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GENERAL INFORMATION ABOUT THE PROCESS OF SYNTHESIZING HYDROCARBONS FROM CO2 AND H2

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Abstract
The synthesis method for obtaining high-molecular synthetic hydrocarbons from pentane to nonadecane from synthesis gas is a complex system of chemical reactions that proceed sequentially and in parallel in the presence of a selected catalyst to obtain high-molecular synthetic hydrocarbons from pentane to nonadecane from synthesis gas, i.e. a mixture of flue gas and hydrogen.

Introduction

Hydrogenation of carbon (II) oxide is the main reaction for the production of hydrocarbons from syngas to high molecular weight synthetic pentane to nonadecane. [14-15]:

$$CO + H_2 \rightarrow (-CH_2-) + H_2O \quad \Delta H = -165{,}0 \text{ кЖ} \qquad (1.1)$$

(1.1) Equation (1.1) characterizes the successful reaction of hydrocarbon production from cobalt-containing synthesis gas, i.e., a mixture of flue gas and hydrogen, in the presence of a selected catalyst to produce hydrocarbons ranging from high molecular weight synthetic pentane to nonadecane. The formation of water in the reaction is also an indication that the reaction proceeds in the presence of water vapor (1.2). This reaction is characterized by the fact that it proceeds mainly from iron-rich synthesis gas, i.e. a mixture of flue gas and hydrogen, over a catalyst selected to produce hydrocarbons ranging from high molecular weight synthetic pentane to nonadecane.:

$$CO + H_2O \rightarrow CO_2 + H_2 \quad \Delta H = -39{,}8 \text{ кЖ} \qquad (1.2)$$

In this case, the synthesis of hydrocarbons from iron synthesis gas, i.e. a mixture of carbon dioxide and hydrogen, in the presence of a selected catalyst to obtain hydrocarbons ranging from high molecular weight synthetic pentane to nonadecane, generally takes the following form:

$$2CO + H_2 \rightarrow (-CH_2-) + CO_2 \quad \Delta H = -204{,}8 \text{ кЖ} \qquad (1.3)$$

An overview of the synthesis of hydrocarbons will look like this [17]:

$$nCO + (2n+1)H_2 \rightarrow C_nH_{2n+2} + nH_2O \qquad (1.4)$$

$$2nCO + (n+1)H_2 \rightarrow C_nH_{2n+2} + nCO_2 \qquad (1.5)$$

$$nCO + 2nH_2 \rightarrow C_nH_{2n} + nH_2O \qquad (1.6)$$

$$2nCO + nH_2 \rightarrow C_nH_{2n} + nCO_2 \qquad (1.7)$$

Also, compounds containing oxygen can be formed during the reaction:

Formation of alcohols [Saliev, Aleksey Nikolaevich Technology kobaltovogo zeolitsoderjashchego katalyzatora selektivnogo sintezha jidkih uglevodorodov iz SO i N2: dissertation ... kandida teknicheskih nauk: 05.17.01 Novocherkassk 2018]

$$3nCO + (n+1)H_2 \rightarrow C_nH_{2n+1}OH + 2nCO_2 \quad (1.8)$$

$$nCO + 2nH_2 \rightarrow C_nH_{2n+1}OH + (n-1)\,H_2O \quad (1.9)$$

Formation of aldehydes [4]

$$(2n+1)CO+(n+1)\,H_2 \rightarrow C_nH_{2n+1}CHO + nCO_2 \quad (1.10)$$

$$(n+1)CO+(2n+1)\,H_2 \rightarrow C_nH_{2n+1}CHO + nH_2O \quad (1.11)$$

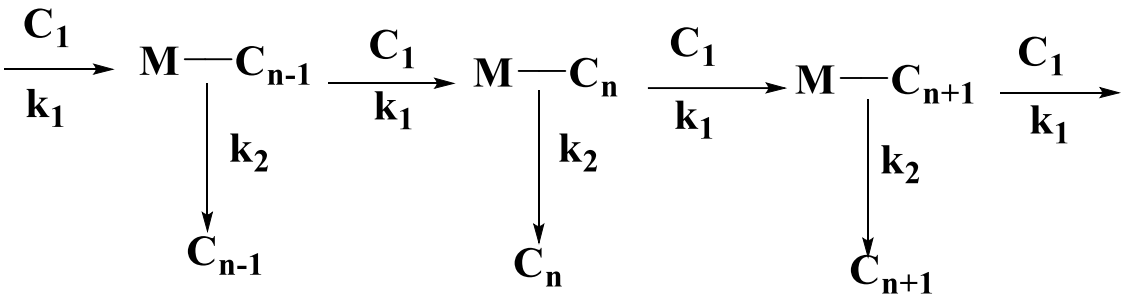
- Along with the main reactions for producing high molecular weight synthetic hydrocarbons from pentane to nonadecane from synthesis gas, the following intermediate processes may also occur:
- Hydrogenation of CO to methane is carried out at temperatures above 200°C on selected catalysts to obtain hydrocarbons from high molecular weight synthetic pentane to nonadecane from cobalt and nickel-containing synthesis gas, i.e. a mixture of carbon dioxide and hydrogen. [8,16, 59]:

