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PROCESS FOR TREATING MINERAL OILS

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5 Claims. (Cl. 252—51)

This invention pertains generally to the improvement of oils and pertains particularly to the stabilization thereof.

5 This invention pertains more particularly to the stabilization of lubricating oils intended for motor car use.

The result of improvements in the automobile motor to develop more power at higher operating temperatures with units occupying smaller
10 space has been to place a much greater demand upon motor oils.

While commercial motor oils as a rule and particularly those made from Pennsylvania grade crudes are composed of highly inert substances
15 capable of heavy duty performance without substantial change in chemical composition, yet extreme service conditions, particularly when accompanied by high temperatures, are sometimes capable of causing undesirable chemical
20 and/or physical changes as evidenced for instance by the corrosion of certain types of bearings.

This invention is based upon the discovery that the stability of oils in general, and particularly those derived from Pennsylvania grade crudes is materially improved upon the addition
25 to said oil of a relatively small amount of a lake-forming substance or dye of which alizarin (1,2 dihydroxyanthraquinone), and its derivatives are examples.

30 By the term lake-forming substances as used herein is meant that class of substances generally known as metallic-mordant dyes or substances.

Oils, when treated in accordance with this invention, exhibit unusual stability under the
35 most exacting conditions.

To illustrate these stabilizing qualities of lake-forming substances, 150 cubic centimeters of an untreated neutral oil were placed in a container and maintained at a temperature of 341° F. A
40 cadmium-silver-copper alloy bearing, having an area of 16 square centimeters, was placed in the oil together with a catalyst comprising a strip of copper having an area of 21 square centimeters and air was passed through the oil at
45 the rate of 5 liters per hour. At the end of 12 hours the bearing showed a loss due to corrosion of approximately 100 milligrams, and at the end of 24 hours of approximately 275 milligrams.

This same oil under exactly the same conditions but after treatment with alizarin (as an example) caused a loss in weight of an identical bearing due to corrosion of only one milligram during the entire 24 hour period.

The stabilizing effect is thus made clearly evident.

The treated oil of the example given was made by adding to a quantity of untreated oil 0.1% by weight of alizarin followed by thorough mixing at 150° C. Any other temperature may be employed and the stabilizer may be added in
5 any other manner.

In view of the fact that the above test is extremely severe and that corrosion of the bearing of only one milligram resulted during a period of 24 hours even though a very active catalyst
10 was present, it follows that good results may be produced upon the addition of smaller quantities of stabilizer. Furthermore larger quantities may be added if desired.

In another example a cadmium-nickel bearing of 21 square centimeters and a copper-lead bearing of 9.5 square centimeters were placed
15 in the sphere of reaction in addition to a copper strip of 21 square centimeters. The oil was treated with 0.03% by weight of alizarin.

20 There was no loss due to corrosion of the cadmium-nickel bearing during the 24 hour period and the loss in weight of the copper-lead bearing was only 2 milligrams.

While in the examples given solution was effected without the aid of solubilizing agents,
25 if desired the lake-forming substances may be brought and/or maintained in solution by a solubilizing agent. Normal dibutyl phthalate for instance may be used for this purpose.

30 Lake-forming substances, however, may be made more soluble in oil by introducing hydrocarbon radicals into the lake-forming molecules such as alkyl and/or aryl radicals, etc.

Further evidence of the stabilizing effect appears to reside in reduction in rate of increase in
35 color, viscosity, acidity, etc., and in an improvement in lubricating qualities.

An example of another lake-forming substance is anthragallol. The following will illustrate its
40 stabilizing qualities:

150 cubic centimeters of a neutral oil before treatment with anthragallol were placed in a container and maintained at a temperature of 341° F. A cadmium-nickel alloy bearing, having an area of 21 square centimeters, was placed
45 in the oil together with a catalyst comprising a copper-lead bearing and air was passed through the oil at a rate of 5 liters per hour. At the end of 12 hours the cadmium-nickel bearing showed a loss due to corrosion of approximately 86 milligrams.

