**Heterogeneous conversion of REE sulphate concentrate to oxalate form**

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**Keywords:** technology of the mineral fertilizers and rare-earth elements, heterogenic conversion, chemical and phase analysis, atomic-emission and weight-spectral analyses, scanning electronic microscopic analyses.

**Abstract.** X-ray diffraction, atomic emission and mass spectral analysis with coupled plasma, gravimetric, photometric, potentiometric analysis and scanning electron microscopy were used to study the phase transformations during the heterogeneous oxalate conversion of calcium sulphate precipitate, containing rare earth elements, obtained from industrial phosphoric acid. The deep purification from S, Si, Na, P, Fe, F, Al, Th and U impurities was registered as the result of the heterogeneous oxalate conversion of the raw precipitate. The concentrate of rare earth elements, containing not less than 99 % of lanthanides and yttrium oxalate hydrate, was obtained. The extraction ratio of rare earth elements from industrial precipitate was not less than 96 %.

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**Comparative analysis of the theoretical-experimental models**

**of hydraulic resistance of polyethylene gas pipes**

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**Keywords**: polyethylene pipes, gas flow, hydraulic resistance.

**Abstract.** The paper includes information about the standards for hydraulic calculation of polyethylene pipelines. The surface of the pipe cannot be exhaustive characterized by one value – coefficient of equivalent roughness, – because the profile record is a random function. This fact is probably the cause of a certain inconsistency between known formulas, including Colebrooke-White, Prandtl, Altshul and others, as well as standard models and the results of natural experiments. Any inconsistencies between the normative models and results of natural experiments were emphasized. In the technical literary is absent information about applications of the mathematical statistics methods in processing the results of the experimental research. To use these methods to processing the results of laboratory-based and full-scale experiment is recommended. Based on of the carried out experiments on air and natural gas flows in polyethylene pipes is recommended a formula for the project and operational calculations of gas distribution systems with the use of polyethylene pipes. The formula has the same shape as the well-known Altshul formula, but values of numerical coefficients are taken different. The results of the present study were at various times used in hydraulic calculations of designed and renovated networks of polyethylene gas pipeline systems of the Republic of Tatarstan.

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**Baromembrane separation of solution in a flat slop channel**

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**Key words:** semipermeable membranes, reverese osmosis, baromembrane processus, spiral wound membrane element.

**Abstract.** The mathematical model of laminar flow separation tasks of aqueous solutions of electrolytes, moving under excess pressure in a narrow flat channel with semipermeable membrane walls is presented. It is based on the balance sheet ratio, velocity profile and dissolved substance concentration profile in the channel cross section. Speed profile adopted unchanged form, and the concentration profile changes the form along the length of the channel depending on the changing selectivity and permeabiliny of the membrane. As an example, the proposed model is used in this paper for the calculation of desalting of NaCl solution in spiral wound reverse osmosis element. Satisfactory convergence of calculated and experimental data is observed.

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**The capture of gaseous methyliodide on ceramic highly porous block-cellular** **sorbents in inert environment**

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**Keywords:** ceramic highly porous block-cellular sorbents, silver nitrate, methyliodide, radioiodine, argon, trapping efficiency, purification coefficient **Abstract.** The dependence of the degree of decomposition of CH3I on temperature at different velocities of gas flow was studied. It is shown that at temperatures above 200 °С the decomposition of methyl iodide to molecular iodine is geinj on and can be localized subsequently in a layer of metallic silver. Tests for capture of methyliodide on ceramic highly porous block-cellular sorbents coated with an active layer made of silver and silver nitrate in an inert environment were carried out. Trapping efficiency of methyliodide labeled with isotope I-131 on ceramic sorbents, obtained by the method of carrier impregnation with silver nitrate and by the method of chemical silvering the surface of the carrier, at different temperatures and concentrations of CH3I in the stream of argon is determined.

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**Effect of liquid phase density calculation method on process design of continuous organosilicon compounds distillation**

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**Key words:** methylchlorosilanes, liquid density, temperature dependence.

**Abstract**. It is shown that the results of process and engineering design of continuous distillation significantly depend on consideration of liquid phase density temperature dependence. As an example of unmixing organosilicon products blend it is demonstrated that the neglect of liquid density temperature dependence affects differential pressure along the column and heat exchange area of column boiler. For substances for which no experimental data of liquid density temperature dependence are available, a method for liquid density calculation at any temperature is proposed. Using the proposed calculation method high boiling liquid methylchlorosilanes density temperature dependence was determined for the first time.

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