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LUBRICATING OIL AND METHOD OF MAKING THE SAME

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The present invention relates to the improvement of lubricating oils.

It is among the objects of the present invention to provide improved lubricating oils which will have a decreased tendency toward sludge formation and which will have lessened tendency to cause corrosion of metallic surfaces with which such lubricating oils may come in contact.

Still further objects and advantages will appear from the more detailed description set forth below, it being understood, however, that this 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.

It has been found that alkyl and aryl phosphites may be added in small quantities to lubricating oils to retard sludge formation and the tendency of such oils to develop corrosive surfaces on metal. These phosphites are not particularly stable and are difficult to produce and are expensive.

It has been found that these phosphites may be stabilized by small amounts of lecithin but the addition of lecithin in small amounts such as 2% to 3% does not seem to enhance the action of the phosphites in stabilizing the lubricating oil and in some instances it appears disadvantageously to affect the quality of the lubricating oil.

It has now been found in accordance with this invention that when much higher quantities of lecithin are utilized together with the phosphite such as from 2 to 10 parts of lecithin to every 5 parts of the phosphite, and particularly where the combination of the high amount of lecithin in the phosphite is subjected after being thoroughly admixed with the lubricating oil to an elevated temperature in excess of 350° F. and desirably to temperatures of about 400° F. to 600° F., substantial stabilization of the lubricating oil is obtained.

This is quite surprising due to the fact, that normally lubricating oils, as well as lecithin, are decomposed or broken down and rendered more subject to deterioration as a result of being subjected to such elevated temperatures. In accordance with this invention, it is necessary for the lubricating oil to be subjected to the elevated temperature in excess of 350° F. together with and after having had thoroughly admixed therein the combination of the lecithin and the phosphites in order to develop the desired effect upon the lubricating oil.

It has been found that the interaction of the lubricating oil, lecithin and the phosphite is not most satisfactorily obtained unless the high heat treatment is applied to the lubricating oil after or during addition of the combination of lecithin and the phosphite, and it has been found particularly desirable that such heat treatment should be conducted with substantial agitation for a period of at least 10 minutes and the treatment may be continued conveniently for as long as several hours or more.

It has been found that the lecithin which is employed for combination with the phosphites is most satisfactorily a crude lecithin derived from vegetable sources, particularly from soya beans, cottonseed or corn. The lecithin when mixed with the phosphite should preferably contain between 10% to 60% of a glyceride oil, preferably a vegetable glyceride oil.

It has been found most satisfactory to add the combination of lecithin and the phosphite in amounts varying from 0.1% to as much as 0.8% although generally between 0.2% and 0.4% are sufficient to show a marked effect upon the lubricating oil that is treated at the elevated temperature with the combination of lecithin and the phosphite.

Preferably an equal mixture of the lecithin and the phosphite by weight is employed rather than other proportions as it has generally been found that where an equal mixture of lecithin and the phosphite is prepared and added to the lubricating oil during or followed by the elevated temperature treatment, the most desirable effect on the lubricating oil is obtained.

Among the different types of the phosphites which may be employed in combination with lecithin at the elevated temperature are triphenyl, tri-cresyl, tri-xylyl, tri-naphthyl, tri-anthracyl, tri-propyl, tri-butyl, tri-amyl and/or tri-hexyl phosphites and various mixed aryl-alkyl phosphites or even alkaryl phosphites or aralkyl phosphites.

Sometimes it has been found possible to use mono- or di- esters instead of the tri- esters, but these are generally not as effective as the tri-esters.

It is possible to use in combination with lecithin or in lieu of the lecithin, but in amounts which should be at least 25% or more of the phosphite, other amino or nitrogen aromatic, aliphatic or heterocyclic compounds having from 2 to 30 or more carbon atoms, 1 or more nuclear or poly-nuclear groups, and 1 to 3 alkyl, aryl, alkaryl or aralkyl substituted or unsubstituted amino, hydroxy, or carboxy groups. Among the

compounds that may be employed in combination or in lieu of the lecithin are phenylhydrazine, cyclohexylamine, triethanolamine and hexamethylenetetramine.

In place of or in addition to the phosphites it is also possible to utilize small amounts of the aryl or alkyl or other esters or compounds of sulfurous and arsenious acids.

It is also possible to utilize various organic sulfur compounds, such as the thiophenols, thioamines, mercaptans, and sulfides such as for example thiodiphenylamine or phenyl disulfide.

Having described my invention, what I claim is:

1. A process of improving lubricating oils to decrease sludge formation and also to decrease their tendency to cause corrosion of metal surfaces, which comprises reacting the entire body of such oil with a relatively small amount of a combination of lecithin and a phosphite ester at an elevated temperature in excess of about 350° F.

2. A process of improving lubricating oils to decrease sludge formation and also to decrease their tendency to cause corrosion of metal surfaces, which comprises reacting the entire body of such oil with a relatively small amount, less than 0.8%, of a combination of lecithin and a phosphite ester at a temperature of between about 400° F. and 600° F., the amount of lecithin present being at least 25% of the phosphite ester.

3. A process of improving lubricating oils to decrease sludge formation and also to decrease their tendency to cause corrosion of metal surfaces, which comprises reacting the entire body of such oil with a relatively small amount, less than 0.8%, of a combination of about equal proportions of lecithin and tri-phenyl phosphite at an elevated temperature in excess of about 350° F.

4. A substantially stabilized lubricating oil resistant to sludge formation and having a decreased tendency toward corrosion of metal surfaces containing the heat reaction products of the entire body of the lubricating oil with a small amount of a combination of lecithin and a phosphite ester, said reaction products having been formed in the lubricating oil at a temperature in excess of about 350° F., the amount of lecithin present being at least 25% of the phosphite ester.

5. A substantially stabilized lubricating oil resistant to sludge formation and having a decreased tendency toward corrosion of metal surfaces containing the heat reaction products of the entire body of the lubricating oil with a small amount, less than 0.8%, of a combination of lecithin and a phosphite ester, said reaction products having been formed in the lubricating oil at a temperature of between about 400° F. and 600° F., the amount of lecithin present being at least 25% of the phosphite ester.

6. A substantially stabilized lubricating oil resistant to sludge formation and having a decreased tendency toward corrosion of metal surfaces containing the heat reaction products of the entire body of the lubricating oil with a small amount, less than 0.8%, of a combination of lecithin and triphenyl phosphite, said reaction products having been formed in the lubricating oil at a temperature of between about 400° F. and 600° F., the amount of lecithin present being at least 25% of the phosphite.

7. A process of modifying the properties of a lubricating oil which comprises thoroughly mixing said oil with 0.1% to 0.8% of a mixture of 2 to 10 parts by weight of lecithin and 5 parts of a triaryl phosphite, and then heating to an elevated temperature of about 400° F. to 600° F. for at least 10 minutes to several hours.

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