

PATENT SPECIFICATION

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394,506

(Divided out of No. 386,982.)

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COMPLETE SPECIFICATION.



Improvements in and connected with the Catalytic Treatment of Carbonaceous Materials in Gaseous or Liquid Phase.

I, WILLIAM THOMAS ROBINSON BINDLEY, a British Subject, of 162, Worple Road, Wimbledon, London, S.W., 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:—

This invention relates to the catalytic treatment of carbonaceous materials, in liquid or gaseous phase with powdered or granular catalysts attached to supports and has for its object to provide an improved process wherein the liquid or gas will be subjected to more effective treatment over a large area of the catalyst. The essential feature of the invention is the use of a silicon ester as the means of attaching a catalyst in powdered or granular form positively to some support.

The invention therefore consists of a process for the catalytic treatment of liquids, semi-liquids and gases wherein the liquid, semi-liquid or gas is caused to pass in contact with a catalytic surface composed of a granular or powdered catalytic material positively attached to a supporting material by means of a silicon ester. The attachment of the powder or granules to the support is effected by the use of a silicon ester which is not only effective to cause the adhesion but is beneficial to the reaction. The term silicon ester may be taken to mean readily hydrolysable esters of acids containing silicon.

In carrying the invention into practice according to one method the granular or powdered catalytic material is applied to the catalyst supports or carriers by first spraying or otherwise applying silicon ester to the supports or carriers—which may be of metal or other non-combustible material—after they have been heated, and then dusting or sprinkling the catalytic powder or granules over the surface while it is still tacky. After this treatment the catalysts so produced can be heated in an atmosphere of reducing gas.

[Price 1/-]

The liquid or gas to be treated is caused to pass continuously over and in contact with the catalytic surfaces for example, in the manner described in the Specification of my copending Application No. 386,982, but other forms of apparatus may be employed the essential condition being observed that the liquid or gas to be treated is caused to pass continuously over and in contact with the rough catalytic surfaces consisting of catalytic powder or granules.

The foregoing process may be employed with catalysts of known composition, the catalysts I propose to employ are prepared from oxides of cobalt and manganese, in some cases in admixture with chromium and cerium oxides, these oxides being later heated in hydrogen or other reducing gas.

Cerium oxide and chromium, in metal or oxide form, may be added and the whole intimately mixed.

The mixed powder of metals and oxides of metals is caused to adhere to the catalyst carriers as before described.

As before mentioned the process is suitable for the treatment of either liquids or gases and actual experiments have shown that gases can be converted into hydrocarbon oil by the process.

According to one experiment a mixture of pure CO and H₂ in the proportion of 30% by volume of CO and 70% by volume of H₂ was passed over a catalyst consisting of cobalt and manganese at atmospheric pressure at temperatures ranging between 208° C. and 230° C. and 270 grammes of hydrocarbon oil were obtained from 100 cubic feet of the gas treated. In another experiment sulphur free water gas containing 27% by volume of CO and 40% by volume of hydrogen was passed over a catalyst consisting of cobalt, manganese, cerium and chromium oxides at atmospheric pressure and a temperature of 210° C., and hydrocarbon oil resulted at the rate of one gallon from the treatment of 1000 cubic feet of gas.

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:—

- 5 1: An improved process for the catalytic treatment of fluid or semi-fluid carbonaceous materials, including gases, according to which the material or gas to be treated is caused to pass in intimate
10 contact with a catalytic surface consisting of powdered or granular catalytic material positively attached to a non-combustible supporting material by means of a silicon ester.
- 15 2: An improved catalyser for the catalytic treatment of fluid and semi-fluid carbonaceous material including gases according to claim 1 consisting of a cobalt

and manganese oxide in powdered or granular form attached to a non-com- 20 bustible support by means of silicon ester substantially as described.

3: An improved catalyser according to claim 2 having cerium oxide and chromium in metal or oxide form in 25 admixture with the cobalt and manganese substantially as described.

4: The improved process for the catalytic treatment of carbonaceous materials and gases substantially as described. 30

Dated this 11th day of August, 1932.

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