Volume 3, Issue 4, April - 2025 **ISSN (E):** 2938-3811

COBALT-BASED CATALYSTS

Koybakarob Oybek Ergashovich
Karshi State Technical University

Abstract

Among the known catalysts for the synthesis of high molecular weight synthetic hydrocarbons from pentane to nonadecane from a mixture of carbon monoxide and hydrogen, cobalt-based catalysts are the most promising. They are characterized by [47, 48]: operation at relatively low temperatures; active influence on the preferential formation of n-saturated hydrocarbons; and low activity in the formation of water gas.

Introduction

Among the catalysts for the production of high molecular weight synthetic hydrocarbons from carbon monoxide and hydrogen, cobalt- and iron-based catalysts allow the synthesis of mixtures with a high content of olefins, branched alkanes, and oxygenated compounds. [54]. In the presence of cobalt-based catalysts, long-chain linear alkanes are produced with high selectivity[17], but mainly alkanes are hydrogenated. Cobalt is more efficient at hydrogenation than iron, Therefore, cobalt-based catalysts for the production of high molecular weight synthetic hydrocarbons from pentane to nonadecane from synthesis gas have a higher hydrogenation performance than iron-based catalysts. The properties of cobalt catalytic systems for the synthesis of high molecular weight synthetic hydrocarbons from pentane to nonadecane from soot gas and hydrogen are influenced by [24]: the nature of the base, the production of high molecular weight synthetic hydrocarbons from pentane to nonadecane from synthesis gas The method of preparing the catalyst for, the conditions for its pre-purification (before recovery), the conditions for recovery (activation) of the catalyst for obtaining hydrocarbons from high molecular weight synthetic pentane to nonadecane from synthesis gas, and the presence of a substance or a second metal in it that increases the activity of the oxide catalyst.

It is important to note that the preparation of catalysts for the production of high molecular weight synthetic hydrocarbons from pentane to nonadecane from synthesis gas is a structure-sensitive process, therefore, the selectivity and catalytic activity for pentane and higher molecular weight synthetic hydrocarbons from pentane to nonadecane are determined by the composition of the catalyst. It is necessary to take into account the effect of the size and structure of the particles [4]. It is known that cobalt particles smaller than 5 nm are active centers in the hydrogenation of gas to methane, which leads to a decrease in selectivity and catalytic activity in the formation of pentane and higher molecular weight synthetic hydrocarbons from pentane to nonadecane. Catalysts for the production of high molecular weight synthetic hydrocarbons from pentane to nonadecane from synthesis gas should be sized so that the active component particles are in the range of 6 to 10 nm to achieve optimal selectivity and highest relative activity. The preparation method, heat treatment regime, carrier selection, promotion, and regeneration conditions have an impact on the formation of the active component of cobalt-based catalysts for the production of high-molecular-weight synthetic hydrocarbons from pentane to nonadecane from synthesis gas.

The final step in the preparation of catalysts for the production of high molecular weight synthetic hydrocarbons from pentane to nonadecane from the input synthesis gas is the heat treatment of the catalyst-impregnated granules. During the drying step, the input materials are retained in the pores of the carrier due to the removal of the solvent using thermal energy. The oxide form of the catalyst is obtained from synthesis gas to produce high molecular weight synthetic hydrocarbons ranging from pentane to nonadecane by heating the granules at high temperatures that do not form difficult-to-reduce compounds in the active catalytic phase.

Typically, in the preparation of catalysts for the production of high molecular weight synthetic hydrocarbons from pentane to nonadecane from synthesis gas, supports with a high relative surface area are used, which are: [54]: It is necessary to stabilize the active component, form a porous structure of the catalyst for the production of high-molecular synthetic hydrocarbons from pentane to nonadecane from synthesis gas, ensure thermal stability, and meet other requirements. The state of matter that increases the activity of the catalyst is of great importance in the formation of the catalyst component for the production of high molecular weight synthetic hydrocarbons from pentane to nonadecane from active synthesis gas.

