PATENT SPECIFICATION

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COMPLETE SPECIFICATION

An Improved Process for the Catalytic Preparation of Liquid Hydrocarbons by Reduction of Carbon Monoxide

I, André Marie Ghislain Maurice Luyckx, a Belgian subject, of 72, Boulevard de Tirlemont, Louvain, Belgium, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

It is known that hydrocarbons adapted to be used as a substitute for petrol can be prepared by catalytic reduction of carbon monoxide in presence of hydrogen at about 200° C. and at atmospheric pressure.

For the catalysis of this reaction it has been found advantageous to employ catalysts containing cobalt as the metal present and to activate this with thoria, copper, manganese and the like. Generally, binary catalysts, such as cobalt-thoria catalysts, have been found to be preferable to more complex catalysts.

On account of the expensive character of thoria, attempts have been made to replace it by other promotors, such as chromium, zinc, beryllium, aluminium, magnesium, manganese and uranium oxides. In this connection it has been proposed to use a catalyst comprising 3 parts of uranium oxide and 1 part of cobalt and to use this catalyst at 270° C. It has also been proposed to use the above oxides in conjunction with cobalt or nickel in the ratio of from 1 to 3 parts of cobalt or nickel to each part of oxide and also to use cobalt catalysts containing uranium, as well as thoria or copper.

Catalysts containing metals of the iron group, such as cobalt or nickel, or their oxides together with uranium oxide have also been proposed for use in the catalytic production of methane and other gaseous hydrocarbons from carbon monoxide and hydrogen and in the production of lamp black from unsaturated hydrocarbons.

The present invention relates to the production of liquid hydrocarbons from carbon monoxide and hydrogen and it has for its object to provide a process whereby high yields of liquid hydrocarbons may be obtained with the use of a catalyst that will be both cheap and resistant and in which activation is obtained with uranium oxide only.

According to this invention, carbon monoxide is treated with hydrogen at atmospheric pressure and at a temperature of from 200° to 215° C. in presence of a finely divided binary uranium oxide-cobalt catalyst supported on an inert support, such as kieselguhr, the ratio of cobalt metal to uranium metal being at least 4:1 by weight.

It has been found that with the novel catalyst not only are high yields of liquid hydrocarbons to be obtained but, that, as compared to the catalysts previously proposed, there is a great and quite unexpected increase in the usual life of the catalyst.

Example.

Cobalt and uranium nitrates are dissolved in water in the proportion of cobalt : uranium = 100 : 16. To this solution kieselguhr is added in the proportion of cobalt : kieselguhr = 2 : 3 and the product neutralised with potassium carbonate. The precipitate is carefully washed, dried at 120° C. and then reduced by hydrogen at about 350° C. There is obtained a mixture of cobalt in the metallic state and uranium oxides, with kieselguhr as the support.

In operation, with a quantity of this catalyst corresponding to 5 gr. of metallic cobalt, at about 210° C. and at a flow-rate of 4 litres per hour of a mixture consisting of one molecule of carbon monoxide to two molecules of hydrogen a yield of 168 c.cs of liquid hydrocarbons per cubic meter of gas treated is obtained.

It should be understood that these figures are merely given by way of example and they do not in any way limit the application of the process.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A process for the catalytic preparation of liquid hydrocarbons from carbon monoxide and hydrogen which comprises contacting a mixture of said gases at

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atmospheric pressure and at a temperature between 200 and 215° C. with a finely divided binary uranium oxide-cobalt catalyst supported on an inert support, such as kieselguhr and in which the ratio of cobalt metal to uranium metal is at least 4 to 1 by weight.

2. A process for the catalytic preparation of liquid hydrocarbons, substantially as hereinbefore described.

3. Liquid hydrocarbons when prepared by the process of either of the preceding claims.

Dated this 20th day of July, 1938.

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