

UNITED STATES PATENT OFFICE

1,934,068

PROCESS FOR TREATING SYNTHETIC OILS

Edward M. Jolly and Charles C. Swoope, Baton Rouge, La., assignors to Standard Oil Development Company, a corporation of Delaware

No Drawing. Application December 5, 1930
Serial No. 500,424

5 Claims. (Cl. 196—23)

The present invention relates to an improved method for treating lubricating oils and more specifically to the removal of halogens from oils prepared by condensation means. Our invention will be fully understood from the following description and the example which illustrates one method of application of our process.

In the production of high grade lubricants, and in particular the lubricants prepared by condensation of organic halides or of organic materials in the presence of metallic halides, it is well known that the complete elimination of chlorine and other halogens from the finished product is necessary, particularly with motor oils or oils which are adapted for machinery operation at high temperatures. For example, a residue of as little as 0.1% chlorine is known to form combinations with iron and aluminum producing active cracking or polymerizing catalysts in the cylinders and bearings of the engine. The action of halogen is therefore undesirable both because of its corrosive effects on the engine parts and because of its catalytic effect in promoting the formation of carbon and sludge from the oil. We have now found a method whereby chlorine and similar substances may be removed from the lubricating oils so completely that not even traces of residual chlorine may be found in the final oil. Our improved process consists essentially in treating the synthetic oil with reactive metal which is in a liquid condition under the conditions of operation.

In the operation of our process the condensed oil which has been found to contain traces of chlorine or other halides is subjected to the action of a reactive metal such as an alkali metal or mercury at a temperature of about 300° F. to 450° F., which is the preferred operating range. It will be understood that lower temperatures may be used which are ordinarily above the melting point of the particular metal say 210° F. for sodium for example, but usually the temperature range given above is preferred in order to obtain the most complete reaction within a reasonably short time, say less than five or ten hours. The temperature may also be above 450° F. even up to 600° F. or slightly higher, but it is preferably below such temperature as causes appreciable thermal decomposition of the oil.

As an example of the operation of the process the following is given:—

A hard paraffin wax having a melting point of 122 to 125° F. is chlorinated by the direction addition of chlorine in the presence of a trace of iodine and at a temperature of about 200° F.

The chlorine is blown through the oil for about 24 hours and after this time it is found that the product contains about 12% chlorine, although there is some unchlorinated hydrocarbon. To 90 parts of this chloro-paraffin 10 parts of naphthalene and 10 parts of aluminum chloride are then added with a sufficient quantity of kerosene to completely dissolve the organic materials. The reaction is carried on at room temperature and is found to be substantially complete in about 24 hours and at this time the temperature is raised gradually to about 200° F. The aluminous sludge is then allowed to settle and the liquid oil is withdrawn and distilled to remove the kerosene and the unreacted paraffin as distillates. The heavy oil remaining has the following inspection:

Gravity	23.4° A. P. I.
Vis. at 100° F.	8500 sec. Saybolt
Vis. at 210° F.	312 sec. Saybolt
Pour	65° F.
Flash	535° F.
Conradson carbon	4.6%
Residual chlorine	.2%

This synthetic oil and similar oils prepared by condensation of organic chlorides contains small amounts of residual chlorine which is normally below 1% and may be as low as .2 to 0.05 of 1% and is objectionable. The majority of this chlorine may be removed by treatment with alumina, bauxite, and the like, but ordinary treatment with these agents does not remove all the chlorine and we have found that a final treatment with metals of the class described, namely those having melting points below 400° F., completely removes the residual chlorine. As an example of one method of treatment by our process the following is given:

500 grams of synthetic oil containing 0.02% chlorine is treated with 1 gram of sodium for four hours at 300–350° F. the mixture being stirred vigorously throughout this time with a mechanical stirrer. At the end of the four hours the mixture is allowed to cool and methyl alcohol is added to decompose the excess sodium. When reaction has ceased the oil is diluted with 300 cc. of gasoline and washed well with hot water. The gasoline and alcohol are then removed by distillation using external heating and passing steam through the liquid. No trace of chlorine is found in the final oil after this treatment. The oil is then suitable for use as a high quality lubricating oil, or it may be blended with other oils suitable for lubrication, or it may be added in

very small amounts of 10% to $\frac{1}{2}$ of 1% or less as a solidification inhibitor to oils of high pour point to produce a marked decrease in the pour point of the oil.

5 While the above example shows the use of sodium for removing chlorine from a lubricating oil prepared by condensation of chloro-paraffin with a naphthenic compound in the presence of aluminum chloride it will be understood that our
10 process includes the removal of halides from any lubricating oil prepared by synthetic means in which either organic or metallic halides are used. As examples of such oils the following are given; oils prepared by condensation of chloro-paraffin
15 through the action of a high vacuum distillation, by the condensation of olefins and similar organic substances with metallic halides, or by the condensation of organic halides with olefins or aromatic compounds. It will also be understood
20 that other reactive metals having melting points below 400° F. including lithium, potassium, rubidium, caesium and mercury may be used in place of sodium.

This invention is not to be limited by any
25 theory of the mechanism of the reactions nor to any specific example which may have been given for purpose of illustration, but only by the following claims in which it is wished to claim all novelty inherent in this invention.

We claim:

1. Process for removing traces of halides from oils produced by condensation of organic material containing a halide comprising treating the liquid oil with a reactive metal in a liquid or
80 molten condition at a temperature below the decomposition temperature of the oil.

2. Process for removing traces of halides from lubricating oils produced by the condensation of organic halides by the action of metallic halides
85 which comprises treatment of the condensed liquid oil at temperatures below about 600° F. with a metal which is in a molten condition at the temperature of treating.

3. Process for removing traces of halides from lubricating oils produced by condensation of organic materials in the presence of metallic halides which comprises bringing the condensed liquid oil into contact at a temperature below 600° F. with the reactive metal in a molten condition.
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4. Process according to claim 1 in which a metal from the class comprising alkali metals and mercury is used.

5. Process according to claim 1, in which sodium is used at a temperature between about
100 190 and 450° F.

EDWARD M. JOLLY.

CHARLES C. SWOOPE.