50 This same oil under exactly the same conditions but after treatment with anthragallol reduced the corrosion of the cadmium-nickel bearing to only 4 milligrams for the 12-hour period.

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This treated oil was made by adding to a quantity of untreated oil .1 per cent by weight of anthragallol followed by thorough mixing. The undissolved anthragallol was separated by filtration and the oil containing anthragallol in solution was subjected to test without further treatment.

While the foregoing indicates a rather low solubility of anthragallol in oil, should it be desired to add larger quantities of anthragallol it would be merely necessary to add a suitable solubilizing agent to hold the anthragallol in solution.

Another example of a lake-forming substance is methyl red.

When the untreated oil of the previous example was treated in the same manner with methyl red instead of anthragallol and then subjected to the same conditions with the same bearings present the corrosion of the cadmium-nickel bearing was reduced to 1 milligram for the 12 hour period.

As in the case with anthragallol should it be desired to add larger quantities of methyl red to the oil it is merely necessary to resort to solubilizing agents.

However, since the conditions of the test during the 12 hour period were extremely severe and since the loss due to corrosion for anthragallol and methyl red was only 4 milligrams and 1 milligram respectively, the quantities which remain in solution are quite sufficient for practical purposes.

In fact these tests indicate that even smaller quantities of these inhibitors would meet all of the requirements of actual service conditions met with in the automobile motor.

Thus the quantities added might be sufficiently small to insure complete solution regardless of temperature conditions.

While the phenomena surrounding the corrosion inhibiting action of lake-forming substances when added to oils has not been definitely established it is thought that the corrosion of bearing and other metals in automobile motors is caused by unstable oxidizing substances in the oil which tend to oxidize metals in the motor and particularly bearing metals.

Upon the addition of a lake-forming substance to the oil it is thought that this substance unites with the metal surface film or with the first film of metallic derivative formed (such as oxides, hydroxides, salts, etc.), on the wearing surface of a bearing, and forms a lake thereon.

The lake because of its inert properties and/or the large size of its molecules prevents diffusion

of the oxidizing substances of the oil through the lake film formed on the bearing.

The lake thus formed on the bearing surface adheres tenaciously thereto.

This viewpoint is confirmed by the fact that upon visual inspection of the wearing surfaces of bearings, after having been subjected to the treated oil under oxidizing conditions, an iridescent surface film is observed indicating the presence of a tenaciously adhering lake on the bearing surface.

Oils treated in accordance with this invention may be used for any other purpose such as insulating oils for transformer, cables, etc., or for other lubricating purposes.

In the claims the term lake-forming substance when referred to is employed generically and includes a mixture containing a lake-forming substance in sufficient quantities to be effective as such. The term includes a mixture wherein a lake-forming substance is for practical purposes essentially the sole active component operating as a stabilizer.

Also in the claims the term "lubricating oil" when referred to is intended to mean a petroleum oil of a viscous character, that is, an oil having a viscosity of 50 Saybolt seconds at 100° F. or above, and regardless of the use to which such oil is put.

While procedure for the purpose of carrying out the invention has been particularly described, it is to be understood that this is by way of illustration. Therefore changes, omissions, additions, substitutions, and/or modifications may be made within the scope of the claims without departing from the spirit of the invention which is intended to be limited only as required by the prior art.

I claim:

1. A lubricating oil having a lake-forming substance in solution therein in quantity sufficient to stabilize against bearing corrosion.

2. A lubricating oil having in solution, in quantities sufficient to stabilize against bearing corrosion, a lake-forming substance selected from the group consisting of alizarin, anthragallol and methyl red.

3. A lubricating oil having alizarin in solution therein in quantity sufficient to stabilize against bearing corrosion.

4. A lubricating oil having anthragallol in solution therein in quantity sufficient to stabilize against bearing corrosion.

5. A lubricating oil having methyl red in solution therein in quantity sufficient to stabilize against bearing corrosion.

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