, where such additives possess properties which inhibit sludge formation, piston and ring sticking, and varnish and lacquer formation.

Further objects of this invention include the production of oil or water-soluble medium applicable as a machining lubricant, such as for cutting, drilling, reaming, broaching, milling, threading, grinding, hot forging, cold and hot stamping, drawing, and for plastic cold working of metals.

Still further objects and advantages of the present invention will appear from the more detailed description set forth below, it being understood that such more detailed description is given by way of illustration and explanation only and not by way of limitation, since various changes therein may be made by those skilled in the art without departing from the scope and spirit of the present invention.

2

In accordance with the present invention, lubricating agents are prepared by the co-reaction of a compound of an organic nitrogen base and an organic acid, with an oxidized-phosphorized-sulfurized organic lubricating body. The term oxidized-phosphorized-sulfurized organic lubricating body is intended to cover an organic lubricating body which has been subjected to oxidation to produce a substantial amount of oxygen containing compounds therein followed by treatment with agents which produce a phosphorization and sulfurization of the oxidized body; or organic lubricating bodies which have been subjected to treatment with agents to produce phosphorization and sulfurization followed by an oxidation treatment of such phosphorized-sulfurized body to produce materials which contain a substantial amount of combined oxygen. The resulting products from such combinations of oxidation, phosphorization and sulfurization treatments, regardless of the order of treatment, are included under the term oxidized-phosphorized-sulfurized organic lubricating body herein. It has been found that such oxidized-phosphorized-sulfurized organic lubricating bodies co-react with organic nitrogen base-organic acid reaction products to produce homogeneous compounds particularly useful for lubricating purposes and in other arts.

The term "organic nitrogen base-organic reaction product" is intended to cover the reaction product of a compound of an organic nitrogen base and an organic acid as exemplified by the following: (1) amine organic acid reaction products, and (2) quaternary ammonium hydroxide organic acid reaction products.

As representative of the amine there are included alkylamines, alkyl polyamines, alkylolamines, polyalkylene polyamines, alicyclic amines, aralkylamines, heterocyclic basic nitrogen compounds, etc. The quaternary ammonium hydroxide derivatives are exemplified by tetra-alkyl ammonium hydroxides, aryl-aralkyl ammonium hydroxides, etc. More specifically there may be mentioned such amines as diethylamine, mono-amylamine, di-amylamine, and triamylamine, di-n-butylamine, monobutylamine, di-

butylamine, undecylic amine, laurylamine, myristicamine, palmitylamine, stearylamine, mono, di, and triethanolamine, laurylolamine, palmitylolamine, stearylolamine, ethylene diamine, diamino-isopropanol, triethylene tetramine, cyclohexylamine, dicyclohexylamine, benzylamine, morpholine, piperidine, pyridine, quinoline, cephalin, lecithin, trimethyl benzyl ammonium hydroxyl, dimethyldibenzylammonium hydroxide, tetraethyl ammonium hydroxide, "Alkaterge-O," which is a substituted oxazoline having a specific gravity of 0.90, a solidification point of —26 and is both oil and water soluble, etc.

The organic acids used to produce a reaction product with the amines or quaternary ammonium hydroxide derivatives, include a variety of both aliphatic, alicyclic, aromatic and other carbocyclic acids, including mono and di-basic acids. The fatty acid complexes obtained from the various glyceride oils may be utilized as such or the individual components of such acids may be employed. An exemplary of the organic acids which are suitable there may be mentioned capric, undecylic, lauric, myristic, anachidic, anthranilic, stearic, oleic, palmitic, ricinoleic, linoleic, oxalic, succinic, glutaric, adipic, sebacic, lactic, maleic, malic, tartaric, citric, benzoic, toluic, cinnamic, salicylic, peanut-oil fatty acids, soy bean oil fatty acids, hydrogenated soy bean oil fatty acids, hydrogenated fish oil fatty acids, degras fatty acids, naphthenic acids, acids prepared by oxidation of petroleum hydrocarbons, resin acids such as abietic acid, etc. Organic sulfonic acids may also be utilized such as p-toluene sulfonic acid, paradiphenylsulfonic acid, quinolinesulfonic acids, etc. The carboxylic acids are generally more satisfactory, however, than the sulfonic acids in the preparation of this component.