In industrial practice, it is technologically justified to carry out the catalyst regeneration process in a separate apparatus to obtain high-molecular-weight synthetic hydrocarbons from synthesis gas, from pentane to nonadecane, after which the catalyst is loaded into the synthesis reactor to obtain high-molecular-weight synthetic hydrocarbons from pentane to nonadecane from the regenerated synthesis gas. [68]. The catalyst for producing high molecular weight synthetic hydrocarbons from pentane to nonadecane from recovered synthesis gas is pyrophoric, so it must be passivated before transportation for safety reasons.

The final stage of the catalyst production for the production of hydrocarbons from high molecular weight synthetic pentane to nonadecane from synthesis gas is its activation in a stream of a mixture of carbon dioxide and hydrogen under the conditions of the synthesis of hydrocarbons from high molecular weight synthetic pentane to nonadecane. At this stage, the composition and structure of the catalytic phase are formed. Typically, a catalyst is used to produce high molecular weight synthetic hydrocarbons from pentane to nonadecane from synthesis gas. The development of a mixture of hydrogen gas and high molecular weight synthetic hydrocarbons from pentane to nonadecane is carried out at a temperature below the effective reduction temperature, and then gradually increases the temperature until it reaches working conditions.

The synthesis is carried out at a temperature of 230°C and a pressure of 2.5 MPa. Description: The improved fuel is produced by cracking [81]. The synthesized products include saturated hydrocarbons, olefins, and aromatic hydrocarbons. The obtained Hydrocarbon hydroprocessing involves cracking of sulfided NiMo/Al2O3-based synthesis gas at a temperature of 350°C and a pressure of 5 MPa to produce hydrocarbons ranging from high molecular weight synthetic pentane to nonadecane [82-84].

One of the options for evaluating the positive and negative characteristics of reactor types [90, 91] is presented in [92].

Summary

In industrial practice, it is technologically justified to carry out the catalyst regeneration process in a separate apparatus to obtain high-molecular-weight synthetic hydrocarbons from synthesis gas, from pentane to nonadecane, after which the catalyst is loaded into the synthesis reactor to obtain high-molecular-weight synthetic hydrocarbons from pentane to nonadecane from the regenerated synthesis gas. [68]. The catalyst for producing high molecular weight synthetic hydrocarbons from pentane to nonadecane from recovered synthesis gas is pyrophoric, so it must be passivated before transportation for safety reasons.

