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METHODOLOGY FOR RECEIVING HIGH MOLECULAR SYNTHETIC, PENTANE TO NONADECANE HYDROCARBONS FROM SOG GAS AND HYDROGEN

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Abstract

Collection of liquid products is carried out in a cooled 12 vessel under atmospheric pressure. 15%Co-15%Fe/YuKTs and 15%Co-15%Fe-5%Ni-1%ZrO2/YuKTs synthesis-gas, i.e. a mixture of hydrogen gas and high molecular liquid in the presence of a catalyst to obtain selected synthetic hydrocarbons the study of the main kinetic laws of the process of interaction of hydrogen with gas was carried out in a flow catalytic device operating in differential mode.

Аннотация

Сбор жидких продуктов осуществляют в охлаждаемую емкость 12 при атмосферном давлении. 15%Co-15%Fe/ЮКЦ и 15%Co-15%Fe-5%Ni-1%ZrO2/ЮКЦ синтез-газ, т.е. смесь газообразного водорода и высокомолекулярной жидкости в присутствии катализатора для получения выбранного Синтетические углеводороды Исследование основных кинетических закономерностей процесса взаимодействия водорода с газом проводилось в проточной каталитической установке, работающей в дифференциальном режими.

Key words

pentane, crystal hydrate, cobalt (II) nitrate crystal hydrate, nickel (II) nitrate crystal hydrate.

Ключевые слова

пентан, кристаллогидрат, кристаллогидрат нитрата кобальта (II), кристаллогидрат нитрата никеля (II).

Catalytic synthesis of high-molecular-weight synthetic, pentane to nonadecane hydrocarbons from is gas and hydrogen was carried out in a flow reactor operating in differential mode.

In the reactor for obtaining high molecular weight synthetic hydrocarbons from pentane to nonadecane in the form of a steel tube with an inner diameter of 20 mm, there is an immobile layer of the catalyst for obtaining high molecular weight synthetic hydrocarbons from pentane to nonadecane from a selected mixture of 5 synthesis gases, i.e. from a selected mixture of greenhouse gas and hydrogen

The reactor for obtaining high molecular weight synthetic hydrocarbons from gas and hydrogen, from pentane to nonadecane, is placed in a cylindrical electric furnace marked with number 6. Temperature control in the reactor for the production of high molecular weight synthetic hydrocarbons from pentane to nonadecane from furnace gas and hydrogen is carried out by 7. The temperature in the furnace is measured by thermocouple number 8, and by thermocouple number 9 in the reactor for the production of high molecular weight synthetic, pentane to nondecane hydrocarbons from carbon dioxide and hydrogen. Both thermocouples are made of 4 and 14 chromel wire. The temperature in the reactor for the production of high-molecular-weight synthetic hydrocarbons from gas and hydrogen, from pentane to nonadecane, is maintained with an accuracy of +10C.

Collection of liquid products is carried out in a cooled 12 vessel under atmospheric pressure. 15%Co-15%Fe/YuKTs and 15%Co-15%Fe-5%Ni-1%ZrO2/YuKTs synthesis-gas, i.e. a mixture of hydrogen gas and high molecular liquid in the presence of a catalyst to obtain selected synthetic hydrocarbons the study of the main kinetic laws of the process of interaction of hydrogen with gas was carried out in a flow catalytic device operating in differential mode.

The catalytic activity of the selected catalyst per volume unit for obtaining high molecular synthetic hydrocarbons from pentane to nonadecane from synthesis gas, i.e., a mixture consisting of carbon dioxide and hydrogen, was determined by the following formula: $W=A\times S\times\eta$. Here, W is the catalytic activity per unit volume of the catalyst; A - specific activity of the catalyst, S - surface area of the catalyst; η- the level of use of the selected catalyst.