While individual amines and individual quaternary ammonium hydroxides, and individual acids have been referred to above, any combination of the stated components may be utilized employing mixtures of amines and quaternary ammonium hydroxides with the same or different acids, or of amines with one or more of the stated acids, or of quaternary ammonium hydroxides with one or more of the stated acids; and combinations of the various components referred to may be utilized in producing this component of the final lubricating agent. These materials readily react and the amine or quaternary ammonium hydroxide or mixtures together with the acid or mixtures of acids may be reacted at room or higher temperatures, an elevated reaction temperature being desirable, the time of reaction varying from ½ to 4 hours as a general rule.

The oxidized-phosphorized-sulfurized organic lubricating body may be produced by proper treatments from any desired organic lubricating material. Mixtures of hydrocarbon compounds, or their unsaturated fractions, desirably the average molecular carbon content being above decane, comprising olefines, iso-olefines, diolefines and their polymers, may be treated. Still further modifications can be resorted to in producing the base and it has been found that the unsaturated hydrocarbons and/or high molecular weight fatty bodies can be first phosphorized-sulfurized and then react with organic sulfo compounds or vice versa and the product reacted with amine-organic acid to form the lubricating base composition. In cases where mixtures of unsaturated oils and/or fatty bodies

and/or organic sulfo compounds are reacted simultaneously with phosphorizing-sulfurizing agents it is believed that the phosphorus and sulfur enters both components at certain temperature levels; above such temperature levels phosphorus tends to split away, the resultant product containing a high percentage of reactive sulfur and a small amount of phosphorus which was not readily removed during purification of resultant product. However, the governing factor is not which component the phosphorus and sulfur enters, if mixtures as described above are used but the amount of phosphorus-sulfur present in the resultant product that is the determining factor in producing a more potent product. During certain phosphorization-sulfurization of organic bodies it has been found advantageous to carry out the reaction in the presence of P_2O_5 which causes the reaction to progress more smoothly and rapidly to completion. In any of the above methods the final product is substantially freed from the unreacted reagents and from formed side by-products, such as phosphoric, sulfuric acids, H_2S, SO_2, phosphorus, etc., and the final product may be further purified if desired, or its residual acidity may be neutralized with an amine separately or in situ. The invention will be particularly exemplified below by the utilization of mineral oil components or mixtures of petroleum hydrocarbons, or petroleum distillates, particularly petroleum fractions in the range of lubricating viscosity.

The oxidizing treatment may be carried out in any desired way by the utilization of oxidizing agents to produce the oxidized organic lubricating body, such oxidizing agents including oxygen, air, ozone, potassium permanganate, hydrogen peroxide, phosphorus pentoxide, phosphorus trioxide, phosphorus tetroxide, chromates, organic peroxides such as benzoyl peroxide, and acetyl peroxide, ultra violet rays, X-rays, actinic rays, etc. The oxidation treatment is generally carried out at an elevated temperature of for example, from about 200 to about 500° F. to produce a resultant product which contains at least 1% of combined oxygen.

While the petroleum and mineral oil fractions, particularly those of lubricating viscosity are emphasized and will be utilized to illustrate the organic lubricating bodies treated in accordance with the present invention, other organic lubricating bodies including glycerine, ethylene dichloride, trichlorodiphenyloxide, cod-liver oil, castor oil, hydrocarbon oils of various viscosities, paraffin wax, etc. The mineral oil fractions will, however, as indicated be utilized to illustrate the invention. The term "organic lubricating body" is used hereinafter to cover the materials specifically referred to immediately above.

