PATENT SPECIFICATION

Application Date : May 16, 1939. No. 14606/39. — 529,390

Complete Specification Accepted : Nov. 20, 1940.

COMPLETE SPECIFICATION

Method of Preparing an Iron Catalyst in Synthesizing Gasoline

I, GEN-ITSU KITA, a resident of 64 Kitasirakawa-Iorityo, Sakyoku, Kyoto, Japan, and a Subject of the Emperor of Japan, 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:—

The present invention relates to a method for preparing a catalytic material which can most effectively be used in producing synthetic gasoline out of carbon monoxide and hydrogen.

An object of the present invention is to provide a catalyst of high activity for the synthetic production of gasoline, and another object is to provide a catalyst which will greatly simplify the process of reduction in producing synthetic gasoline. Thus in short it is the object of this invention to make the synthetic production of gasoline simpler, more effective, hence more economical.

It is a generally known fact that the Fischer's method of making synthetic gasoline makes use of an iron catalyst for its low cost. But as reported so far, the catalyst in his method is of greatly limited nature in its action; i.e., out of one cubic meter of mixed gases of carbon monoxide and hydrogen was produced by him a maximum of fifty milli-litres of gasoline. Such being the case, the use of the like catalyst is obviously unpracticable and of little value from the industrial and economical points of view. By the use of the present invention, however, the productive rate of gasoline is considerably increased. According to this invention, a substance mainly consisting of iron hydroxides and copper hydroxides, or their carbonates, or both of them, is derived from their salts and precipitated upon diatomaceous earth by alkali treatment. To the substance thus formed is added further a little amount of alkali as well as boric acid or its salts. The result is a good catalyst which on account of the boric acid or its salts is capable of yielding, for instance, more than one hundred and twenty milli-litres of gasoline per cubic meter of the said mixed gases. In addition to this advantage it can be used at the best reaction temperature of the mixed gases so that there is no necessity of going to a preliminary heating at a higher temperature as usual in case of ordinary practice, because it exerts a good reducing activation at about 250°C, the temperature most suitable for bringing the said carbon monoxide and hydrogen into reacting combination.

When the catalyst is made according to the present invention either boric acid in liquid form (and sometimes one or two of its salts) together with alkali can be added to the catalytic substance at the same time or such boric acid and alkali can be applied separately.

With application of any of the above, boric acid or its salts, a very effective result is obtained, but prior to this addition some activation accelerator such as manganese or alumina can be also added to the said catalytic substance to a good advantage of increasing still more catalytic action.

With the following description of an example, a more complete understanding of the present invention will be had; to a nitrate solution containing by weight 100 parts of iron, 25 parts of copper and 2 parts of manganese was added 125 parts of diatomaceous earth by weight and suspended there; then by impouring of potassium carbonate solution a raw catalytic substance was precipitated. After washing this catalytic substance with water, 3 parts of caustic potash by weight was added to it and then the resultant product was dried up. Again to this resultant product was added 20 parts of boric acid by weight in liquid form and again the last product was dried up to the finish, thus obtaining the catalyst of this invention. With the catalyst thus obtained, a mixture of carbon monoxide and hydrogen was brought into reaction at 225°C. The time required for the catalyst to reach 225°C was about 6 hours and after that period there was produced 120 milli-litres of gasoline per cubic meter of the above gases.

It is understood that the above description is illustrative only and will be modified in many ways in future without departing from the spirit and scope of the present invention which is solely limited by the appending claims.

Having now particularly described and

[*Price* 1/-]

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. Process of preparing a catalyst for use in the production of gasoline from carbon monoxide and hydrogen in which a substance consisting mainly of hydroxides and/or carbonates of iron and copper is precipitated by an alkali from salts of those elements upon diatomaceous earth, and small amounts of alkali and of boric acid and/or borates added thereto.

2. Process as claimed in claim 1 in which the alkali and boric acid (or its salts) are added separately.

3. Process as claimed in claim 1 in which the alkali and boric acid (or its salts) are added simultaneously.

4. Process as claimed in any of the preceding claims in which known activation accelerators such as manganese or alumina are added.

5. Process as claimed in claim 1 in which the substance consisting mainly of hydroxides and/or carbonates of iron and copper is precipitated upon diatomaceous earth in suspension in the solution of salts.

6. Process as claimed in claims 4 and 5 in which the solution of salts contains also salts of manganese or aluminium from which the metal may be precipitated by an alkali.

7. Catalyst for use in the production of gasoline from carbon monoxide and hydrogen when prepared by a process according to any of the preceding claims.

8. Process for producing gasoline from carbon monoxide and hydrogen in the presence of a catalyst in which a catalyst according to claim 7 is used.

9. Gasoline when produced by a process according to claim 8.

Dated this 16th day of May, A.D. 1939.

ERNEST E. TOWLER,
Chartered Patent Agent,
Agent for the Applicants,
Connaught House, 63, Aldwych,
London, W.C.2.

Leamington Spa: Printed for His Majesty's Stationery Office, by the Courier Press.—1940.