REFERENCES

1. Kuyboqarov O., Anvarova I., Abdullayev B. RESEARCH OF THE CATALYTIC PROPERTIES OF A CATALYST SELECTED FOR THE PRODUCTION OF HIGH-MOLECULAR WEIGHT LIQUID SYNTHETIC HYDROCARBONS FROM SYNTHESIS GAS //Universum: технические науки. – 2023. – №. 10-7 (115). – С. 28-32.
2. Kuyboqarov O., Egamnazarova F., Jumaboyev B. STUDYING THE ACTIVITY OF THE CATALYST DURING THE PRODUCTION PROCESS OF SYNTHETIC LIQUID HYDROCARBONS //Universum: технические науки. – 2023. – №. 11-7 (116). – С. 41-45.
3. Муртазаев Ф.И., Неъматов Х.И., Бойтемиров О.Э., Куйбакаров О.Э., & Каршиев М.Т. (2019). ПОЛУЧЕНИЕ КОМПОЗИЦИЙ НА ОСНОВЕ СЕРЫ И НИЗКОМОЛЕКУЛЯРНОГО ПОЛИЭТИЛЕНА ДЛЯ ДОРОЖНЫХ И СТРОИТЕЛЬНЫХ МАТЕРИАЛОВ. Международный академический вестник, (10), 102-105.
4. Муртазаев Ф.И., Неъматов Х.И., Бойтемиров О.Э., Куйбакаров О.Э., & Каршиев М.Т. (2019). ФИЗИКО-ХИМИЧЕСКИЕ СВОЙСТВА СИНТЕЗИРОВАННЫХ ОЛИГОМЕРОВ ДЛЯ ОБЕССЕРИВАНИЯ ПРИРОДНОГО ГАЗА ОТ СЕРОВОДОРОДА. Международный академический вестник, (10), 105-107.
5. Boytemirov O., Shukurov A., Ne'matov X., & Qo'yboqarov O. (2020). Styrene-based organic substances, chemistry of polymers and their technology. Результаты научных исследований в условиях пандемии (COVID-19), 1(06), 157-160.
6. Куйбокаров О., Бозоров О., Файзуллаев Н., Хайитов Ж., & Худойбердиев И.А. (2022, June). Кобальтовые катализаторы синтеза Фишера-Тропша, нанесенные на Al2O3 различных полиморфных модификаций. In E Conference Zone (pp. 349-351).
7. Куйбокаров О.Э., Бозоров О.Н., Файзуллаев Н.И., & Нуруллаев А.Ф.У. (2022). КАТАЛИТИЧЕСКИЙ СИНТЕЗ ВЫСОКОМОЛЕКУЛЯРНЫХ УГЛЕВОДОРОДОВ ИЗ СИНТЕЗ-ГАЗА В ПОЛИФУНКЦИОНАЛЬНОМ КАТАЛИЗАТОРЕ. Universum: технические науки, (1-2 (94)), 93-103.
8. Куйбокаров О.Э., Бозоров О.Н., Файзуллаев Н.И., & Хайдаров О.У.У. (2021). СИНТЕЗ ВЫСОКОМОЛЕКУЛЯРНЫХ УГЛЕРОДОВ ИЗ СИНТЕТИЧЕСКОГО ГАЗА ПРИ

УЧАСТИИ CO-FE-NIZRO2/ВКЦ (ВЕРХНИЙ КРЫМСКИЙ ЦЕОЛИТ). Universum: технические науки, (12-4 (93)), 72-79.

9. Қуйбоқаров О.Э., Шобердиев О.А., Рахматуллаев К.С., & Муродуллаева Ш. (2022). ПОЛИОКСИДНЫЕ КАТАЛИЗАТОРЫ ПЕРЕРАБОТКИ МЕТАНА В СИНТЕЗ ГАЗ. Central Asian Research Journal for Interdisciplinary Studies (CARJIS), 2(5), 679-685.

10. Rustamovich O.N., Ergashovich K.O., Khujanazarovna K.Y., Ruzimurodovich K.D., & Ibodullaevich F.N. (2021). Physıcal-Chemıcal and Texture Characterıstıcs of Coate-Fe-Ni-ZrO2/YuKS+ Fe3O4+ d-FeOON. Turkish Online Journal of Qualitative Inquiry, 12(3).

11. О.Э.Куйбокаров.,Т.Х.Сайфуллаев Конверсия метана в карбонат на молибденовых и цирконийных катализаторах Universum: технические науки. Выпуск: 12(117) Декабрь 2023 год.

12. О.Э.Куйбокаров. Контроль качества препарата самарий153sm-оксобифор Universum: технические науки. Выпуск: 3 (120) март 2024 год.

13. Qo‘yboqarov O.E. Metanni karbonatli konversiyalanishi Sanoatda raqamli texnologiyalar 2(1). (2024).

14. Oybek Kuybokarov, Muradulla Karshiyev, Ganisher Rakhimov, Research of the catalytic properties of a catalyst selected for the production of high-molecular weight liquid synthetic hydrocarbons from synthesis gas E3S Web Conf. III International Conference on Actual Problems of the Energy Complex: Mining, Production, Transmission, Processing and Environmental Protection (ICAPE2024) Volume 498, 2024.