Or the oxidized organic lubricating bodies may be obtained from other sources. During the acid treatment of mineral oils, or other organic lubricating bodies to produce sulfonates, the action of the acid or of the acid and oxygen of the air, upon the organic lubricating body has an oxidizing effect during the period of reaction. After the sludge and impurities have been removed, the resultant product comprises mixtures of oxidized organic lubricating bodies and its oxidized sulfo compounds. This mixture may be used as such or the oxidized sulfo compounds may be removed by conventional methods which usually contain from 20 to 80% of the entrained organic lubricating bodies. For utilization here-

in, the oxidized organic lubricating bodies include bodies subjected to oxidation or the extracted oxidized sulfo components produced as set forth above.

The phosphorizing-sulfurizing treatment may be carried out utilizing any agents which will produce that effect on the materials employed resulting in the introduction of phosphorus and sulfur into the complex products and such agents include phosphorus disulfide P_3S_6, phosphorus trisulfide P_4S_6, phosphorus sesquisulfide P_4S_3, phosphorus pentasulfide P_2S_5, and phosphorus heptasulfide P_4S_7. Of these agents, phosphorus pentasulfide, phosphorus sesquisulfide, and phosphorus heptasulfide are more desirable because of their availability and reactivity with the organic lubricating bodies or the oxidized bodies. The phosphorizing-sulfurizing treatment may be carried out at elevated temperatures, preferably from 150 to 500° F. and as indicated above, the phosphorizing-sulfurizing treatment may be applied to the organic lubricating bodies which have first been subjected to the oxidation treatment, or the organic lubricating bodies may first be subjected to the phosphorization-sulfurization treatment followed by the oxidation treatment.

As indicated above, it is not necessary in accordance with the present invention to utilize metal salts of any of the stated components but metal salts may be employed including alkali metal salts such as sodium, lithium, potassium, or other salts such as the alkaline earth metals including calcium, strontium, and barium, as well as metals like beryllium, magnesium, zinc, cadmium, and mercury may be used. Also heavier metal salts including aluminum, lead, nickel, iron, copper, chromium, vanadium, manganese and molybdenum may be utilized. The salt may be either preformed or formed in situ. Generally these salts may be utilized in the form of the sulfonic acid salts where sulfo acids are present or the salts may be produced from other components utilized in producing the reaction complexes of the present invention.

The ratio of the compound of organic nitrogen base and organic acid with the oxidized-phosphorized-sulfurized organic lubricating body may vary over substantial limits. For example, from 10 to 75 molar percent of the organic nitrogen base-organic acid product may be utilized with from 25 to 90 molar percent of the oxidized-phosphorized-sulfurized component. Such homogeneous products are excellent lubricating agents whether utilized by themselves or in combination with other components. These lubricating agents may be utilized in admixture with other lubricating oil fractions including mineral oil, organic lubricating bodies of various types, or with other than oil soluble mediums, such as water, glycerine, the glycols, etc.

The amount of the homogeneous product utilized in such lubricating compositions when admixed with other components will be determined in general by the nature of the components used, the medium with which it is admixed, and the characteristics desired in the lubricant. Therefore, the nature of the homogeneous product and the final characteristics desired of the lubricant will in all cases determine the amount of the homogeneous product to be employed. Usually from 0.1–50%, and in many cases, 5–25% of the homogeneous lubricating agent is sufficient. For many uses, the homogeneous lubricating agent per se may be used as the lubricating medium.

As ordinarily prepared, the products are substantially anhydrous, other than moisture which may be normally present in the various ingredients utilized in producing such reaction products. The temperature and time of reaction may be varied over wide limits depending upon the reagents used. Usually the temperature employed varies from about room temperature to the boiling point of the component parts, and the time of reaction varies from a fraction of an hour to about 8 hours. The reaction may be carried out under pressure if desired. The amount of amine or quaternary ammonium base and respective organic acid or mixtures thereof may be approximately the equivalent molecular weights of each ingredient. In some cases it may be desirable to have present an excess of amine in the final product because of its stabilizing effect, its value in counteracting corrosion, its value in accentuating a desirable phase relationship with the medium which is compounded with it, or to improve the refractive index of the combined composition, or to effect any combination of the above mentioned functions. In general the amount of the oxidized-phosphorized-sulfurized organic lubricating body used will vary from about approximately equimolecular proportions to about 50 of the amine-organic acid reaction product.