$$CO + 3H_2 \rightarrow CH_4 + H_2O \quad \Delta H=-214{,}8\ кЖ \quad (1.12)$$

The formation of carbon due to the disproportionation of CO (Boudouard reaction) leads to blocking, i.e. poisoning, the active surface of the catalyst selected for the production of hydrocarbons from high molecular weight synthetic pentane to nonadecane from synthesis gas, i.e. a mixture of carbon monoxide and hydrogen. [17]:

$$2CO \rightarrow C + CO_2 \quad \Delta H=-134{,}0\ кЖ \quad (1.13)$$

In addition to the above-mentioned reactions, secondary processes such as cracking and isomerization can also be observed in the formation of products under the conditions of hydrocarbon synthesis [18,19]. The synthesis of hydrocarbons from high molecular weight synthetic pentane to nonadecane from carbon monoxide and hydrogen is carried out under stationary conditions and can be described as follows:



Cobalt catalysts are selected for the production of high molecular weight synthetic hydrocarbons from pentane to nonadecane from synthesis gas, i.e. a mixture of carbon dioxide and hydrogen.

Among the catalysts selected for the synthesis of high molecular weight synthetic hydrocarbons from pentane to nonadecane from synthesis gas, i.e., a mixture of carbon dioxide and hydrogen,

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cobalt systems are the most promising, and they [47, 48]: It is characterized by operating at relatively low temperatures; active influence on the preferential formation of n-saturated hydrocarbons; and low activity in the formation of water gas. Cobalt and iron-based synthesis gas, i.e. a mixture of carbon monoxide and hydrogen, is used to produce hydrocarbons ranging from high molecular weight synthetic pentane to nonadecane, olefins, branched chain hydrocarbons, etc., from carbon monoxide and hydrogen in the presence of selected catalysts. It allows the synthesis of mixtures with a high content of alkanes and oxygenated compounds. It is possible to obtain hydrocarbons from high molecular weight synthetic pentane to nonadecane from cobalt and iron-based synthesis gas, i.e. a mixture of carbon dioxide and hydrogenThe catalysts selected for . form surface oxides, carbides, and nitrides, which are also active in the hydropolymerization of carbon monoxide [54]. In the presence of cobalt systems, long-chain linear alkanes are formed with high selectivity. The main products of the production of high-molecular-weight synthetic pentane to nonadecane hydrocarbons from hydrogen gas and hydrogen are unsaturated intermediates [17], but they are mainly hydrogenated alkanes. Cobalt is more efficient at hydrogen than iron, so the hydrogenation performance of cobalt catalysts selected for the production of high molecular weight synthetic hydrocarbons from pentane to nonadecane from synthesis gas, i.e. a mixture of flue gas and hydrogen, is higher than that of iron. The properties of cobalt contacts for the synthesis of hydrocarbons from high molecular weight synthetic pentane to nonadecane from carbon monoxide and hydrogen [24] are influenced by: the nature of the base, the synthesis gas, i.e., a mixture of carbon monoxide and hydrogen, and the high molecular weight synthetic pentane The method of preparing the selected catalyst for the production of hydrocarbons up to nonadecane, the conditions for its pre-purification (before recycling), the synthesis gas, i.e. a mixture of flue gas and hydrogen, is higher than The conditions for the reduction (activation) of the selected catalyst for the production of hydrocarbons from molecular synthetic pentane to nonadecane and the presence of a substance or a second metal in it that increases the activity of the oxide catalyst.

Summary

Cobalt is more efficient at hydrogen than iron, so the hydrogenation performance of cobalt catalysts selected for the production of high molecular weight synthetic hydrocarbons from pentane to nonadecane from synthesis gas, i.e. a mixture of flue gas and hydrogen, is higher than that of iron. The properties of cobalt contacts for the synthesis of hydrocarbons from high molecular weight synthetic pentane to nonadecane from carbon monoxide and hydrogen [24] are influenced by: the nature of the base, the synthesis gas, i.e., a mixture of carbon monoxide and hydrogen, and the high molecular weight synthetic pentane.

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