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GREASE AND LUBRICANT

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This invention relates to the manufacture of greases and lubricants, more particularly to the manufacture of greases and lubricants comprising an aluminum soap of a higher saturated fatty acid.

As is well known in the art, greases having a base comprising an aluminum soap of a higher saturated fatty acid, e. g. aluminum stearate, have been extensively and widely used. These greases have many excellent properties, among them being that greases prepared from such aluminum soaps are highly transparent, waterproof and stable to heat. These greases are ordinarily manufactured by heating an aluminum soap of a higher saturated fatty acid with a mineral oil such as a heavy paraffin oil, and then permitting the gel to cool whereby the mass sets to form a grease. While this method of manufacture is in most cases eminently satisfactory, occasionally greases are obtained which tend to bleed; i. e. the greases are not stable, the solvent tending to separate from the gel. Many attempts have been made to remedy this difficulty, but as yet no satisfactory method has been found for insuring the production of non-bleeding aluminum soap greases.

It is an object of this invention to provide a process for the preparation of non-bleeding greases comprising aluminum soaps of higher saturated fatty acids.

I have found that greases comprising aluminum soaps of higher saturated fatty acids and relatively small amounts of a substance selected from the group consisting of hydrogenated castor oil and the fatty acids obtained therefrom show markedly reduced tendencies toward bleeding, as compared with ordinary greases containing aluminum soaps of higher saturated fatty acids. Such greases may be prepared by dissolving hydrogenated castor oil, or the fatty acids obtained therefrom in the oil in which the aluminum soap is dissolved in order to form the grease; thus, for example, the greases of my invention may be manufactured by heating a relatively small amount of a substance selected from the above group and an aluminum soap of a higher saturated fatty acid with a mineral oil to elevated temperatures, and then permitting the mass to cool so as to form the grease. My invention also permits the production of substantially non-bleeding aluminum-soda soap greases; this feature of my invention is most surprising, since soda soap greases normally have a marked tendency to bleed and hence are somewhat unsuitable for general use. The fact that substantially non-

bleeding aluminum-soda soap greases may be prepared in accordance with my invention is also important because of the fact that such greases are cheaper than the corresponding aluminum soap greases, and hence may be more widely used for commercial purposes.

The hydrogenated castor oil employed in accordance with my invention may be easily prepared by subjecting castor oil to catalytic hydrogenation. I prefer to employ hydrogenated castor oil having an iodine value less than about 30. The fatty acids of the hydrogenated castor oil may be obtained in the ordinary manner by saponifying the hydrogenated castor oil with alkali or by any other means known to the art; these fatty acids comprise chiefly 12-hydroxy stearic acid. Soaps of these fatty acids may also be employed in accordance with my invention although I prefer to employ either the oil or its fatty acids.

The greases of my invention may be prepared in substantially the same manner as ordinary aluminum soap greases are prepared. Thus, for example, a mixture of aluminum stearate and/or aluminum palmitate and either hydrogenated castor oil or the fatty acids obtained therefrom may be heated with an oil and the mass then cooled to form the grease. The oil employed may be any oil suitable for the preparation of greases; for example, paraffin base oils, asphalt base oils or naphthenic base oils may be employed, depending upon the type of grease it is desired to prepare. The amount of aluminum soap of the higher saturated fatty acid heated with the oil may vary somewhat depending upon the type of grease desired; generally it is suitable to prepare a grease containing about 10% more or less of the aluminum soap. The amount of hydrogenated castor oil or hydrogenated castor oil fatty acids heated with the oil may likewise vary somewhat, but ordinarily a grease containing between about 0.5% and about 10% of these products, the particular amount varying with the aluminum soap content of the grease, possesses the desired characteristics. In order to form the grease the above mixture may be heated to elevated temperatures, e. g. temperatures varying between about 275° F. and about 300° F., and the mass then permitted to cool in order to form the grease. Preferably the cooling is carried out rather carefully in order to obtain a uniform grease, as is well known to grease makers. In practically every case I have found that the greases prepared in accordance with my invention show no tendency toward bleeding, whereas similar greases contain-

ing no hydrogenated castor oil or fatty acids thereof in many cases show pronounced bleeds.

An important feature of my invention involves the preparation of aluminum-soda soap greases which are substantially non-bleeding. As above pointed out, it has long been recognized that because of the comparative cheapness of soda soaps, it would be desirable to employ greases containing these soaps for many commercial purposes; as yet, however, the tendency of greases containing these soaps to bleed has prevented their extensive use. The aluminum-soda soap greases of my invention are suitably prepared by heating a mixture of an aluminum soap of a higher saturated fatty acid, a sodium soap of a higher saturated fatty acid and either hydrogenated castor oil or the fatty acids obtained therefrom with an oil, and then permitting the mass to cool so as to form the grease. The amount of aluminum soap and soda soap heated with the oil may vary widely depending upon the type of grease it is desired to prepare; I have found, however, that greases containing anywhere from about 1% to about 10% of each of these soaps, when prepared in accordance with my invention, are highly suitable. The amount of hydrogenated castor oil or its fatty acids incorporated in the greases of my invention may likewise vary, but ordinarily an amount varying between about 0.5% and about 10%, the particular amount varying with the soap content of the grease, is suitable in order to prepare these non-bleeding greases. The method of preparing these greases is substantially the same as that described in connection with the preparation of the aluminum soap greases, except that the temperature to which the mixture is heated should preferably be between about 450° F. and about 500° F.