Also in many instances where it is desired to modify organic lubricating mediums other than oil soluble ones, such as water or water-soluble substances including glycerol, ethylene glycol, alcohol, ketone, esters, aldehydes, etc., the amine may be used in amounts greater than the equimolecular amount necessary for combining with the acid or acid components, in order to obtain a more stable and desirable product.

The methods of preparing the complex bases in accordance with the present invention are relatively simple, requiring no specially designed complex equipment or delicate control. The following examples are used for purposes of illustration, the parts being by weight unless otherwise indicated.

I

A diethylamine-stearic acid reaction product was prepared from approximately 1 to 5 moles of diethylamine and about 1 mole of stearic acid, reacted at an elevated reaction temperature for a period of ½ to 4 hours in a suitable reaction vessel.

Approximately 1 to 20 moles of petroleum sulfonate together with an amount of a light petroleum oil sufficient to solubilize the sulfonate are heated for 1 to 4 hours with air being blown through the mixture under constant agitation. The oxidation product was then subjected to phosphorization and sulfurization by treatment with a suitable amount of phosphorus pentasulfide which may be used in amounts up to 50% of the weight of the oxidized organic lubricating body. The phosphorization-sulfurization treatment may be carried out in a suitable medium such as solvents, oils, or the lubricating body with which it is to be further compounded. After the phosphorus pentasulfide is added, the resulting mixture is subjected to reaction at elevated temperatures in excess of 400° F. preferably, for about from 1 to 4 hours, at which time both phosphorus and sulfur have entered and chemically reacted into the compound. At the end of this period, the evolution of hydrogen sulfide

has practically ceased. The reaction may be carried out if desired, by adding phosphorus pentoxide about one-tenth in weight of that of the phosphorus pentasulfide, together with the latter and the heat treatment carried out for about 1 hour.

At the end of the reaction, the composition is freed from unreacted reagents and from side products formed that are undesirable in the final product. If desired, excess amine may be utilized to neutralize any acidity present. The amine-organic acid reaction product is slowly stirred into the oxidized-phosphorized-sulfurized product and the entire mixture reheated., 1 to 10 parts of the lubricating oil desired may be slowly added with constant agitation.

The lubricating base obtained is soluble in mineral lubricating, vegetable and animal oils.

II

A phenyldiethanolamine-myristic acid reaction product was produced by reaction of approximately 1 to 5 moles of phenydiethanolamine and 1 mole of myristic acid at elevated reaction temperatures of about 200 to over 400° F. for a period up to 4 hours in a suitable reaction vessel.

An oxidized-phosphorized-sulfurized organic lubricating body was then prepared as follows. Approximately 1 to 20 moles of organic petroleum sulfonates were reacted with a suitable amount of phosphorus sesquisulfide in the manner set forth in Example I. Either at the same time or toward the end of this reaction, approximately one or more moles of olefinic polymer was added, more phosphorus sesquisulfide was added if needed, and the whole mixture continued in reaction at elevated temperatures until a desirable homogeneous stable compound was produced, at which time the evolution of hydrogen sulfide had practically ceased.

The resulting phosphorized-sulfurized body was then subjected to oxidation treatment, as for example, by being blown with air for from 1 to 4 hours under constant agitation at elevated temperatures of from 200 to 500° F.

The oxidized-sulfurized-phosphorized product was then freed from any undesirable components. To such oxidized-phosphorized-sulfurized organic lubricating body, the amine-organic acid reaction product was added while stirring. Heating may be utilized during this admixing operation. The resulting lubricating agent may be employed as a lubricant per se or may be utilized in combination with other lubricating bodies, as for example, mineral lubricating oils of desired viscosity utilizing from 1 to 10 parts of such oil with the lubricating agent, the components being mixed slowly with constant agitation.

III

A triethanolamine-degras fatty acid reaction product was prepared from approximately one or more moles of triethanolamine and about an equivalent amount of one mole of degras fatty acid, which components were reacted at an elevated reaction temperature of about 200 to over 400° F. for a period up to about 2 hours in a suitable reaction vessel.

