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LUBRICATING OIL

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Our invention relates to lubricating oils and more particularly to admixtures of hydrocarbon oils and halogenated aromatic ketones as new compositions of matter.

In general, it is known that the addition of chlorinated compounds to hydrocarbon oils will impart to them an increased film strength. A number of addition agents, however, are unstable to heat; and at high operating temperatures are apt to decompose and liberate hydrogen chloride, which will combine with moisture present to form hydrochloric acid and corrode the parts being lubricated.

One object of our invention is to provide a stable lubricating oil of high film strength.

Another object of our invention is to provide lubricants which are less corrosive to certain types of bearing metals such as lead and cadmium alloys.

In general, our invention contemplates the addition of small quantities of halogen-bearing aromatic ketones to a hydrocarbon oil. The ketones must contain at least one aromatic nucleus in the molecule but two or more may be present. The halogen atom or atoms may be directly attached to the aromatic nucleus or nuclei or may be present in another part of the molecule. For some purposes, we prefer to have all the halogen atoms present attached directly to the aromatic nucleus; but for other purposes, it is not necessary that their position be so restricted.

By way of example and not by way of limitation, the following examples are given. Each of these compounds is to be considered as an example of our invention when blended in a lubricant:

1. o-Chlorobenzophenone—a blend of a good grade of hydrocarbon oil and one per cent of o-chlorobenzophenone, which is an aromatic ketone having two aromatic nuclei, was prepared. The film strength of the hydrocarbon oil was measured on the Timken machine designed for this purpose and fully described in the literature of the art. The hydrocarbon oil showed a film strength of eight pounds, and the above-described blend showed a film strength of 30.5 pounds or almost four times that of the hydrocarbon oil. The blend was held at a temperature between 230° and 240° F. for several days, and no chemical change in the sample occurred, showing that the blend was stable to heat.

2. m-Chlorobenzophenone

3. p-Chlorobenzophenone

4. 2,4-dichlorobenzophenone

5. 4,4'-dichlorobenzophenone

6. o-Bromobenzophenone

7. o-Iodobenzophenone

8. p-Chloroacetophenone—a blend of one per cent of this halogen-bearing aromatic ketone containing one aromatic nucleus showed a Timken film strength of 28 pounds, which shows the high film strength of blends of this type of compound.

9. o-Chloropropiophenone

10. p-Chlorobutyrophenone

11. o-Chlorostearophenone

12. Stearoyl chloronaphthalene. This addend was prepared by means of a Friedel-Crafts reaction as follows: To a mixture of 28 parts of chlorinated naphthalene containing about 1½ atoms of chlorine per molecule and 20 parts of anhydrous aluminum chloride in 150 parts of carbon bisulfide was added 45 parts of the chloride of stearic acid in 150 parts of carbon bisulfide. The mixture was refluxed several hours and then stood overnight. It was then decomposed by a mixture of ice and hydrochloric acid and the oil separated. After removing the solvent, the product was blended in hydrocarbon oil to obtain our advantageous results.

13. Chlorinated stearoyl naphthalene—a procedure similar to that described for Example 12 was used, substituting an equivalent quantity of naphthalene for the chlorinated naphthalene. After the condensation product was obtained, it was subjected to the action of chlorine gas. Presumably some of the chlorine atoms entered the naphthalene ring and some the stearic acid radical. The product was found to be suitable for our purposes.

14. Chlorinated dibenzyl ketone

15. Acetyl chlorodiphenyl

16. Chlorinated anthrone

Aromatic ketones are not only stable, but they are free from objectionable odors. The amount of aromatic ketone to be used in making a blend may vary between about one tenth of one per cent and ten per cent by weight, depending on the intended use of the lubricant, the film

strength desired, and the particular aromatic ketone being employed. One advantage of halogen-bearing aromatic ketones lies in the fact that a comparatively minute quantity will produce a marked increase in film strength, so that comparatively smaller amounts than most halogenated compounds can be used in producing a high film strength lubricant.

Another advantage of halogen-bearing ketones for addends to lubricants is that they are relatively non-corrosive to certain types of bearing metals now widely used, such as lead and cadmium compositions, giving about the same metal loss per unit of area of bearing surface as a fully refined, unblended hydrocarbon oil.

It is sometimes advantageous to combine more than one of these compounds in a blend to obtain particular properties. We accomplish this by mixing two or more of these compounds together and blending the mixture with the hydrocarbon oil or by blending one in the hydrocarbon oil, blending the second into the mixture, and so on until the composition is complete.

While the other halogens are useful in accordance with our invention, chlorine is the one generally preferred since it is both effective and relatively inexpensive.

It may be desirable to include in one and the same blend, in addition to the addends here described, other addends for specific purposes. Thus, we may add a pour point depressor such as a naphthalene-chlorwax condensation product, a viscosity index improver such as certain resins or polymerized hydrocarbons, and sulfur or phosphorous containing inhibitors in addition to our halogen-bearing ketones. Indeed, in some cases it is advantageous to combine with our halogen-bearing aromatic ketones in a hydrocarbon oil blend such materials as calcium dichlorostearate, chromium oleate, aluminum stearate, tin soaps and other metallic soaps. Various halogenated oxygen-bearing aliphatic compounds may be added.

Our addends are admirably adapted for use in lubricating oils of all types including those designed for use in automotive crankcases, Diesel oils, and any other oils of lubricating viscosity. Furthermore, our addends are advantageously blended in gasoline and other petroleum fuels either directly or after being blended first in a lubricating oil and then added to the fuel. Soap-thickened mineral oils of all types ranging from those showing only a slight increase in viscosity over that of the mineral oil alone to the semi-solid and solid greases containing fifty per cent or more of soap are amenable to treatment according to our invention. In making these greases, the usual soaps such as sodium stearate, aluminum stearate, calcium soaps of beta fat, and the like may be used and the halogen-bearing aromatic ketone blended into the mixture after the grease is otherwise complete. Various other thickening ingredients or materials for other purposes may be added, including yarn, hair, graphite, glycerol, water, lampblack, mica, dust, zinc, litharge, and the like, depending on the use intended.

This application is a continuation in part of our co-pending application Serial No. 62,474, filed February 5, 1936.

Other modes of applying the principle of our invention may be employed instead of the one explained, change being made as regards the composition and method herein disclosed, provided the ingredients or steps stated by any of the following claims or the equivalent of such stated ingredients or steps be employed.

We therefore particularly point out and distinctly claim as our invention:

1. A composition of matter comprising in combination a hydrocarbon oil intimately admixed with from one tenth of one percent to ten percent by weight of a halogenated, aromatic ketone.

2. A composition of matter comprising in combination a hydrocarbon oil intimately admixed with from one tenth of one percent to ten percent by weight of a chlorinated aromatic ketone.

3. A composition of matter comprising in combination a hydrocarbon oil intimately admixed with from one tenth of one percent to ten percent by weight of a halogen bearing ketone containing at least one aromatic radical.

4. A composition of matter comprising in combination a hydrocarbon oil intimately admixed with from one tenth of one percent to ten percent by weight of halogenated benzophenone.

5. A composition of matter comprising in combination hydrocarbon oil, intimately admixed with from one tenth of one percent to ten percent by weight of chlorobenzophenone.

6. A composition of matter comprising in combination a hydrocarbon oil intimately admixed with from one tenth of one percent to ten percent by weight of a halogen bearing stearoyl naphthalene.

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