and its combination with polymers already showed an opportunity to convert CO_2 to CO, ethylene and other products using electrochemical and photochemical approaches [2, 3]. That makes our technology promising for the purposes of catalysis and clean energy production.

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ANALYSIS OF THE FORMALIZED HYDROCARBON COMPOSITION FOR THE PRODUCTS OF C_5–C_7 HYDROCARBONS PROCESSING ON ZEOLITE

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Search technologies and techniques that increase the depth of processing of hydrocarbon feedstock, are one of the priorities of the modern oil and gas industry. The involvement of stable gas condensate in the processes of motor fuel production is a possible way to get closer to the solution of this problem.

Stable gas condensate is a liquid blend of hydrocarbons from which low molecular weight (C_1–C_4) compounds are removed, at the same time normal C_5–C_7 paraffins are a major part of stable gas condensate.

The aim of this work is analysis the formalized hydrocarbon composition of n-pentane, n-hexane, and n-heptane processing products using the zeolite catalyst.

The processing of normal C_5–C_7 paraffins (zeoforming process) was carried out with technological parameters: temperature of 375 °C, pressure of 0.25 MP, feedstock volumetric flow rate 2 h^{-1}. The process products compositions were received by gas-liquid chromatography method in accordance with [1]. Some individual components from composition lists were aggregated based on the similarity of physicochemical properties into subgroups. The formalized compound list of normal paraffins C_5–C_7 processing products received as aggregation result (Table).

Results interpretation

1. The maximum propane yield is observed in the zeoforming process of n-hexane, which can be explained with its formation as a result of the breaking of the C–C bond in the middle of the n-hexane molecule.

2. N-pentane processing products have significant content n-pentane. Presumably, the temperature of 375 °C is not enough for the effective realization of the primary reactions of the cracking of n-pentane.

3. The olefins yield increases with an increase in the molecular weight of the feedstock, which is explained by a decrease in the activation energy of the cracking reaction of paraffins in the series n-pentane, n-hexane, n-heptane.

4. The yield of heavy C_{9+} n-paraffins and aromatic compounds increases with an increase in the molecular weight of the feedstock. These observations can be explained by the increasing role of the hydrogen transfer in olefins reaction, the result of which is the n-paraffins and aromatic compounds formation [2]. The high yield of n-paraffins C_{9+} can be associated with the equalization reaction rates of their formation and thermal decomposition.

5. The butanes yield decrease with an increase in the molecular weight of the feedstock. The iso-

pentane yield is maximum in the product of the n-pentane zeoforming process, and the isoparaffins C_6–C_8 yield is maximum in the product of the n-hexane zeoforming process.

It is possible to make an assumption about two main directions of transformations of the researched normal paraffins in the zeoforming process. The feedstock is cracked to form olefins. Light olefins C_2–C_3. which have high reactivity. quickly enter into secondary condensation reactions with the formation of heavier olefins. The formed secondary olefins react in two directions: the hydrogen transfer reaction with the formation of heavy n-paraffins and aromatic compounds. as well as the isomerization reaction by methyl shift with further hydrogenation. These directions are competing. the ratio between them depends on the composition of the feedstock.

Table 1. Formalized composition of n-paraffins C_5–C_7 zeoforming products

Component/component group	n-pentane	n-hexane	n-heptane
propane	1.286	4.648	1.039
butanes	17.403	16.136	12.117
n-pentane	35.421	4.737	5.227
n-hexane	2.603	3.305	1.464
n-heptane	0.070	0.112	2.757
normal paraffins C_{9+}	0.681	4.818	8.090
aromatic compounds C_6–C_9	10.192	18.228	26.423
aromatic compounds C_{9+}	0.117	0.921	8.054
isopentane	14.582	7.325	7.725
isoparaffins C_6–C_8	9.140	31.446	7.606
isoparaffins C_{9+}	3.458	0.366	6.335
naphthenes	3.293	4.422	5.440
olefins	1.717	3.523	7.700

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