An oxidized-phosphorized-sulfurized component was then prepared as follows. Approximately 1 to 20 moles of sulfonated castor oil and light petroleum oil sufficient to solubilize the sulfonated castor oil was slowly heated and from 5 to 10% of potassium permanganate carefully added, the entire mixture being reacted with constant stirring for about an hour. The resulting product was reacted at an elevated temperature with a suitable amount of phosphorus pentasulfide, as for example, an amount of the latter of about 10–50% based on the weight of the oxidized oil product and the reaction with the phosphorus pentasulfide carried out until the evolution of hydrogen sulfide practically ceased. Any undesirable by-products present or unreacted reagents may be removed.

The resulting oxidized-phosphorized-sulfurized product was commingled with the triethanolamine-degras fatty acid reaction product by heating the components to an elevated temperature. The resulting product may be utilized as a lubricating agent per se or may be employed in admixture with from 1 to 10 parts of pale oil and utilized as a lubricant. The lubricating agent produced in accordance with this example is soluble in lubricating oil.

IV

A triethanolamine-oleic acid reaction product was produced by reaction of approximately one or more moles but not exceeding five moles of triethanolamine with one mole of oleic acid, reacted at room or at elevated temperature until a homogeneous product is obtained.

Approximately 1 to 15 moles of petroleum sulfonate (containing from 20 to 80% entrained oxidized oil) was reacted with a suitable amount of phosphorus pentasulfide using up to 50% of the phosphorus pentasulfide based on the weight of the other material undergoing treatment, at an elevated temperature of about 300–400° F. Phosphorus pentoxide may be added in this case also either at the beginning of the phosphorization-sulfurization treatment or at the end thereof to improve the phosphorization-sulfurization reaction. At the end of the reaction, the compound is freed from unreacted reagents and undesirable by-products and utilized by adding to it the triethanolamine-oleic acid reaction product. The materials may be stirred together and the mixture heated to an elevated temperature to produce a homogeneous compound.

The resulting lubricating agent may be utilized per se or may be compounded with 1 to 10 parts of mineral, vegetable or animal oils to produce lubricating compositions. The homogeneous lubricating agent is soluble in organic lubricating mediums.

V

1 to 15 moles (estimated) of organic petroleum sulfonates and suitable amount, usually not exceeding 50% of the sulfonates by weight, of phosphorus pentasulfide are reacted at an elevated temperature. The reaction may be carried out in a suitable or desirable medium to keep the sulfonate in diluted form, such medium being solvents, oils, or the lubricating body with which the treated material is to be compounded. The reaction at elevated temperatures may be in excess of 400° F. for about from 1 to 4 hours at which time both phosphorus and sulfur have entered and chemically reacted with the organic sulfonate to form a stable compound. At the end of this reaction, the evolution of hydrogen sulfide has practically ceased. If desired the reaction may be carried out by adding phosphorus pentoxide (about one-tenth in weight of that of the phosphorus pentasulfide) and the heating continued for about 1 hour. At the end of the reaction, the composition is freed from unreacted reagents and from formed side products that are

undesirable in the final product. The resultant product will have a low pH which may be neutralized if desired with an excess amine. The resulting phosphorized-sulfurized body is then subjected to oxidation treatment, as for example, by being blown with air for from 1 to 4 hours under constant agitation at elevated temperatures of, for example, from 200 to 500° F.

Approximately 1 mole of oleic acid is reacted with a suitable amount of phosphorus pentasulfide at an elevated temperature, as for example, in excess of 400° F. for about from 1 to 4 hours until both phosphorus and sulfur have entered into and chemically reacted with the oleic acid. It may be noted that the oleic acid may be added to the organic petroleum sulfonate towards the end of its reaction and the oleic acid will react with the residual reagent present in the vessel, or if necessary more reagent may be added by itself or in conjunction with phosphorus pentoxide as described above. At the end of the reaction, the compound is freed from unreacted reagent and to it, one or more moles (usually not more than five) of laurylolamine is stirred into the entire mixture, which is heated at an elevated temperature of from 200 to 400° F. for example, until a homogeneous compound is obtained. It is obvious that the organic acid may be phosphorized-sulfurized separately and then reacted with the amine, and the co-reaction product combined with separately phosphorized-sulfurized-oxidized organic sulfonate. The final compound may be mixed with from 1 to 10 parts of mineral, vegetable, or animal oil. The homogeneous lubricating base is soluble in organic lubricating mediums.

