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PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

1174

Improvements in Catalysts of High Mechanical Strength.

We, I. G. Farbenindustrie Aktiengesellschaft, of Frankfort-on-Main, Germany, a joint stock company organized under the laws of Germany, 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:—

Catalysts, especially those of oxide character, when employed in catalytic processes frequently cause trouble in working since, owing to their relatively low mechanical strength, dusty particles are carried away by the gases and vapours passing over or through the said catalysts, which choke up the apparatus, contaminate the reaction product, and cause other difficulties.

In order to avoid these difficulties it has been proposed to increase the stability of the catalysts by incorporating therewith water glass or calcium compounds as binding agents. Also catalysts which comprise metallic halides or magnesium salts or magnesium oxide are well known in the art, which additions have been made either for the aforesaid purpose of stabilisation or for improving the catalytic efficiency.

We have now found that catalysts of high mechanical stability and free from the above mentioned defects, may be obtained by a specific method of adding water-soluble magnesium salts to the catalysts during their preparation, prior to their use. The method of carrying out the process according to our invention consists in making one of the components of the catalyst into a solid mass by means of one or more water-soluble magnesium salts, expelling the acid or acids of the magnesium salt or salts from the mass and adding thereto a solution of the other components of the catalyst. Oxide masses of great durability and especially suitable for the hydrogenation of oxides of carbon, are obtained in this manner. Additions of magnesium chloride, sulphate or nitrate, for example, are suitable for the said purposes.

The mechanical stability may be increased, to a remarkable degree, by suitably selecting the working conditions in the process of production, without impairing the catalytic efficiency.

The following examples will further illustrate how the said invention may be carried into effect but the invention is not limited thereto. The parts are by weight.

Example 1.

Zinc oxide is made into a paste with a solution of magnesium chloride, so that the mixture contains about 10 parts of magnesium chloride to 100 parts of zinc oxide. The paste is then dried, pressed, and the hydrochloric acid contained therein is expelled by heating in air or in a current of inert gas, the resulting product being then impregnated with chromic acid. If a mixture of 1 part of carbon monoxide and 3 parts of hydrogen be passed over this catalyst at about 400° Centigrade and under a pressure of about 200 atmospheres, a liquid reaction product is obtained containing 95 per cent. of methanol, the yield and quality being the same as in the case of catalysts containing only the oxides of zinc and chromium, but the advantage being experienced according to the present invention that troubles due to catalyst dust are avoided.

Example 2.

The mass prepared from zinc oxide and magnesium chloride in the manner described in Example 1 is treated with a solution of alkali metal bichromate after the expulsion of the hydrochloric acid. If a mixture of 1 part of carbon monoxide and 3 parts of hydrogen be passed over this catalyst at about 450° Centigrade and under a pressure of about 200 atmospheres, a liquid product is obtained containing, in addition to methanol, about 30 per cent. of higher alcohols and other organic compounds containing oxygen. Other water-soluble magnesium salts, such as the sulphate, or nitrate, may also be employed in a similar manner.

In addition to preventing the formation of dust, the advantage of the catalysts produced in this manner consists especially in the fact that the masses do not cake together in use.

Having now particularly described and

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ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A process for the manufacture and production of catalysts of high mechanical strength which consists in making one of the components of the catalyst into a solid mass by means of one or more water-soluble magnesium salts, expelling the acid or acids of the magnesium salt or salts from the mass, and adding thereto a solution of the other components of the catalyst.

2. The process for the manufacture and production of catalysts of high mechanical stability substantially as described in each of the foregoing examples.

3. Catalysts of high mechanical stability when prepared in accordance with the preceding claiming clauses.

Dated this 14th day of October, 1927.

JOHNSONS & WILLCOX,
47, Lincoln's Inn Fields, London,
W.C. 2,
Agents.

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