[Second Edition.]

PATENT SPECIFICATION.

Convention Date (Germany): Dec. 3, 1924.

244,076

Application Date (In United Kingdom): Nov. 19, 1925. No. 29,256 / 25.

Complete Accepted: Feb. 21, 1927.

358

COMPLETE SPECIFICATION.

Process for the Production of Methane.

We, CHEMISCHE FABRIK GRIESHEIM-ELEKTRON, a corporation organised under the laws of Germany, of 81, Gutleutstrasse, Frankfurt-on-the-Main, 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:—

This invention relates to a process for the production of methane.

In all the hitherto known processes for the production of methane from carbon monoxide and hydrogen or hydrogen-containing gas mixtures by means of nickel catalysts, the operation is conducted at temperatures up to 500° C., preferably at temperatures of 350° C.

It has now unexpectedly been found that the maintenance of the above-mentioned temperatures is by no means necessary at atmospheric pressure, and that the temperature in the catalyst may be substantially higher than 500° C., without reducing the yield of methane or causing the separation of carbon. It is even possible to bring the contact substance to glowing without detrimentally influencing the undisturbed quantitative transformation of the carbon monoxide into methane. The complete success of this operation depends principally on the correct adjustment of the rate of flow of the gas mixture or on the sufficiently rapid removal of the final gases from the hot reaction zone.

The great technical advance of the employment of the present process is primarily due to the fact that the great acceleration of the speed of reaction through the increase in the temperature, enables a given amount of products to be produced in a shorter time and in substantially smaller contact furnaces or with a smaller amount of contact substance than was hitherto possible. Since, moreover, the control of the operation is considerably simplified by the absence of the necessity of carefully regulating the low temperature hitherto maintained, it follows that, taking everything into consideration, a substantial simplification is effected as compared with the method of operation hitherto employed.

The present process is suitable both for the production of methane by merely passing the gas mixture over one or more catalysts arranged in series, and also for this production by operating in a cyclic system.

EXAMPLE 1.

1 cc. of active nickel catalyst prepared in known manner is arranged in a U-shaped glass tube of about 4 m/m. diameter and the whole is heated in an air- or metal-bath to 250 to 300° C. Thereupon a mixture of 20% carbon monoxide and 80% hydrogen is passed over catalyst at such a rate that the latter attains a dull red heat. This small amount of contact substance will treat 20 litres and more of the gas mixture per hour without secondary reactions occurring or any carbon being found after the experiment.

EXAMPLE 2.

An initial gas composed of 15% carbon monoxide, 25% methane, remainder hydrogen is treated in the manner set forth in Example 1, at a rate of flow of up to 30 litres per hour. A gas containing more than 70% methane is obtained, the temperature of the contact being again maintained at dull red heat, which corresponds to a temperature of above 550°. No carbon could be detected in the catalyst, nor was the yield in methane any smaller as compared with that obtained by working at 300° C.

[Price 1/-]

EXAMPLE 3.

In a cyclic process, the carbon monoxide concentration prior to encountering the catalyst is so adjusted that methane of about 35% concentration leaves the apparatus. The temperature exceeds 500° C. without any deposition, separation of carbon or damage to the contact substance occurring.

It is already known that methane can be prepared from carbon monoxide with the aid of glowing molybdenum, tungsten and other metals belonging to this group of the periodic system. This process is however restricted to quite definite rare metals of a group to which nickel does not belong, and the replacement of these products by nickel, has been expressly considered as quite out of the question, on account of the existing danger of poisoning the catalyst.

Having now particularly described and 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. The process for the production of methane from carbon monoxide and hydrogen or hydrogen-containing gas mixtures by means of nickel catalysts, which consists in effecting the catalytic transformation of the carbon monoxide with the hydrogen at atmospheric pressure and at temperatures of upwards of 500° C.

2. The process for the production of methane substantially as described.

Dated this 19th day of November, 1925.

ALBERT L. MOND,
19, Southampton Buildings,
Chancery Lane, London, W.C. 2,
Agent for the Applicants.

Abingdon: Printed for His Majesty's Stationery Office, by Burgess & Son.
[Wt. 33A.—50/10/1930.]