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

Web of Scientists and Scholars: Journal of Multidisciplinary Research

MIXED CATALYSTS FOR THE PRODUCTION OF HIGH MOLECULAR WEIGHT SYNTHETIC HYDROCARBONS FROM PENTANE TO NONADECANE FROM SYNTHESIS GAS

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Abstract
It can also enter into chemical interaction with the carrier metal [28, 29, 45-46]. The mixture of carbon dioxide and hydrogen, which performs the functions of hydrocarbon synthesis and hydrorefining, allows obtaining the simplest type of catalysts, which are mixed powders of catalyst and zeolite for the synthesis of hydrocarbons from high molecular weight synthetic pentane to nonadecane.

Introduction

The effect of the method of combining the components of catalysts for the production of high-molecular synthetic hydrocarbons from pentane to nonadecane from mixed synthesis gas on the performance of the hydrocarbon synthesis process was studied in scientific works [102-105]. In the scientific work [105], a mixture of Co (14wt.%)/Al2O3 is gas and hydrogens loaded into a mixed reactor in the form of a mixed layer and in successive layers. Hybrid systems based on a catalyst for the production of hydrocarbons and a Ni/ZSM-5 hydroimprovement catalyst for the production of hydrocarbons from high molecular weight synthetic pentane to nonadecane from synthesis gas were studied. The maximum amount of liquid and branched hydrocarbons for the catalyst for the production of high molecular weight synthetic pentane to nonadecane hydrocarbons from a mixed synthesis gas in the form of a layer containing pentane and higher molecular weight synthetic pentane to nonadecane hydrocarbons is set at 95% and 32%, respectively.

Catalysts for the production of high-molecular-weight synthetic hydrocarbons from pentane to nonadecane from synthesis gas in the form of a mixture of components have been reported to increase selectivity to methane in some studies [104, 112, 113]. In order to obtain high molecular weight synthetic hydrocarbons from synthesis gas, ranging from pentane to nonadecane, catalyst overheating can be reduced by adding inert materials. For example, in [109], a mixture of carbon monoxide and hydrogen was used to produce high molecular weight synthetic hydrocarbons from pentane to nonadecane. The study showed that the selectivity of both components in methane production due to the addition of a mixture of hydrocarbon production catalyst Co/SiO2 and zeolite ZSM-5 with silicon carbide was similar to the layer-by-layer loading of the component and was at the level of 11%. Catalysts for the production of hydrocarbons from high molecular weight synthetic pentane to nonadecane from synthesis gas have the same catalytic activity in the synthesis of hydrocarbons.

[109, 111] in scientific work, the acidity and structure of various zeolites, the mixture of gas and hydrogen, the synthesis of hydrocarbons from high molecular weight synthetic pentane to nonadecane The effect of a catalyst mixture of Co(20 wt.%)/SiO2 for the production of high molecular weight synthetic hydrocarbons from pentane to nonadecane from synthesis gas on the activity and stability of the resulting mixed catalysts was studied. The studies were conducted at a temperature of 250°C, a pressure of 2 MPa, and H2/CO=2. The catalyst powders and zeolites were loaded into the reactor in a 1:1 ratio to obtain high molecular weight synthetic hydrocarbons from syngas, a mixture of flue gas and hydrogen, from which high molecular weight synthetic hydrocarbons from pentane to nonadecane were synthesized. ZSM-5 was found to be a preferred component of catalysts for the production of high molecular weight synthetic hydrocarbons from pentane to nonadecane from mixed syngas, as it is characterized by increased activity in hydrorefining reactions - the selectivity for the production of hydrocarbons from pentane to dodecane was 62% , In catalysts for the production of high molecular weight synthetic hydrocarbons from pentane to nonadecane from other synthesis gases, this amount is 44-57% [109]. The authors found that the activity of catalysts in the hydroconversion of hydrocarbons to produce high molecular weight synthetic pentane to nonadecane from synthesis gas does not correspond to the acid center and strength of the zeolites.. It was found that this may be due to the effect of water on the acid center of zeolites, as well as to their different structure, which reduces their activity. ZSM-5 zeolite is used to obtain high molecular weight synthetic hydrocarbons from pentane to nonadecane from synthesis gas. Acid centers are characterized by the smallest dimensions of the entrance channels formed by the formation of carbon-containing compounds as a result of the reaction. Studies have established a correlation between the size of the inlet channels and the rate of loss of activity of catalysts for the production of high molecular weight synthetic hydrocarbons from pentane to nonadecane from synthesis gas due to less quenching, and also increases in the hydroimprovement processes of ZSM-5, IM-5, MCM-22, ITQ-2 [109] ZSM-5, HMOR, HBeta, usy [111] in the following order.

