**Getting complex mineral fertilizers on the basis of technogenic waste phosphoric production**

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**Keywords:** phosphorus sludge, dust kottrelnaya, humic acid, ammonium sulfate, complex fertilizers, ammonium phosphate, superphosphate.

Production of phosphorus is associated with the formation of technogenic waste: phosphorus sludge, kottrelnoy dust, gas emissions. Phosphorus sludge and dust kottrelnaya represent a valuable secondary raw material for the production of phosphate fertilizers.However, sound and practically implemented technologies for processing waste in fertilizing products are still not existed. In this context, the search for new opportunities, large tonnage recycling of secondary phosphorus raw materials is an important task.In this paper, for the type of fertilizer MAP a mixture of phosphorus sludge, dust , ammonium sulfate and humic acid were used. For the proposed process technologial conditions and key performance indicators were developed.

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**The improved method of purification solutions of sodium tungstate from the impurities forming heteropolyanions**

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**Keywords:** carbonation, heteropolyanions, silicon, phosphorus, tungsten, reextract.

 The purification of solutions of sodium tungstate from silicon and phosphorus was studied. It is shown that the use of carbonic acid to neutralize the carbonate-alkaline solutions of sodium tungstate eliminates formation of heteropolyanions and reduces the residual silicon content of less than 0.1 g/l . The eguilibricem in wolframate solutions during carbonization is achieved in 3 to 4 times faster at 70-80 оС than at normal temperatures. To achieve the degree of purification from silicon > 90 % , it is useful to introduce a solution of aluminum salts as coagulants. It is shown that together with silicon the wolfra-foul solutions is cleaned from phosphorus.

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**Modification process as a variant of expansion of sulfur use area**

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**Keywords:** Sulfur, surplus, modification, modified sulfur, sulfurconcrete, sulfurasphaltic concrete, construction industry.

Russia is a major producer of elemental sulfur. In 2012, sulfur production was
6.4 million tons, the level of consumption was 2.9 million tons. The main direction of use of sulfur is production of sulfuric acid for fertilizers. A surplus of 3.5 million tons sold to foreign markets (exports). In the medium and long term excess of world sulfur production is projected. By 2020, surplus of world production could reach 5 million tons per year. In the present article the problem definition of expansion of area of use of sulfur is realized. Theoretical bases of process of chemical modification of sulfur that can be used as component of construction materials are given. Some positive properties of the modified sulfur and materials on its basis are shown. The prospect of use of modified sulfur in construction industry and in production of asphaltic concrete mixtures is proved.

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**Changing the surface properties of the phthalocyanine pigment**

**by chemical modification**

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**Keywords**: organic pigments, chemical technique of surface modification, nanosized materials, Gomberg-Bachmann reaction.

The paper describes the method of synthesis and the application’s way of new reagents for the chemical modification of blue copper phthalocyanine pigment (P.B.15:3, C.I.:12474). Modifiers are derived from 4-aminobenzoic acid and tertiary amines (di- and triethanolamines) having hydroxyethyl groups. The functional fragments of these compounds were fixed on the surface of pigment particles by Gomberg-Bachmann arylation. The presence of polar bulky groups on the surface of particles are increase its affinity for aqueous media. The dispersion degree of powdery pigment are also increased. The improvement of technical and performance characteristics of the pigment after modification was shown in various laboratory tests.

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**Environmentally friendly inhibitors for petrochemical production**

**water recycling systems**

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**Keywords**: recycling water supply, corrosion and scale inhibitor.

A new environmentally friendly corrosion and scale inhibitor for cooling water treatment – OPC-800 was developed. Gravimetric method showed that inhibitor exhibits the maximum protection against carbon steel corrosion and calcium carbonate deposition at a dose of 50 mg/L. In the potentiostatic study it was defined that reagent OPC-800 is a mixed-type inhibitor that provides high level protection of carbon steel in water of low and medium mineralizaton. The inhibitor effectively reduces the possibility of scale formation keeping water stability in the temperature range of 25 oC to 75oC. The data of application of this inhibitor in recycling water supply system of PJSC «Nizhnekamskneftekhim» are presented.

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**The development of energy saving technological line of the rectification in the production of the aromatic hydrocarbons from light alkanes**

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**Keywords:** simulator, reflux ratio, model, module.

Evolutionary algorithm of synthesis of the energy and resources saving technologies of the rectification is realized by simulator ChemCAD. Computer models of the 5 different variants of the technological lines of the rectification of the aromatic hydrocarbons (in the production of the arenes from the light alkanes) are developed. The best variaut from the position of the energy and resources saving is selected by different criterion for the efficiency of technological lines (annual charges, total heat duty). Identical results are observed at a choice of the most effective technological line of the rectification by using 2 different criterion for the efficiency by using simulation.

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**Mathematical modeling of network interaction of innovation processes participants in petrochemical clusters**

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**Keywords**: innovation process, organizational structure, innovation network, a cluster, a member of the network, networking, the utility function, Petrochemical industry, chemical technological system, the external network effects, externalities, the space-time conditions.

Networks provide the acceleration of the diffusion of innovations, stimulating innovation activity of network participants. The appearance of positive external network effects leads to the recruitment of new participants, which in turn provides the growing importance of the utility function. The objective of the processes of formation of innovation networks becomes the optimization of the number of the network participants. The article contains the mathematical model of innovation network, which is determined, on the one hand, by the dynamics of the utility function of its members, and on the other - the space-time conditions of network operating. Proposed the particular mathematical model for valuation of the external network effects made by the functioning of the innovation network at the petrochemical industry, which takes into account the specificity of chemical and technological processes, as well as features of the structure of the industry due to raw material orientation of the industry.

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