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STABILIZED HYDROCARBON OIL

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5 Claims. (Cl. 252—35)

This invention relates to improvements in lubricating oils and, in particular, to lubricating oils having improved lubricity, color and sludge stability and non-ringsticking properties.

It is the primary object of this invention to provide viscous mineral oils, such as lubricating oils suitable for use in the lubrication of automotive and Diesel engines and turbines, which have especially good lubricating properties, are highly resistant to color and sludge formation and which have no tendency to cause ring sticking.

I have found that these highly desirable properties can be imparted to viscous mineral oils of the type defined by adding to such oils from about 0.001% to about 5% and preferably from about 0.01% to about 1% of the heavy metal alcoholates and thio alcoholates. These heavy metal alcoholates or thio alcoholates have the general formula $M(XR)_n$ in which M is a heavy metal, X is an element selected from the group consisting of oxygen and sulfur, R is a radical selected from the group consisting of alkyl, aryl, aralkyl and hydro aryl radicals and n represents the number of the effective valences of the metal M. The alkyl radical is preferably one containing at least three carbon atoms in the radical.

The term "heavy metal" as used herein and in the appended claims includes the elements such as aluminum, zinc, iron, tin, lead, antimony, etc., and excludes the light metals such as potassium, sodium, lithium, magnesium, strontium, barium and the like.

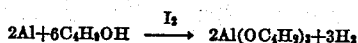
As specific examples of the alcoholates or thio alcoholates which may be effectively used are:

Aluminum butylate	$Al(OC_4H_9)_3$
Aluminum laurylate	$Al(OC_{12}H_{25})_3$
Aluminum cyclo hexylate	$Al(O(Cyclo)C_6H_{11})_3$
Aluminum thio butylate	$Al(SC_4H_9)_3$
Zinc amylate	$Zn(OC_5H_{11})_2$
Zinc laurylate	$Zn(OC_{12}H_{25})_2$
Zinc thio butylate	$Zn(SC_4H_9)_2$
Ferric amylate	$Fe(OC_5H_{11})_3$
Lead thioamylate	$Pb(SC_5H_{11})_2$

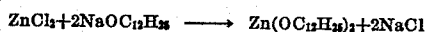
My invention contemplates the use of the corresponding isomers of any of the above compounds and mixtures of the alcoholates and/or thio alcoholates, such as for example the lorolates which are a mixture of alkyl alcoholates having 12 to 18 carbon atoms in the alkyl chain but predominately dodecyl and tetra decyl derivatives.

The alcoholates or thio alcoholates may be prepared by treating the metal with an alcohol or mercaptan using iodine or tin tetra chloride as a carrier. For example, aluminum butylate may

be prepared by treating aluminum with butyl alcohol in the presence of iodine. The reaction which takes place may be illustrated by the following equation:



The heavy metal alcoholates or thio alcoholates may also be prepared by treating the metal halide with sodium alcoholate or thio alcoholate, as illustrated by the equation



The corresponding thio alcoholates may be prepared by substituting the corresponding mercaptan for the alcohol or alcoholates in the above equations.

Lubricating oils containing small amounts of the heavy metal alcoholates or thio alcoholates are particularly well adapted for use in lubricating high speed combustion engines, especially engines of the Diesel type because of their property of eliminating or materially reducing the tendency to ring sticking. Ring sticking is due to the decomposition or breakdown of the lubricants under high temperatures and pressures to form sludge and other products of decomposition and/or oxidation which are deposited or formed in the piston ring grooves. Ring sticking causes excessive blow-by resulting in decreased engine efficiency, excessive oil consumption and engine wear. While the addition of heavy metal alcoholates and/or thio alcoholates of the type herein described materially improves the effectiveness of Diesel lubricating oils derived from any petroleum base oil or synthetic lubricating oils, greater improvement is obtained when the heavy metal alcoholates or thio alcoholates are added to Diesel lubricating oils derived from naphthenic base crude oils. These Diesel lubricating oils preferably have a viscosity in the range of a S. A. E. 10 to a S. A. E. 50 oil and a viscosity index of not over about 50 or 60.

In addition to preventing ring sticking the heavy metal alcoholates and thio alcoholates when added to lubricating oils prevent the development of color forming bodies and materially decrease the tendency of lubricating oils to increase in viscosity during use. They are effective in stabilizing viscous hydrocarbon oils against color and sludge formation during storage. They are also effective oxidation inhibitors for other petroleum products such as insulating oils, transformer oils, etc.

I claim:

1. The method of preventing ring sticking in

- Diesel engines which comprises lubricating said engines with a lubricant comprising a mineral lubricating oil normally having the tendency to cause ring sticking in such engines and a heavy metal alcoholate having the general formula $M(XR)_n$, in which M is a heavy metal, X is an element selected from the group consisting of oxygen and sulfur, R is a radical selected from the group consisting of alkyl, aryl, aralkyl and hydroaryl radicals and n represents the number of effective valences of the metal M, said alcoholate being added in small but sufficient quantities to substantially inhibit ring sticking in said Diesel engines.
- 15 2. The method of preventing ring sticking in Diesel engines as described in claim 1 in which the heavy metal is a metal selected from the group consisting of aluminum, zinc, iron, tin, lead, and antimony.
- 20 3. The method of preventing ring sticking in a Diesel engine which comprises lubricating said engine with a lubricant comprising a mineral lubricating oil normally having the tendency to cause ring sticking in such engine and a small amount of aluminum lorolate in small but sufficient quantity to substantially inhibit ring sticking.
4. The method of preventing ring sticking in a Diesel engine which comprises lubricating said engine with a lubricant comprising a mineral lubricating oil normally having the tendency to cause ring sticking in such engine and a small amount of zinc octylate in small but sufficient quantity to substantially inhibit ring sticking.
5. The method of preventing ring sticking in a Diesel engine which comprises lubricating said engine with a lubricant comprising a mineral lubricating oil normally having the tendency to cause ring sticking in such engines and a small amount of aluminum thioamylate in small but sufficient quantity to substantially inhibit ring sticking.

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