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GREASE COMPOSITIONS

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This invention relates to improvements in lubricant greases, and more particularly relates to stable, thermally reversible lubricant greases.

It is an object of the present invention to provide an improved stable grease composition. Another object of the invention is to provide a thermally reversible grease. Other objects and advantages will become apparent from the following description thereof.

Greases of the present invention comprise essentially a normally liquid oleaginous compound, preferably a hydrocarbon oil, and from about 0.1% to about 15%, and preferably from about 0.5% to about 5%, of a guanidine salt, such as for example, guanidine carbonate, guanidine acetate, guanidine sulfate, guanidine hydrochloride, etc., and from about 1% to about 50%, and preferably from about 5% to about 20% of a hydrocarbon oil sulfonate, preferably a preferentially oil-soluble petroleum sulfonate.

The hydrocarbon oil sulfonic acids which can be used to produce sulfonates of this invention are those obtained in the treatment of hydrocarbon oils, such as mineral or petroleum oils with strong sulfuric acid, such as concentrated or fuming sulfuric acid. In the treatment of petroleum oils to obtain highly refined products of the type of electrical insulating oils, turbine oils, technical white oils and medicinal white oils, etc., the petroleum oils are treated successively with a number of portions of concentrated sulfuric acid (i. e. above about 95% strength) or fuming sulfuric acid. A variety of sulfur-containing compounds are formed by the chemical reaction of the sulfuric acid upon the oil, including sulfonic acids, organic esters of sulfuric acid, partial esters of sulfuric acid, etc. Most of these compounds are relatively insoluble in the oil under the treated conditions and separate from the oil together with the unreacted sulfuric acid, as a sludge, which is separated from the oil after each acid treatment. The sulfuric acid is usually added in "dumps" of about one-half pound per gallon of oil, the total quantity of acid treated depending upon the oil treated and the desired final product. Usually, from about three pounds to about nine pounds of sulfuric acid per gallon of oil are used. Some of the sulfonic acids resulting from the treatment of the oil with sulfuric acid are preferentially oil-soluble and remain in the oil layer after removal of the acid sludge. Because of the characteristic mahogany color of these preferentially oil-soluble sulfonic acids, they are known in the petroleum art as mahogany acids. The salts of such mahogany

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acids can be obtained by neutralizing the acid-treated oil with basic alkali metal or alkaline earth compound to form sulfonates which are then extracted from the oil by treatment with 50% to 80% aqueous alcohol solutions or other suitable means.

The alkali metal salts, such as sodium, potassium and lithium, and the alkaline earth salts, such as calcium, barium, strontium, etc., of preferentially oil-soluble petroleum sulfonic acids are preferred, although the heavy metal salts of such acids can also be used.

The preferentially oil-soluble petroleum sulfonic acids have molecular weights ranging from about 350 to about 525. While any of these sulfonic acids can be used, we prefer to use those having molecular weights ranging from about 400 to about 500, particularly those having molecular weights in the range of about 430 to 450, and 470 to 500. In preparing the sulfonate from the petroleum sulfonic acids, we can use substantially oil-free sulfonic acids, although for practical purposes blends of oil and sulfonic acids can be used. Usually, the sulfonic acids are recovered as blends of about 40–50% sulfonic acid in hydrocarbon oil.

Greases of the type described can be readily prepared by stirring a mixture of the guanidine salt, sulfonate and hydrocarbon oil at a temperature of from about 220° F. to about 350° F. to effect a solution of the sulfonate in the oil, and then permitting the mixture to cool to room temperature.

The liquid vehicle of the grease can be any liquid lubricant, either natural or synthetic, usually having Saybolt Universal viscosities in the range of from about 65 seconds at 100° F. to about 400 seconds at 210° F., capable of being used in grease compositions. Examples of such vehicles are hydrocarbon oils, i. e., petroleum oils, and synthetic hydrocarbon lubricating oils, such as for example, those obtained by the polymerization of olefins and oils in the lubricating oil range obtained in the Fischer-Tropsch process. Other suitable synthetic oleaginous compounds are aliphatic dicarboxylic acid esters of the type disclosed in U. S. Patent 2,430,222, the esters of dihydroxy thioether, such as are disclosed in U. S. Patent 2,451,895, silicone polymers and the monohydroxy, 1,2 polyoxypropylene aliphatic monoethers of the type described in U. S. Patent 2,488,644, etc.

