

Таким образом, процесс пиролиза является неселективным, т.к. образуется достаточное количество побочных продуктов. Выход этилена составляет 59,5% масс., по сравнению с 51,3 в литературе. При наличии пропан – бутановой фракции на производстве и пропуская ее через расплав соли, более эффективно и целесообразно, чем при подачи в топливную сеть.

Выводы:

1. При пиролизе пропан-бутановой фракции в расплаве можно получить низшие олефины (этилен, пропилен), которые являются ценным сырьем для нефтехимии.

2. Для переработки сырья, склонного к коксообразованию рекомендуется использование термоконтактной теплопередачи.

3. Применение процессов с жидким теплоносителем показывает перспективность применения расплавов неорганических соединений.

4. Снижая температуру процесса и применяя другие расплавы, можно достичь максимального выхода этилена.

SYNTHESIS OF HYDROCARBONS UNDER PRESSURE ON INDUSTRIAL AMMONIA SYNTHESIS CATALYST "CA-C." ASSESSMENT OF STATIONARY LAYER AND AEROSOL NANOCATALYSIS

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Hydrocarbon reserves in known deposits of fossil fuels has decreased steadily [1]. Maintenance of fuel and energy stability of the state is a paramount task in a modern economic situation. Improvement of technologies on receiving hydrocarbons and, in particular, fuels can become one of decisions.

One of ways of receiving hydrocarbons is Fischer-Tropsh (SFT) synthesis. [2] Its industrial realization and long-term operation carried out in South Africa, thanks to the use of coal as a raw material available for the production of synthesis gas.

Being based on data of work [2] interest represented possibility of synthesis of hydrocarbons on the ammonia synthesis catalyst under pressure. In researches used industrial, instead of a laboratory sample of the catalyst that allowed to avoid errors connected with process of preparation of a multicomponent catalytic mix.

For research of this process in the conditions of AnCVB (Aerosol nanocatalysis with Vibrating Bed) [3] under pressure has been selected the fused ammonia synthesis catalyst CA-C (medium temperature) $\text{FeO}:\text{K}_2\text{O}:\text{Al}_2\text{O}_3:\text{CaO}:\text{SiO}_2$ structure with a mass ratio of components in limits: (31-40): (0,8-1,2): (2,4-3,8): (1,9-2,8), made on TU U 6-05761672.152-96.

Work purpose: receiving hydrocarbons by Fischer-Tropsh synthesis under pressure on the ammonia synthesis catalyst (CA-C), comparison of its activity in a stationary layer and in the conditions of AnCVB.

Experimental installation (fig. 1) represents a complex of vessels and devices connected by pipelines to shutoff valves, instrumentation and automation devices and a mechanical drive [4].

Exits of hydrocarbons in a motionless and vibrating layer of catalytic system from duration of carrying out experiment are presented in drawings 2, 3. Results of research of process in two modes: stationary bed (expense synthesis gas of 4,0 l/h; $\text{CO}:\text{H}_2=1:1$; temperature 240°C; the pressure $P = 2$ atm.; diameter of $DM \sim 1.0$ mm, $C_{\text{cat}} = 480$ kg/m³) and in conditions AnCVB (expense synthesis gas of 4,0 l/h; $\text{CO}:\text{H}_2=1:1$; temperature 240°C, the pressure $P = 2$ atm.; diameter $DM \sim 1.0$ mm; $f = 9,5$ Hz, $C_{\text{cat}} = 0.01$ kg/m³ and $A = 10$ mm) shown in Table 1.

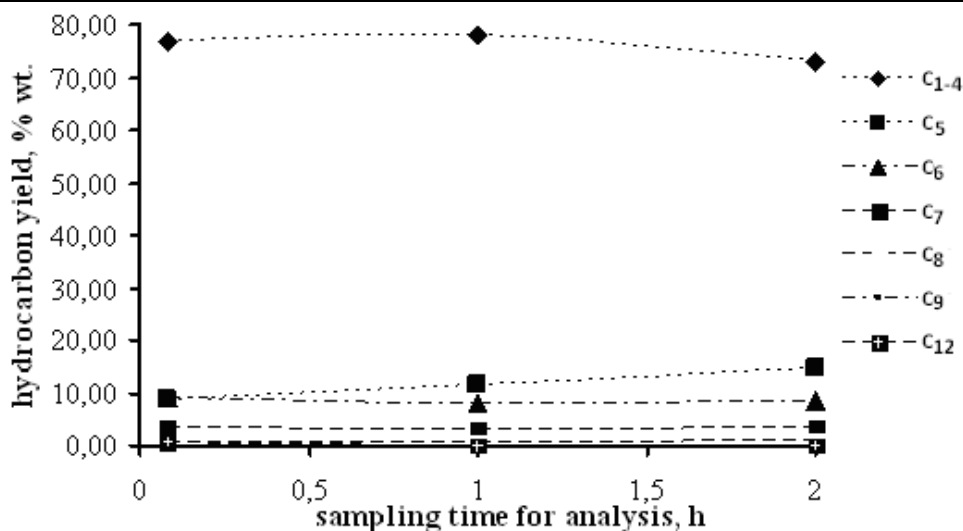


Fig. 2. Dependence of an exit of hydrocarbons in a fixed bed of catalytic system from duration of process.

