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LUBRICANT

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Our present invention relates to lubricating compositions, and more particularly to lubricants having incorporated therein special types of modifying agents.

It may be generally stated that while it has heretofore been realized that no one mineral lubricating oil is equally well adapted for all purposes, the ideal lubricant must satisfy several important conditions. For example, it is well known that, in the production of lubricants, relatively small changes in the viscosity of the lubricant with change in temperature is a highly desirable property. The viscosity change of liquid lubricants occurring between two given temperatures, as between 100 and 210° F., is considered a measure of quality, and may be expressed in terms of viscosity index. This index is defined by Dean and Davis in their article in Chemical and Metallurgical Engineering, volume 36, page 618.

Now, we have discovered by the addition of a relatively small amount of halogenated fatty acids, or in the form of certain of their derivatives, to ordinary mineral oil, lubricants of superior quality may be obtained. Hence, it may be stated that it is one of the main objects of our present invention to provide a highly improved type of lubricant having the desirable qualities of an improved viscosity index and adaptability to a variety of applications involving relatively high temperature and pressure, or both, by utilizing, in combination with a mineral oil, suitable modifying agents.

Another important object of this invention is to provide an oil or grease lubricant, including mineral oil, which additionally has incorporated therein an agent, such as a chlorinated fatty acid, a chlorinated derivative of a fatty acid, a chlorinated glyceride of a fatty acid, or a chlorinated soap, whereby the lubricant is readily adapted for use in the lubrication of gears, "free-wheeling" devices, wire drawing, metal cutting and the like.

Another object of this invention is to provide a lubricating oil or grease which embodies a sufficient amount of a compound including a chlorinated fatty acid radical to materially improve the viscosity index of the oil or grease without substantially affecting the pour point, flash point, corrosiveness and the important properties of the oil or grease.

The novel features which we believe to be characteristic of our invention are set forth in particularity in the appended claims, the invention itself, however, will best be understood by reference to the following description in which we have indicated the various ingredients for carrying our invention into effect.

The following specific disclosure will serve to indicate the character of the invention in further detail. It will be appreciated that the examples given are for illustrative purposes, and not by way of limitation. Suitable modifying agents, which are to be embodied in the mineral oil to form the improved lubricant, comprise a predetermined amount of a chlorinated acid, or a mixture of chlorinated acids, of the fatty acid group. Such acids are well known and include oleic, ricinoleic, palmitic, stearic, and the like.

The manner of chlorinating the desired fatty acid is of secondary importance. Any well known method of the prior art may be utilized in this connection. The chlorine content of the modifying agent is one of the factors which govern the "stiffness" of the final product.

A group of modifying agents which we have found to be especially useful comprises the glycerides of the chlorinated fatty acids. That is, any of the aforementioned fatty acids may be reacted with glycerine, and the resulting glyceride treated with chlorine to give the chlorinated glyceride. In place of using one, or more, of the fatty acids, and converting the same to the corresponding glyceride, the naturally occurring glyceride may be chlorinated. Similarly, any other fats, or oils, of animal or vegetable origin containing glycerides of fatty acids may be chlorinated, and used as a modifying agent.

Still another group of modifying agents has been found useful for improving mineral oil lubricants. This group includes the soaps of the chlorinated fatty acids. The lead, calcium, aluminum, sodium, potassium soaps of the chlorinated fatty acids may be used as modifying agents. This group of modifying agents is especially useful for incorporation in a mineral oil to form lubricating greases. The aforementioned groups are more particularly useful in connection with lubricating oils.

The chlorinated fatty acid soap, in the case of the sodium soap for example, may be produced by chlorinating a desired fatty acid (as stearic, palmitic or oleic), and then treating the chlorinated acid with sodium hydroxide. Of course, the chlorinated soap may be also produced by reacting the chlorinated glycerides with sodium hydroxide, for example, to produce glycerine and the chlorinated soap. Regardless of the procedure followed in securing the chlorinated soap, it is to be noted that the soap may

be of the alkali metal, alkaline earth, or heavy metal type.

The following tables of physical properties are given to demonstrate the extent to which mineral lubricating oil is modified by the present invention. It is to be clearly understood, however, that the tables are illustrative in nature and not restrictive in any manner. Percentages indicated are by volume of final mixture.