VI

Approximately 1 mole or more, usually not more than 5 moles, of triethanolamine and 1 mole of oleic acid are reacted at room or at an elevated reaction temperature as illustrated above in other examples, for a period of ½ to 4 hours in a suitable reaction vessel.

In another vessel approximately 1 mole of oleic acid and 1 to 15 moles of organic petroleum sulfonates are mixed together and the mixture reacted at an elevated temperature with a suitable amount of phosphorus pentasulfide, for example, at temperatures and with amounts as illustrated in the preceding example, until the evolution of hydrogen sulfide practically ceases. A stable reaction product is formed. This reaction product may then be subjected to oxidation, as for example, by being blown with air for from 1 to 4 hours under constant agitation at elevated temperatures of, for example, from 200 to 500° F.

The reaction mixture is then freed by suitable means from unreacted reagents or from formed undesirable by-products. The amine-organic acid reaction product is commingled with the oxidized - phosphorized - sulfurized mixture of oleic acid organic petroleum sulfonate. It may be noted that the order of adding the oleic acid may be modified to some advantage, as for example, by adding the oleic acid towards the end of reaction of the organic petroleum sulfonate as indicated in the preceding example. The entire complex mixture obtained may be further diluted with from 1 to 10 parts of mineral, animal, or vegetable oil. This product may be used as an additive as indicated above in various oils, or may be used as a lubricating base per se, or in proportions as low as about one-tenth of one percent as an additive in stated mediums.

Various other organic reagents can be incorporated with the homogeneous lubricating agents produced in accordance with the present invention, either during the mixing process or after it has been compounded in order to enhance lubricating and/or physical properties. Among the desirable additives are halogenated aromatic and aliphatic compounds, sulfurized oils, phosphorus-sulfur oxygen containing organic reaction products, sulfur-oxygen containing organic reaction products, phosphorus-sulfurized oil compounds, such as unsaturated petroleum derivatives, olefines, isolefines, diolefines and olefinic polymers. unsaturated fatty bodies which can be either vegetable, animal or mineral type. The phosphorus-sulfur reagents used can be either inorganic or organic compounds, such as phosphorus pentasulfide, phosphorus sesquisulfide, phosphorus trisulfide, phosphorus oxides, phosphorus halides, phosphorus oxyhalides, phosphorus sulfohalides, reacted with unsaturated organic compounds and/or unsaturated fatty bodies. Pour point depressors, such as chlorinated naphthalenes, alkyl-aromatic amines, liquid polymers of dimethyl silicons, and other organic silicons, and organic silicon polymers, corrosive inhibitors, such as inorganic nitrites and organic nitroso and nitro compounds, agents to facilitate dynamic impacts in cold and hot forging, drawing, piercing, or thread grinding, such as the polyvalent metal high molecular weight fatty acid derivatives, etc. Inert materials such as pulverized mica, zonolite, colloidal graphite, and the like may be included.

This application is a continuation-in-part of applications Serial No. 616,960, filed September 17, 1945, now Patent No. 2,481,585, patented September 13, 1949, and Serial No. 616,961, filed September 17, 1945.

Having thus set forth my invention, I claim:

1. A lubricating liquid vehicle having incorporated therein a homogeneous product in amount of from about 0.1% to about 25% of (*a*) 10 to 75 moles of a reaction product obtained by reacting from about 1 to 5 moles of an amine with about 1 mole of a higher fatty acid with (*b*) 90 to 25 moles of an oxidized-phosphorized-sulfurized organic body selected from the group consisting of petroleum sulfonates and sulfonated castor oil, the oxidation being produced by treatment with an oxidizing agent at a temperature of from 200 to 500° F. until at least 1% of combined oxygen is present, and the phosphorization and sulphurization being produced by up to 50% by weight on the product subjected to phosphorization and sulphurization of a phosphorus sulfide at a temperature of from about 150 to 500° F., said reaction products (*a*) and (*b*) co-reacted until a homogeneous product is obtained.