The authors of scientific works [115-118] studied the formation of liquid hydrocarbons from two- and three-component synthesis gas in the presence of a catalyst to obtain hydrocarbons ranging from high molecular weight synthetic pentane to nonadecane, which in the first case is a CO (20 wt.%) / SiO2 carbon monoxide gas. and hydrogen mixture synthesis of high molecular weight synthetic hydrocarbons from pentane to nonadecane from synthesis gas; a mixture of zeolite powders with a catalyst for obtaining high molecular weight synthetic hydrocarbons from pentane to nonadecane; in the second case, these mixtures are subjected to palladium-containing cracking A catalyst was added to produce high molecular weight synthetic hydrocarbons from pentane to nonadecane from synthesis gas.

During the experiments, it was found that the maximum catalytic activity was characteristic of the catalyst for the production of hydrocarbons from high molecular weight synthetic pentane to nonadecane from granular synthesis gas: at synthesis temperatures of 234°C and 240°C, the degree of conversion of CO gas was 77% and 69%, while the content of liquid hydrocarbons (C5-C11) and isosaturated hydrocarbons reached 50-60% and 19-23%.

The increase in catalytic activity of catalysts for the production of high molecular weight synthetic hydrocarbons from pentane to nonadecane from granulated synthesis gas has been reported in scientific works [120-122]. An increase in the degree of conversion of soot gas and the yield of pentane and higher molecular weight synthetic hydrocarbons from pentane to nonadecane up to 70-80% and up to 80-110 g/m3 have been noted. For all modified synthesis gas catalysts for the production of high molecular weight synthetic pentane to nonadecane hydrocarbons, the content of hydrocarbons in the pentane and high molecular weight synthetic pentane to nonadecane hydrocarbons ranged from 95% to C5-C18, with the content of isosaturated hydrocarbons ranging from 26-49%.

In the scientific work [122], a mixture of gas and hydrogens was hybridized on the basis of mixtures of catalysts for the synthesis of hydrocarbons from high molecular synthetic pentane to nonadecane. The results of the production of catalysts for the production of hydrocarbons from high molecular weight synthetic pentane to nonadecane from synthesis gas are presented. The samples were tested at a temperature range of 230-260°C, a pressure of 2.0 MPa, and a volume flow rate of 1000 h-1. The tested catalysts for the production of hydrocarbons from high molecular weight synthetic pentane to nonadecane from synthesis gas showed high activity in the synthesis and hydrorefining of hydrocarbons. The conversion rate of Is gas was 67-90%, the selectivity of formation of pentane and higher molecular liquid hydrocarbons was in the range of 53-72%. Synthesis products contain at least 93% liquid hydrocarbons.

Summary

The increase in catalytic activity of catalysts for the production of high molecular weight synthetic hydrocarbons from pentane to nonadecane from granulated synthesis gas has been reported in scientific works [120-122]. An increase in the degree of conversion of soot gas and the yield of pentane and higher molecular weight synthetic hydrocarbons from pentane to nonadecane up to 70-80% and up to 80-110 g/m3 have been noted. For all modified synthesis gas catalysts for the production of high molecular weight synthetic pentane to nonadecane hydrocarbons, the content of hydrocarbons in the pentane and high molecular weight synthetic pentane to nonadecane hydrocarbons ranged from 95% to C5-C18, with the content of isosaturated hydrocarbons ranging from 26-49%.

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