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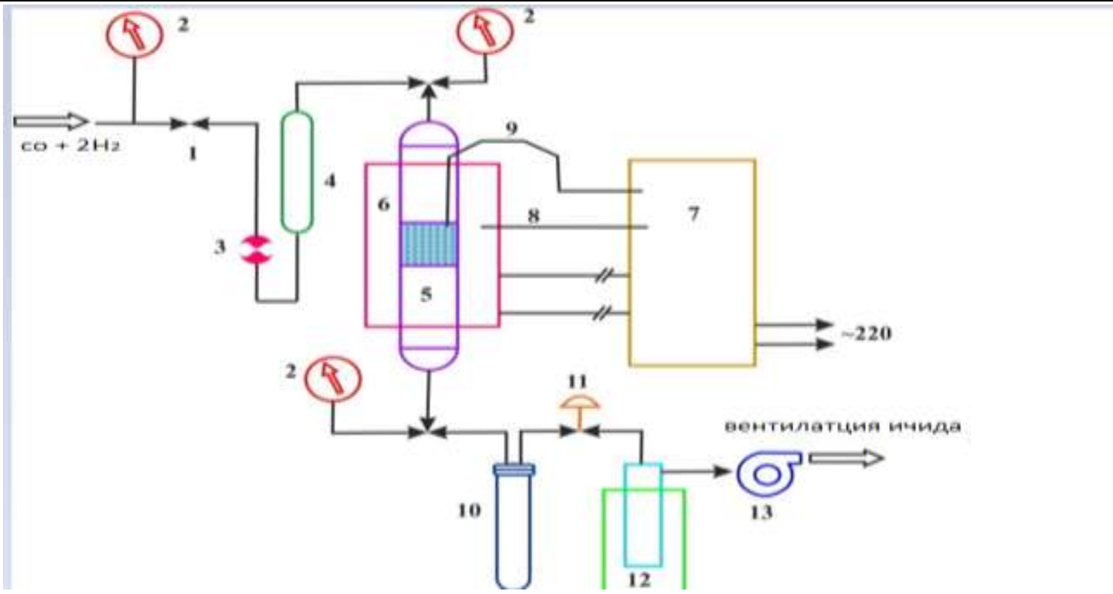

Picture 1. Schematic diagram of a laboratory device for the production of high-molecular-weight synthetic hydrocarbons from pentane to nondecane from synthesis gas at high pressure

1- pressure regulator, 2- monometer, 3- screw, 4- cup meter, 5- is gas and high molecular synthetic from hydrogen, reactor for obtaining hydrocarbons from pentane to nonadecane, 6- furnace, 7- temperature controller, 8- thermocouple, 9- control thermocouple, 10-receiver, 11-pressure regulator, 12-loop, 13-gas clock

Textural characteristics of catalysts selected for the production of high molecular weight synthetic hydrocarbons from pentane to nonadecane from synthesis gas, that is, a mixture of carbon dioxide and hydrogen, total surface area, average particle size, mesopore size, pore size distribution based on nitrogen absorption and desorption isotherms in the SORBTOMETER was determined. The volume of micropores and mesopores was determined by the BXJ method. The surface-to-surface ratio was calculated by the Brunauer-Emmett-Taylor (BET method):

$$\Gamma = \frac{\Gamma_m Cp/p_s}{(1-p/p_s)[1+(C-1)p/p_s]}, \qquad (12.37)$$

Kelvin's equation is used to find the pore radius

$$\ln\frac{P_y}{P_5} = -\frac{2V_m\sigma}{rRT} \qquad (1.3.61)$$

The radius of the pores of the selected catalyst for obtaining high molecular synthetic hydrocarbons from pentane to nonadecane from synthesis gas, that is, from a mixture consisting of carbon dioxide and hydrogen, was determined by

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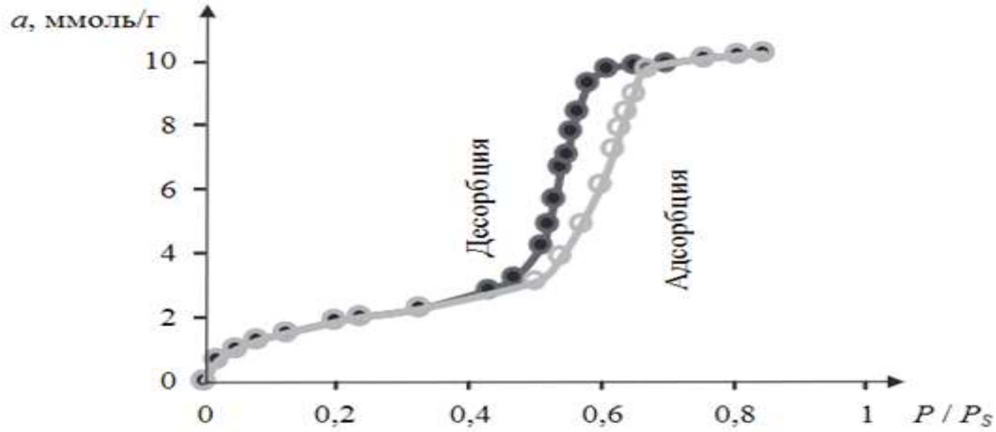
absorption and desorption isotherms of benzene vapors:



Picture 3. Absorption and desorption isotherms of benzene vapors

The dynamic light scattering method was used to measure the particle size. This method is distinguished from other methods by its expressivity and can be used to determine the main laws in the formation of particles.

2.3. A catalyst preparation procedure selected for the production of high-molecular-weight synthetic hydrocarbons from pentane to nondecane from syngas, i.e., a mixture of carbon dioxide and hydrogen.

Samples of selected catalysts for obtaining high-molecular synthetic hydrocarbons from pentane to nonadecane from synthesis gas, i.e., a mixture consisting of carbon dioxide and hydrogen, were prepared by thermal decomposition of appropriate salts or their solutions of starting materials in a wide temperature range.

At 120oC, below the decomposition temperature, iron (III) nitrate crystal hydrate, cobalt (II) nitrate crystal hydrate, nickel (II) nitrate crystal hydrate, and zirconyl (IV) nitrate crystal hydrate decompose into the hydrocarbon part of the liquid and in its crystallization water, iron (III) nitrate crystal hydrate, cobalt (II) nitrate crystal hydrate, nickel (II) nitrate crystal hydrate and zirconyl (IV) nitrate crystal hydrate formed by melting, dark red solution was observed

At 150-170oC, decomposition of iron (III) nitrate crystal hydrate, cobalt (II) nitrate crystal hydrate, nickel (II) nitrate crystal hydrate, and zirconyl (IV) nitrate crystal hydrate was observed with the release of brown gas-nitrogen oxide (IV). A light brown suspension of iron (III) oxide, cobalt (II) oxide, nickel (II) oxide and zirconium (IV) oxide is formed. However, it is unstable due to the large size of the particles formed by iron (III) oxide, cobalt (II) oxide, nickel (II) oxide and zirconium (IV) oxide. Almost complete sedimentation of iron (III) oxide, cobalt (II) oxide, nickel (II) oxide and zirconium (IV) oxide particles is observed a few minutes after the end of mixing.

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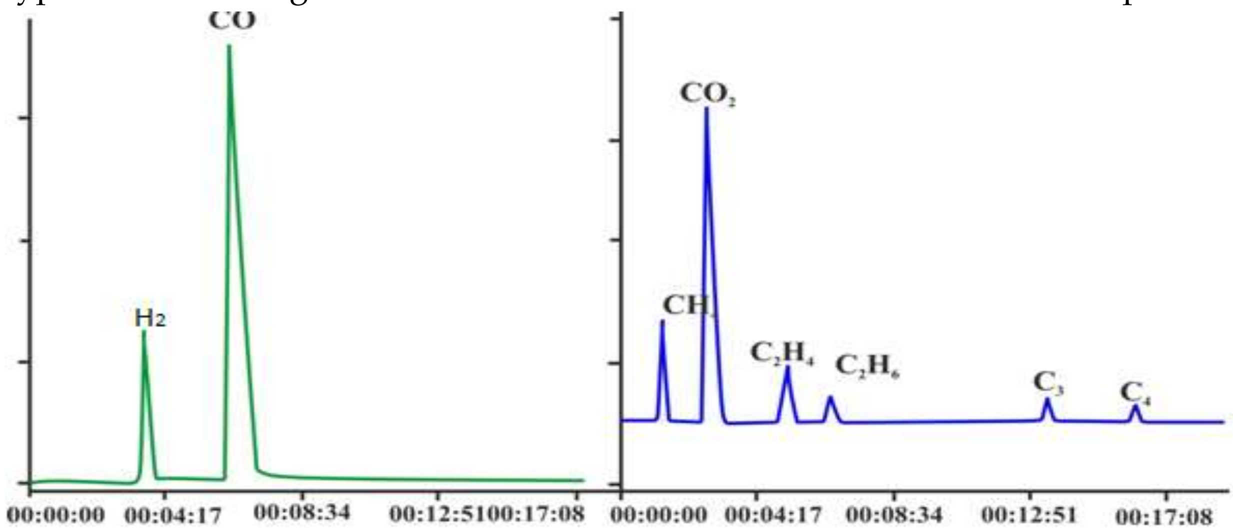
At 200-250oC, the decomposition of iron (III) nitrate crystal hydrate, cobalt (II) nitrate crystal hydrate, nickel (II) nitrate crystal hydrate, and zirconyl (IV) nitrate crystal hydrate occurs more rapidly than at 150-170oC. The resulting colloidal solution has a darker color and is characterized by greater stability, and sedimentation is not observed for a long time.

