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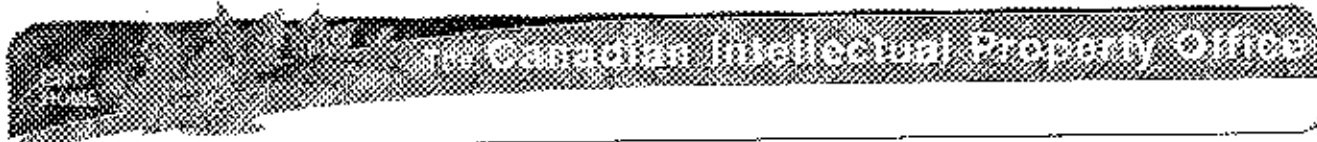
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(2) Patent:

(54) MANUFACTURE OF OXYGENATED ORGANIC COMPOUNDS

(54) PRODUCTION DE COMPOSES ORGANIQUES OXYGENES

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ABSTRACT:

CLAIMS: [Show all claims](#)

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## S P E C I F I C A T I O N .

TO ALL WHOM IT MAY CONCERN :-

Be it known that we, Alwin Mittasch, Mathias Pier and Karl Winkler, Chemists, the first and third of Ludwigshafen-on-Rhine, the second of Heidelberg, Germany, having jointly invented a certain new and useful improvement in the PRODUCTION OF OXYGENATED ORGANIC COMPOUNDS do hereby declare that the following is a full, clear and exact description of the same :

By the reduction of carbon monoxid or dioxid with hydrogen at an elevated temperature and pressure, methanol or other oxygenated organic compounds can be produced, provided proper catalysts are used.

According to the present invention the beforementioned process can be carried out with particular advantage by using contact masses containing mixtures of such oxids of metals of different groups of the periodic system as are not reduced to the metals under the conditions of working and with a preponderating quantity of the more basic oxid. Non-reducible oxids of the second to the seventh group of the periodic system are especially suitable for such mixed catalysts.

As an example we mention the combination of zinc oxid and chromium oxid with the zinc oxid preponderating; from two to twelve or more molecular weights of zinc oxid may be present for each one molecular weight of chromium oxid. Other suitable combinations according to the invention are the oxids of zinc and uranium, zinc and vanadium, zinc and tungsten, magnesium and molybdenum, cerium and manganese, but many others may be combined with the more basic oxid in a preponderating amount in either case. Other substances, for examples metals, may also be present.

The mixed contact masses of the character described may be prepared by intimately mixing the constituents, or by simultaneously precipitating them from solutions of proper salts, or by melting suitable salts together, or in any other suitable way.

Supports may also be employed.

It is advisable to keep the contact masses free from iron and nickel, or to allow only comparatively small amounts thereof to be contained therein, to keep also the gas mixture serving for the reaction free from volatile iron and nickel compounds and to make the apparatus so as to avoid a contamination of the contact mass by iron, making it from copper, for example, or lining it inside with copper.

The contact masses may be employed at temperatures between about 200 degrees and 600 degrees Centigrade, the pressure ranging preferably above 50 atmospheres without putting an upper limit to the pressure. After separating the products formed, which may consist of either practically pure methanol, or of a mixture of methanol with more or less of oxygenated organic substances of an oily nature, insoluble in water, the residual gases may be again subjected to the catalytic treatment, after adding the gases consumed by the reaction. The mixture of carbon monoxid or dioxid, or both, and hydrogen, which latter preferably should exceed, by volume, the former, may also contain gaseous hydrocarbons, nitrogen or other gases.

The following example describes more exactly how to carry the invention into effect, but the invention is not limited thereto.

A gaseous mixture composed, by volume, of 30 parts of carbon monoxid, 64 parts of hydrogen, 4 parts of nitrogen, 1 part of methane and 1 part of carbon dioxid is conveyed, at a pressure of 200 atmospheres and a temperature of 400 degrees Centigrade, over a contact mass prepared by mixing, while moist, 90 parts of zinc oxid and 10 parts of chromic acid and reducing the mixture before use with the aid of the aforementioned gas mixture under the pressure and temperature referred to, which may be done in the contact vessel itself. The reaction gases on cooling, while still under the pressure, yield a condensate of ample quantities of practically pure methanol.

The following compounded catalysts may be employed with a similar result: 85 parts of zinc oxid impregnated with a solution of 15 parts of vanadium nitrate, or 90 parts of cadmium oxid with 10 parts of chromic acid. Even zinc oxid with only 1 per cent of chromic acid is an excellent catalyst .

WHAT WE CLAIM AS OUR INVENTION IS:

1. The manufacture of methanol or other oxygenated organic compounds which consists in passing a mixture of carbon oxid with hydrogen at an elevated pressure and temperature over a contact mass containing in intimate mixture a plurality of oxides, non-reducible to the metals under the conditions of working, of metals belonging to different groups of the periodic system, but preferably within the second to the seventh group thereof and preferably free from iron and nickel, with the more basic oxid in a preponderating quantity and separating the products from the gases after catalytic treatment preferably by cooling without releasing the pressure.
2. The manufacture of methanol or other oxygenated organic compounds which consists in passing a mixture of carbon oxid with hydrogen at an elevated temperature and pressure and while excluding volatile compounds of iron and nickel over a contact mass containing in intimate mixture a plurality of oxides, non-reducible to the metals under the conditions of working, of metals belonging to different groups of the periodic system, but preferably within the second to the seventh group thereof and preferably free from iron and nickel with the more basic oxid in a preponderating quantity and separating the products from the gases after catalytic treatment preferably by cooling without releasing the pressure.
3. The manufacture of methanol or other oxygenated organic compounds which consists in passing a mixture of carbon oxid with hydrogen at an elevated pressure and temperature and while excluding volatile compounds of iron and nickel over a contact mass containing oxids of zinc and

chromium intimately mixed, but more of the zinc oxid and separating the products from the gasses after catalytic treatment preferably by cooling without releasing the pressure and again passing the residual gas over a contact mass of the character described.

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