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SYNTHESIS OF LUBRICATING OILS

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The present invention relates to the production of lubricating oils by synthesis by means of catalysts from olefin hydrocarbons.

It has hitherto been proposed to subject various unsaturated hydrocarbons such as amylene, butylene and ethylene to the action of various catalysts of the type of aluminum chloride, thereby forming heavier oils of a viscosity suitable for use as lubricating oils. The heavy oils thus produced, however, have been found to undergo marked changes in viscosity with changes in temperature, being inferior in this respect to natural oils, such as the lubricating oils derived from Pennsylvania oils, and in many cases inferior to the natural lubricating oils derived from Mid-Continent and naphthenic oils.

It has also hitherto been proposed (U. S. Patent 1,955,260) to subject hydrocarbon waxes to pyrolytic decomposition whereby olefin hydrocarbons are produced largely within the gasoline boiling range, and thereafter to subject the resulting mixture of unsaturated hydrocarbons to the polymerizing action of aluminum chloride. In that process no attempt was made to isolate and polymerize hydrocarbons having a selected boiling range.

We have now discovered that by subjecting olefin compounds, and particularly straight-chain olefin compounds individually to the action of aluminum chloride and similar catalysts, said hydrocarbons having 8 or more carbon atoms, the heavy oils secured as a result of the polymerization are markedly superior to natural oils in their temperature-viscosity characteristics, the changes of viscosity with increasing temperature being less than those taking place in typical oils, for example, of Pennsylvania origin and of like viscosity.

The olefin hydrocarbons subjected to treatment in accordance with this invention have ranged from octene to cetene. The hydrocarbon selected is subjected to treatment with a suitable quantity of the catalyst, say 1 to 5% and in general about 2%, for six to ten hours at temperatures of from 50 to 100° C. and the resulting product allowed to settle to separate the aluminum chloride sludge from the polymerized oil. The sludge is separated and the oil, preferably after washing with alkali such as sodium hydroxide solution, and water, is reduced by fire and steam distillation to a bottom of the desired viscosity. Under the conditions set forth, the polymerized oil derived from normal octene and reduced to a viscosity of 88 seconds Saybolt at 210° F. was found to have a viscosity of 905 seconds Saybolt

at 100° F. This oil had a cold test of -25° F. or -31.6° C.

The oils secured from individual olefins of higher carbon content are similar with respect to their temperature-viscosity characteristics, or better than that derived from octene. With increasing carbon content of the olefin treated, oils of higher cold test are secured. Thus, by treatment with cetene, and reduction of the polymerized oil to a viscosity of 108 seconds Saybolt at 210° F., an oil is secured having a viscosity of 717 seconds Saybolt at 100° F. and a cold test of 35° F. or 1.7° C. The treatment of dodecylene in a similar manner likewise produces an oil of low sensitiveness to temperature changes.

Other known polymerizing agents having a similar action to aluminum chloride may likewise be employed, such as boron fluoride, zinc chloride, ferric chloride, and the like.

We claim:

1. In the method of producing a synthetic lubricating oil wherein an olefin hydrocarbon is subjected to the polymerizing action of a catalytic quantity of aluminum chloride at a temperature below 100° C., the aluminum chloride forms a sludge with a portion of the olefin material which is separated from the polymerized oil and the separated oil is freed from hydrochloric acid, the improvement which comprises employing as the initial olefin material normal olefin hydrocarbons having at least 8 carbon atoms and substantially free from lower molecular weight olefins, whereby there is produced lubricating oils of abnormally low viscosity temperature coefficient.

2. The process of producing synthetic lubricating oils of low viscosity temperature coefficient, which comprises subjecting a normal olefin hydrocarbon material, consisting principally of olefins having between 8 and 16 carbon atoms to the action of from 1 to 5% of aluminum chloride at a temperature not exceeding 100° C. whereby the olefin hydrocarbon is polymerized to a viscous oil and the aluminum chloride is converted into a sludge, separating said sludge from said oil, neutralizing said oil and subjecting it to distillation to obtain the desired product.

3. The process of producing a synthetic lubricating oil having a viscosity temperature coefficient less than that of a Pennsylvania lubricating oil of equivalent viscosity, comprising subjecting a normal olefin hydrocarbon having between 8 and 16 carbon atoms to the action of a catalytic quantity of aluminum chloride at a temperature not exceeding 100° C. whereby the olefin hydro-

carbon is polymerized to a viscous oil and the aluminum chloride is converted into a sludge, separating said sludge from said oil, neutralizing said oil and subjecting it to distillation to obtain the desired product.

5 4. The process of claim 3 wherein the normal olefin hydrocarbon employed is normal octene.

5. The process of claim 3 wherein the normal olefin hydrocarbon employed is normal duodecylene.

10 6. The process of claim 3 wherein the normal olefin hydrocarbon employed is cetene.

7. In the method of producing a synthetic lubricating oil wherein an olefin hydrocarbon is
15 subjected to the polymerizing action of a catalyst selected from the class consisting of aluminum

chloride, boron fluoride, zinc chloride and ferric chloride in catalytic quantities and at a temperature below 100° C., whereby a sludge is formed with a portion of the olefin material which is separated from the polymerized oil and the separated oil is freed from hydrochloric acid, the improvement which comprises employing as the initial olefin material normal olefin hydrocarbons having at least 8 carbon atoms and substantially free from lower molecular weight olefins, whereby there are produced lubricating oils of abnormally low viscosity temperature coefficient.

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