I have made the observation that heating hydrogenated castor oil or its fatty acids with mineral oils causes a thickening of these oils. This phenomenon may be utilized, if desired, in order to prepare thickened mineral oils for various purposes. The ability of the substances used in accordance with my invention to thicken mineral oils upon being heated therewith may explain the surprising improvements in the greases prepared in accordance with my invention; however, I do not wish to be confined to any particular theory with regard to the manner in which my invention operates.

The following examples are illustrative of the greases which may be prepared in accordance with my invention; amounts are given in parts by weight.

Example I

1 part of the fatty acids obtained by saponifying hydrogenated castor oil having an iodine value of about 2.7 and 10 parts of aluminum stearate were mixed with 89 parts of a paraffin oil having a Saybolt viscosity of 100 seconds at 100° F. This mixture was then heated to 300° F. and cooled slowly to room temperature, whereby a grease was obtained. This grease was transparent and very soft; furthermore, substantially no bleed was noticed. A grease prepared from 10 parts of aluminum stearate and 90 parts of the same paraffin oil produced a noticeable bleed.

Example II

2 parts of the fatty acids obtained by saponifying hydrogenated castor oil having an iodine value of 2.7, 4 parts of a soda soap of hydrogen-

ated fish oil having an iodine value less than 10 and 4 parts of aluminum stearate were mixed with 90 parts of an asphalt base oil having a Saybolt viscosity of 300 seconds at 100° F. This mixture was then heated to 480° F. and permitted to cool slowly to room temperature. The product obtained was a transparent, uniform, soft grease which showed no tendency toward bleeding. A grease prepared in the same manner and containing no hydrogenated castor oil fatty acids showed a noticeable bleed.

Example III

1 part of the fatty acids of hydrogenated castor oil having an iodine value of 2.7, 2 parts of the soda soap of a hydrogenated fish oil having an iodine value less than 10 and 2 parts of aluminum stearate were mixed with 95 parts of an asphalt base oil having a Saybolt viscosity of 300 seconds at 100° F. This mixture was then heated to 480° F. and permitted to cool slowly to room temperature. The product obtained was a transparent, uniform, soft grease which showed no tendency toward bleeding. A grease prepared in the same manner and containing no hydrogenated castor oil fatty acids showed a noticeable bleed.

It will be evident from the above description that my invention permits the production of greases containing aluminum soaps of higher saturated fatty acids and of greases containing both aluminum and soda soaps of higher saturated fatty acids, which greases have substantially no tendency toward bleeding. Hence it will be evident that my invention will be of great interest to those engaged in the manufacture of lubricants and greases.

Since certain changes in carrying out the above processes and certain modifications in the compositions which embody the invention may be made without departing from its scope, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A grease comprising an aluminum soap of a higher saturated fatty acid, a mineral oil and a relatively small amount of a substance selected from the group consisting of hydrogenated castor oil and 12-hydroxy stearic acid.

2. A grease comprising an aluminum soap of a higher saturated fatty acid, a mineral oil and a relatively small amount of hydrogenated castor oil.

3. A grease comprising an aluminum soap of a higher saturated fatty acid, a mineral oil and a relatively small amount of 12-hydroxy stearic acid.

4. A grease comprising aluminum stearate, a mineral oil and between about 0.5% and about 10% of hydrogenated castor oil having an iodine value less than about 30.

5. A grease comprising aluminum stearate, a mineral oil and between about 0.5% and about 10% of 12-hydroxy stearic acid.

6. A grease comprising an aluminum soap of a higher saturated fatty acid, a soda soap of a higher saturated fatty acid, a mineral oil and a relatively small amount of a substance selected from the group consisting of hydrogenated castor oil and 12-hydroxy stearic acid.

7. A grease comprising an aluminum soap of a higher saturated fatty acid, a soda soap of a higher saturated fatty acid, a mineral oil and a

relatively small amount of hydrogenated castor oil.

8. A grease comprising an aluminum soap of a higher saturated fatty acid, a soda soap of a higher saturated fatty acid, a mineral oil and a relatively small amount of 12-hydroxy stearic acid.

9. A grease comprising aluminum stearate, a soda soap of a higher saturated fatty acid, a mineral oil and between about 0.5% and about 10% of hydrogenated castor oil having an iodine value less than about 30.

10. A grease comprising aluminum stearate, a soda soap of a higher saturated fatty acid, a mineral oil and between about 0.5% and about 10% of 12-hydroxy stearic acid.

11. A grease base comprising an aluminum soap of a higher saturated fatty acid and a substance selected from the group consisting of hydrogenated castor oil and 12-hydroxy stearic acid.

12. A grease base comprising an aluminum soap of a higher saturated fatty acid and hydrogenated castor oil.

13. A grease base comprising an aluminum soap of a higher saturated fatty acid and 12-hydroxy stearic acid.

14. A grease base comprising aluminum stearate and hydrogenated castor oil having an iodine value less than about 30.

15. A grease base comprising aluminum stearate and 12-hydroxy stearic acid.

16. A grease base comprising an aluminum soap of a higher saturated fatty acid, a sodium soap of a higher saturated fatty acid and a substance selected from the group consisting of hydrogenated castor oil and 12-hydroxy stearic acid.

17. A grease base comprising aluminum stearate, a soda soap of a higher saturated fatty acid and hydrogenated castor oil having an iodine value less than about 30.

18. A grease base comprising aluminum stearate, a soda soap of a higher saturated fatty acid and 12-hydroxy stearic acid.

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