The physical properties given in the tables were determined according to the standards of the American Society for Testing Materials. The chlorine content of the modifying agents were as follows: cottonseed oil, 27%; castor oil, 18%; oleic acid, 33%—the chlorine content being calculated on the weight of the chlorinated product. The content of the modifying agent in the final mixture is given in percent by volume of finished lubricant.

Table 1

	Original mineral lubricating oil	5% chlorinated cotton-seed oil	5% chlorinated castor oil
Specific gravity at 60/60° F	0.884	0.896	0.890
Viscosity, Saybolt seconds—			
At 100° F	538	592	528
At 210° F	66	75	69
Viscosity index	96	115	110
Flash point, °F	430	440	430
Pour point, °F	10	10	10
Corrosion at 210° F	Negative	Negative	Negative

Table 2

	Original mineral lubricating oil	5% chlorinated oleic acid
Specific gravity at 60/60° F	0.887	0.889
Viscosity, Saybolt seconds—		
At 100° F	662	696
At 210° F	73	77
Viscosity index	100	104
Corrosion at 210° F	Negative	Negative

The above products are of course in the class of liquid lubricants or lubricating oils. "Solid" lubricants, or greases, may be obtained by mixing a hydrocarbon or mineral oil with the lead, calcium, aluminum, sodium, or other salt of the chlorinated acids above mentioned. The "stiffness" of the product may be varied by the choice of the salt, the amount used, its chlorine content, and the viscosity of the oil employed. For example, 15% of the calcium, or sodium, salt of chlorinated oleic acid (33% Cl_2), when incorporated in the usual manner with a medium heavy oil, produced a grease of excellent consistency and stability.

In making the soaps, fats proper or fatty acids may be used. Further, various fillers, such as graphite, French chalk, mica, talc, wood pulp and the like, may be embodied in the grease containing the chlorinated soap. Although the chlorinated soaps are primarily used in greases, they can also be used in cutting oils wherein the mineral oil is held in suspension by the soap. A stable emulsion with water is formed which has good lubricating properties. The important function in such a case is the cooling of a cutting edge.

It is to be clearly understood that the expression "modifying agent" is intended to include the employment of one, or more, substances which may be complementary substances having the characteristics mentioned. Again, the phrase "compound including a chlorinated fatty acid radical" used hereinafter in the claims is to be understood as referring to a chlorinated fatty acid, its chlorinated glyceride, or a soap of a chlorinated fatty acid, all of these compounds containing in common a fatty acid radical. The phrase "chlorinated fatty oils" is to be understood as referring to the product of reaction of chlorine and the unsaturated fatty acids and/or their glycerides.

While we have indicated and described several ingredients for carrying our invention into effect, it will be apparent to one skilled in the art that our invention is by no means limited to the said ingredients described heretofore, but that many variations may be made without departing from the scope of our invention as set forth in the appended claims.

What we claim is:

1. A lubricant comprising a major proportion of unchlorinated mineral oil and a minor amount of a compound including a chlorinated fatty acid radical.

2. A lubricant comprising a mineral oil having incorporated therein a chlorinated fatty acid derivative.

3. A process for making a lubricant consisting in reacting a compound including a fatty acid radical with chlorine, and incorporating the resultant reaction product in mineral oil.

4. A lubricating oil comprising in combination a mineral oil and a small percentage of chlorinated non-mineral oil.

5. A lubricrating oil comprising in combination a mineral oil and a small percentage of chlorinated animal oil.

6. A lubricating oil comprising in combination a mineral oil and a small percentage of chlorinated vegetable oil.

7. A lubricating oil comprising in combination a mineral oil and a small percentage of chlorinated cottonseed oil.

8. A lubricating oil comprising in combination a mineral oil and a small percentage of chlorinated castor oil.

9. A lubricating oil comprising in combination a hydrocarbon oil and modifying agent consisting of a small percentage of chlorinated glyceride of a fatty acid of high molecular weight.

10. A lubricant comprising in combination a major proportion of unhalogenated mineral oil and a small percentage of a halogenated compound including a fatty acid radical.

11. A lubricant comprising in combination a mineral oil and a small percentage of a halogenated glyceride.

12. A composition of matter comprising a major proportion of unchlorinated mineral oil and a small percentage based on the amount of mineral oil of a halogen-bearing substance containing a fatty acid radical.

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