**Synthesis of nanofibrous carbon on catalysts, prepared by solution combustion technique**

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**Keywords**: catalyst, solution combustion, catalytic pyrolysis, nanofibrous carbon, specific yield

**Abstract**. The catalysts for decomposition of methane to carbon nanofibers and hydrogen were prepared by solution combustion method. By using optical and scanning electron microscopy was studied morphology of the obtained samples. Samples containing 90 wt.% nickel and 10 wt. % aluminum oxide were tested in the decomposition of methane at a temperature of 550 ° C and 1 atm. Experimental studies of the catalysts were carried out in a quartz flow reactor. It was shown that structural, textural and catalytic properties of the catalysts depend on features of their preparation. The optimal parameters of the catalyst preparation, that provide high specific yield of the carbon nanofibers and hydrogen until the catalyst deactivation, were established.

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**The conversion of linear hydrocarbons on the zeolite catalyst**

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**Keywords:** paraffins, olefins, catalysis, cracking, resin, methane, polyaromatic compounds

**Abstract:** The process of catalytic cracking some paraffin’s and olefins produced in processing of methanol, such as MTO (methanol-to-olefin) and MTG (methanol-to-gasoline) was investigated. As the catalyst was used for such processes typical zeolite НВКЦ (high-silica zealots in the H form) + 0,5% P2O5 based on ZSM-5 (Si / Al = 220), which showed high activity in the conversion of linear hydrocarbons in the gaseous and liquid products. In the gaseous reaction products dominated mostly lower olefins. In the liquid products were determined cyclic and aromatic hydrocarbons and compounds which are formed from olefins, but they were not detected. The amount of olefins and aromatic hydrocarbons liquid products increases with contact time or reaction temperature. It was established that the rate of conversion pairs olefin/paraffin’s (octane / octene and nonane / nonene) are approximately equal. Identified the main regularities of can extend the resource base to produce products of basic organic synthesis.

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**Phosphorus extraction from a ferrophosphorus with a ferrosilicon**

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**Keywords:** ferrophosphorus, iron phosphides, calcium silicides, thermodynamics, balance, ferrosilicium, phosphorus.

**Abstract**. This article contains the research results of the determination of optimum parameters of the phosphorus extraction from a ferrophosphorus produced by the limited partnership “Kazphosphate” with a phosphorus content 20,4 % and 26,2 % with the using the second degree rotostandard plan. The adequate equations of regression, time effect, temperature effect and influence of a ferrosilicon (FS65 grade)-ferrophosphorus ratio on a phosphorus extraction degree in a gas phase were received. It was found, that 85-88 % of phosphorus is extracted from theferrophosphorus, containing 20,4 % of phosphorus, at 1780-18000C, the process duration 104-120 minutes and the FS65 /ferrophosphorus ratio in the initial charge 3,0; and from the ferrophosphorus containing 26,2 % of phosphorus – at 1790-18000C, the process duration 109-120 minutes and the FS65/ferrophosphorus ratio2,4.

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**Study of the structural characteristics chemical and phase composition phosphorus sludge**

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**Keywords:** phosphorus sludge, grain size, elemental, phase composition, microstructure.

**Abstract.** The results of sieve analysis, physico-chemical and microscopic examination of phosphorus sludge. Found that particle size distributions phosphorus sludge does not meet the regulatory requirements for mineral fertilizers. On the chemical composition phosphorus sludge is close to the original raw Karatau phosphate deposits, but differs from it in less phosphate content and the presence of components of the feedstock mass - quartzite and coke. The results of microscopic examination showed that the structure of the phosphor slurry advantageously contains calcium silicates, potassium aluminum silicates and diopside. Based on the work performed can be concluded that phosphorus sludge is a valuable secondary raw phosphate suitable for processing in complex mineral fertilizer.

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**Modeling the process of obtaining tetraalkylammonium hydroxides of high purity by ion exchange**

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**Keywords**: tetraalkylammonium bases, ion exchange, modeling

**Abstact.** The process of tetraalkylammonium hydroxides synthesis with ion exchange in periodic column apparatus was studied. Developed a refined model of the ion exchange column of the periodic fixed-bed ion exchanger. The model takes into account the kinetics of internal diffusion in the pores of the resin beads and the effect of longitudinal mixing. The model used to describe the synthesis of high purity tetraalkylammonium bases in column apparatus. Numerical values ​​of internal diffusion halide- and hydroxy- ions coefficients were determined. Experiments on the production of tetraalkylammonium hydroxides model showed good agreement with the results obtained, which confirms the correctness of its choice.

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**Investigation of mixing reactants in alkylation of benzene with ethylene using methods of computational fluid dynamics**

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**Keywords:** alkylation of benzene, catalyst complex, ethylbenzene, mixing, simulation.

**Abstract.** The purpose of this work is to numerically research benzene alkylation with ethylene and assess a feasibility of the alkylation reactor mixing equipment reconstruction using methods of computational fluid dynamics. To evaluate the effectiveness, a simulation of the mixing chamber was developed using ABAQUS and FlowVision software systems. It allows solving problems with high accuracy in fluid dynamics modeling of liquid and gas flows mixing. Two variants of benzene and catalytic complex input to chamber were considered. Results are presented in color schemes. The obtained results describe the change of reactant concentrations gradient.

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