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ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE PREPARATION OF HIGH GRADE ANTI-KNOCK MOTOR FUELS

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Unsaturated low molecular hydrocarbons, such as are obtained for example in the catalytic cracking of high molecular hydrocarbons, can be converted into highly anti-knock gasoline polymerisates. However, in hydrogenating these polymerisates, which is absolutely necessary for applying these motor fuels to aircraft purposes, the anti-knock property of the gasoline is greatly decreased.

It has been recognized that these hydrocarbons, especially those with from 3 to 5 carbon atoms, can be most satisfactorily converted into a product which, even after hydrogenation, has an excellent anti-knock property. To obtain this result, the low molecular hydrocarbons are treated with carbon oxide and hydrogen at high pressures of about 50–200 atm overpressure, and temperatures of up to, and if necessary above, 300° C. (572° F.) at which alcohols are formed, which thereupon are converted at normal pressure into alkenes with ramified chain, by the usual process of heating with dehydrating means, such as alum earth. Subsequently, a hydrogenation takes place. If desired, this treatment with carbon oxide and hydrogen may be repeatedly carried out with the alkenes obtained, until the hydrogenated final products show the boiling properties required for application as aircraft gasoline.

Before the watergas treatment it is advisable, to introduce a selective polymerisation, whereby only the iso-hydrocarbons are polymerised. Then, by the addition of a methyl group through the watergas treatment, the polymerisates obtained yield compounds which, as regards their anti-knock property, even surpass iso-octane.

Furthermore, before the watergas treatment, it is advisable to treat the starting material with borylphosphate, fuller's earth or similar substances at a high temperature, for example at 200°–300° C. (392°–572° F.), partly in order to isomerise the unsaturated hydrocarbons, and partly to shift the double binding towards the middle of the molecule, which is very favourable for the ramified addition of the methyl group through the watergas treatment. In the same way, the final hydrogenation can be preceded by another treatment with agencies such as borylphosphate, fuller's earth, etc.

A very favourable mode of execution of the above described process results if the products with a boiling range of gasoline, which have been obtained by dehydration, are separated. The low molecular hydrocarbons are then subjected to the treatment with isomerising means which precedes the watergas treatment, while the medium molecular hydrocarbons are conducted to the watergas treatment used for the preparation of alcohols, if desired after the treatment with borylphosphate, etc. On the other hand, the higher molecular fractions, if desired after further treatment with borylphosphate etc., are immediately subjected to hydrogenation. In this way, for example, it is possible to effect a thoroughly satisfactory conversion of the C_3- to C_5-hydrocarbons, obtained in large quantities by the catalytic cracking, into valuable aircraft gasoline.

If desired, one can add to the aircraft gasoline the saturated C_5-hydrocarbons, which during the watergas treatment are given off together with the saturated C_3- and C_4-hydrocarbons that escape as gases, while the latter may be used as fuel gas.

The process allows a practically complete conversion of the C_3- to C_5-hydrocarbons, especially obtained in large quantities by the catalytic cracking, into an aircraft gasoline with a remarkably high octane number. In this connection it should be observed that this conversion can be effected by comparatively simple means.

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