Table 2. Results of research of process of receiving hydrocarbons in the AnC reactor on the CA-C catalyst (the catalyst of synthesis of ammonia)

Experimental conditions	time of selection of test for the analysis	Reaction rate, on a component, $r, \frac{g}{g_{cat} \cdot s}$									
		h	C ₁₋₄	C ₅	C ₆	C ₇	C ₈	C ₉	C ₁₀	C ₁₁	C ₁₂
the stationary bed	2	4	3,56·10 ⁻⁰⁵	5,42·10 ⁻⁰⁶	5,67·10 ⁻⁰⁶	2,20·10 ⁻⁰⁶	5,18·10 ⁻⁰⁷	0,00	0,00	0,00	4,37·10 ⁻⁰⁷
	1	3,48·10 ⁻⁰⁵	7,30·10 ⁻⁰⁶	5,09·10 ⁻⁰⁶	1,90·10 ⁻⁰⁶	3,84·10 ⁻⁰⁷	1,68·10 ⁻⁰⁸	0,00	0,00	7,28·10 ⁻⁰⁸	
	2	2,88·10 ⁻⁰⁵	9,08·10 ⁻⁰⁶	5,17·10 ⁻⁰⁶	2,24·10 ⁻⁰⁶	6,77·10 ⁻⁰⁷	3,23·10 ⁻⁰⁸	0,00	2,80·10 ⁻⁰⁸	1,62·10 ⁻⁰⁸	
AnCVB	0,25	0,074	0,039	0,014	0,006	0,00	0,021	0,047	0,214	0,255	
	1	0,155	0,085	0,029	0,013	0,0036	0,00	0,235	0,164	0,089	
	2	0,142	0,072	0,022	0,009	0,002	0,038	0,219	0,133	0,096	

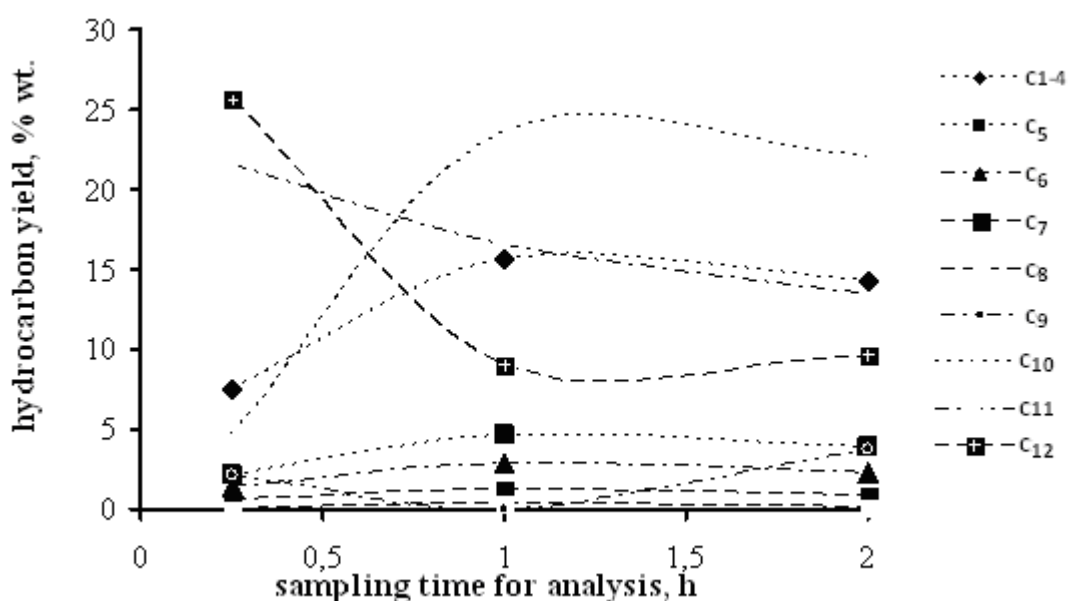


Fig. 3. Dependence of an exit of hydrocarbons in a vibrating layer of catalytic system from duration of process.

Results of researches: receiving wide fraction of hydrocarbons on this catalyst is fixed, high selectivity ~ 77,5 % of C₁-C₄ hydrocarbons by producing in a stationary layer of catalytic system is established, high selectivity ~ 87 % of C₅₋₁₂ hydrocarbons by producing in the conditions of AnCVB on the 15th minute of work of installation is revealed.

It has been established that the fixed bed catalyst system showed a low rate of reaction per unit weight of the catalyst and high selectivity to the formation of light hydrocarbons, whereas vibrating layer showed the reaction rate per unit mass of catalyst higher at 10³-10⁶ times, and decrease of the catalyst consumption almost 10⁵ times.

The carried-out preliminary researches showed advantages of particles of an aerosol of the CA-C catalyst over its motionless layer.

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