The type of oil and the viscosity selected will depend upon the intended use and service for the grease. In addition to the guanidine salt, greases prepared in accordance with the present inven-

tion may contain other constituents such as for example E. P. agents, for example, chlorine and/or sulfur-containing compounds, pourpoint depressors, for example, condensation products of the type described in U. S. Patents 1,963,917 and 1,963,918, oiliness agents, rust inhibitors, antioxidants, the alkali metal and/or alkaline earth soap of high molecular weight fats and fatty acids, for example, tallow, lard, palmitic acid, stearic acid, oleic acid, animal fatty acids, etc.

The following specific examples further illustrate the present invention. It is to be understood that the examples are for illustrative purposes only and should not be regarded as limiting the scope of the invention.

Example I

	Per cent
Guanidine carbonate	2.2
Sodium mahogany soap [1]	10.0
Hydrocarbon oil (S. U. S. at 100° F.—210–215)	87.8

[1] Prepared from mahogany acids having a molecular weight of 430–450.

Example II

	Per cent
Guanidine carbonate	2.8
Sodium mahogany soap [1]	8.7
Hydrocarbon oil (S. U. S. at 100° F.—210–215)	89.5

[1] Prepared from mahogany acids having a molecular weight of 470–500.

The product of Example I was prepared by heating a mixture of the mahogany soap and oil to a temperature of about 300–350° F., adding the guanidine carbonate and cooling to room temperature. The grease obtained upon cooling was a thermally reversible unctuous clear mechanically stable product, water resistant, and did not leak oil. The product had an A. S. T. M. drop point of 300° F. and an A. S. T. M. penetration at 77° F. of 247.

The product of Example II was prepared by heating the mixture of guanidine carbonate, mahogany soap and oil at a temperature of 300° F. for thirty minutes with agitation. Upon cooling, a thermally reversible grease of smooth structure was obtained. The grease had an A. S. T. M. drop point of 290° F., and A. S. T. M. unworked penetration of 290 at 77° F., and a worked penetration of 240. The grease showed no leakage at 230° F. after twenty-four hours exposure in a cone-shaped wire gauge, and had a water absorption (Navy) of 95%.

Greases of the present invention find application as a multi-purpose automotive grease, including stearing gear grease, including ball bearing lubricants, as washing machine lubricants, etc. Furthermore, because of their property of being thermally reversible, such products can be used in such services where cup greases are not satisfactory.

Percentages given herein and in the appended claims are weight percentages unless otherwise specified.

Grease compositions containing a mixture of a preferentially oil-insoluble guanidine sulfonate and a preferentially oil-soluble sulfonate is claimed in the co-pending application of G. T. McLeod et al. Serial No. 192,824 filed October 28, 1950.

While the present invention has been described by reference to specific embodiments thereof,

these have been given by way of illustration and the invention is not to be limited thereby but includes within its scope such modifications as come within the spirit of the appended claims.

I claim:

1. A grease composition comprising essentially a major proportion of a normally liquid oleaginous material, from about 0.1% to about 15% of a water-soluble guanidine salt of a low molecular weight acid, and from about 1% to about 50% of a preferentially oil-soluble hydrocarbon oil sulfonate.

2. A liquid composition comprising essentially a major proportion of a normally liquid hydrocarbon oil, from about 0.1% to about 15% of a water-soluble guanidine salt of a low molecular weight acid, and from about 1% to about 50% of a salt of a preferentially oil-soluble petroleum sulfonic acid.

3. A composition as described in claim 2 in which the guanidine salt is guanidine carbonate.

4. A grease composition described in claim 2 in which the guanidine salt is guanidine acetate.

5. A grease composition as described in claim 2 in which the guanidine salt is guanidine sulfate.

6. A grease composition as described in claim 2 in which the salt of the preferentially oil-soluble petroleum sulfonic acid is an alkali metal salt.

7. A grease composition as described in claim 2 in which the salt of the preferentially oil-soluble petroleum sulfonic acid is sodium.

8. A grease composition as described in claim 2 in which the salt of the preferentially oil-soluble petroleum sulfonic acid is lithium.

9. A grease composition as described in claim 2 in which the salt of the preferentially oil-soluble petroleum sulfonic acid is an alkaline earth salt.

10. A grease composition as described in claim 2 in which the salt of the preferentially oil-soluble petroleum sulfonic acid is calcium.

11. A grease composition as described in claim 2 in which the salt of the preferentially oil-soluble petroleum sulfonic acid is barium.

12. A grease composition comprising essentially a major proportion of a normally liquid hydrocarbon oil, from about 0.5% to about 5% of a guanidine carbonate, and from about 5% to about 20% of a sodium salt of preferentially oil-soluble petroleum sulfonic acid having a molecular weight of about 350 to about 525.

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