2.4. Chromatographic analysis of starting materials and reaction products

The qualitative and quantitative analysis of liquid and gaseous products of the reaction of obtaining hydrocarbons from synthetic pentane to nonadecane from is gas and hydrogen was carried out in the "Krystallyuks-4000M" chromatograph by the gas-adsorption chromatography method under the following optimal conditions: detector-catarometer, the number of chromatographic columns is 2, the temperature regime is isothermal It is equal to 80 oS, the carrier gas is helium, and its consumption is equal to 20 ml/minute. A column filled with SaA (3m x 3mm) was used to separate the carbon dioxide and hydrogen. Separation of hydrocarbons from carbon dioxide and methane to butene was carried out in a column filled with HayeSep (3 m x 3 mm) with a flow rate of 20 ml/min, carrier-gas-helium, temperature regime programmed between 80-200 oC at a rate of 8oC/min. A typical chromatogram of the reaction mixture is shown in picture 3.



Picture 4. Typical chromatogram of gaseous compounds Determination of composition of synthesis products

Picture 4 shows the chromatogram obtained as a result of the chromatographic analysis of the products of the water layer formed by the interaction of a mixture consisting of carbon dioxide and hydrogen.

2.5. Surface morphology of selected catalysts for the production of high molecular weight synthetic hydrocarbons from pentane to nondecane from synthesis gas, that is, a mixture of carbon dioxide and hydrogen

Synthesis gas, that is, synthesis gas used in synthesis gas, that is, a mixture of carbon dioxide and hydrogen, high molecular synthetic, oxidized and reduced forms of catalysts selected to obtain hydrocarbons from pentane to nonadecane, synthesis gas, that is, a mixture of carbon gas and hydrogen, high molecular synthetic, The morphology of the surface of selected catalysts for obtaining hydrocarbons from pentane to nonadecane was studied by scanning electron microscopy and light microscopy. Picture 5 shows microphotographs of the surfaces of selected catalysts for obtaining high-molecular synthetic hydrocarbons from pentane to nondecane from synthesis gas in the form of an oxide, i.e., a mixture of carbon dioxide and hydrogen, obtained using a scanning microscope. Co-Fe-Ni-ZrO2/YuKTs surrounded by zeolite on the surface of selected catalysts for obtaining high molecular synthetic from synthesis gas, i.e. a mixture consisting of carbon dioxide and hydrogen, hydrocarbons from pentane to nonadecane. , was found to have catalyst particles selected for the production of hydrocarbons from pentane to nonadecane. Cobalt oxide Co-Fe-Ni-ZrO2/YuKTs was localized in the selected catalyst for obtaining high molecular weight synthetic hydrocarbons from pentane to nonadecane from synthesis gas, that is, a mixture consisting of carbon dioxide and hydrogen.

CONCLUSION

Synthesis of high-molecular-weight synthetic hydrocarbons from pentane to nonadecane is obtained as a result of a catalytic reaction from synthesis gas in the presence of intermediate group VIII metals. Gas-to-liquid technology is one of the most promising methods of obtaining motor fuel from sources containing carbon as an alternative to oil. Unlike petroleum products, synthetic fuels do not contain aromatic mono- and polycyclic compounds, organic sulfur and nitrogen compounds, and are ecologically clean, high-quality consumable fuel.

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