2. A mineral oil lubricating liquid vehicle having incorporated therein a homogeneous product in amount of from about 0.1% to about 25% of (*a*) 10 to 75 moles of a reaction product obtained by reacting from about 1 to 5 moles of an amine with about 1 mole of a higher fatty acid with (*b*) 90 to 25 moles of an oxidized-phosphorized-sulfurized organic body selected from the group consisting of petroleum sulfonates and sulfonated castor oil, the oxidation being produced by treatment with an oxidizing agent at a temperature of from 200 to 500° F. until at least 1% of combined oxygen is present, and the phosphorization and sulphurization being produced by up to 50% by weight on the product subjected to phosphorization and sulphurization of a phosphorus sulfide at a temperature of from about 150 to 500° F., said

reaction products (*a*) and (*b*) co-reacted until a homogeneous product is obtained.

3. A mineral oil lubricating vehicle having incorporated therein a homogeneous product in amount of from about 0.1% to about 25% of (*a*) to 10 to 75 moles of a reaction product obtained by reacting from about 1 to 5 moles of an alkylamine with about 1 mole of a higher fatty acid with (*b*) 90 to 25 moles of an oxidized-phosphorized-sulfurized reaction product of an organic sulfonated compound selected from the group consisting of petroleum and castor oil, the oxidation being produced by treatment with an oxidizing agent at a temperature of from 200 to 500° F. until at least 1% of combined oxygen is present, and the phosphorization and sulphurization being produced by up to 50% by weight on the product subjected to phosphorization and sulphurization of a phosphorus sulfide at a temperature of from about 150 to 500° F., said reaction products (*a*) and (*b*) co-reacted until a homogeneous product is obtained.

4. A composition as set forth in claim 3 in which the alkyl amine is diethylamine, the fatty acid is stearic acid, the phosphorus sulfide is phosphorus pentasulfide, and the organic body which is oxidized-phosphorized-sulfurized, is a petroleum sulfonate.

5. A composition as set forth in claim 3 in which the vehicle is a mineral oil lubricant, the amine is phenyldiethanolamine, the fatty acid is myristic acid, the phosphorus sulfide is P_4S_7, and the organic body which is oxidized-phosphorized-sulphurized is a petroleum sulfonate.

6. A composition as set forth in claim 3 in which the amine is triethanolamine, the fatty acid is oleic acid, the phosphorus sulfide is P_2S_5, and the organic body which is oxidized-phosphorized-sulfurized is a petroleum sulfonate.

7. A complex homogeneous product obtained by reacting (*a*) 10 to 75 moles of a reaction product obtained by reacting from about 1 to 5 moles of an amine with about 1 mole of a higher fatty acid with (*b*) 90 to 25 moles of an oxidized-phosphorized-sulfurized organic body selected from the group consisting of petroleum sulfonates and sulfonated castor oil, the oxidation being produced by treatment with an oxidizing agent at a temperature of from 200 to 500° F. until at least 1% of combined oxygen is present, and the phosphorization and sulphurization being produced by up to 50% by weight on the product subjected to phosphorization and sulphurization of a phosphorus sulfide at a temperature of from about 150 to 500° F., said reaction products (*a*) and (*b*) co-reacted until a homogeneous product is obtained.

8. A product as set forth in claim 7 in which the amine is diethylamine, the fatty acid is stearic acid, the organic body is a petroleum sulfonate, and the phosphorus sulfide is P_2S_5.

9. A product as set forth in claim 7 in which the amine is phenyl diethanolamine, the fatty acid is myristic acid, the organic body is a petroleum sulfonate, and the phosphorus sulfide is P_4S_7.

10. A product as set forth in claim 7 in which the amine is triethanolamine, the fatty acid is oleic acid, the organic body is a petroleum sulfonate, and the phosphorus sulfide is P_2S_5.

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