**Optimization of open-cell foam catalyst macrostructure for mutual detoxication of NO and CO**

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***Keywords****: open-cell foam, catalyst, optimization, mathematical modelling, nitrogen oxide, carbon monooxide, waste gas purification.*

Waste gas purification from NO and CO is an important problem for environmental catalysis. The influence of state-of-the-art highly porous foam catalyst macrostructure on conversion in the process concerned is studied by means of mathematical modeling and computer simulation. The degree of mutual neutralization of NO and CO is mainly dependent on the total catalyst area. At equal active component loading and equal surface area the foam with the highest porosity possesses the lowest pressure drop. Foam with a lower porosity gives insignificantly higher conversion in conjunction with a strong increase in pressure drop. A material with a high number of pores per inch should be used to reduce the catalyst length that is required for the prescribed conversion value.

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**A method of separating para-nitrotoluene from a mixture of isomers of mononitrotoluene**

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***Keywords****: para-nitrotoluene, sulfuric acid, freezing, mononitrotoluene, dinitrotoluene, isopropyl alcohol, sulfite-soda solution, crystallization, carbamide.*

The scope of Para–nitro toluene are described and point need for different industrial branches. Advantages and disadvantages of three basic ways of production of Para–nitro toluene analyzed.

The evidence shows that release in the company is economically feasible, where get trinitrotoluene and sulfuric acid. Described the methods of allocation Para–nitro toluene by method of freezing in the medium of sulfuric acid and its purification with isopropyl alcohol and sulfite soda solution at laboratory and experienced setting, and also construction of the main equipment.

It is showed method of allocation of Para–nitro toluene with using sulfuric acid allow get a ready–made products with high quality and output. It is considered a method of regeneration of isopropyl alcohol.

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**Low-waste technology for production of 2',4,4'-trinitrobenzanilide, preproduct of 5(6)-amino-2-(4-aminophenyl)benzimidazole**

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***Keywords****:**2´,4,4´-trinitrobenzanilide, 5(6)-amino-2-(4-aminophenyl)-benzimidazole,**acylation,**kinetics.*

Synthesis of 2',4,4'-trinitrobenzanilide by aclation of 2,4-dinitroaniline by 4-nitrobenzoilchloride, catalized by ferric chloride (III), is performed in chlorbenzene media. Recycle of chlorbenzene mother liquid after separation of 2',4,4'-trinitrobenzanilide guarantees simplification of the process, increase of output and significant decrease in the amount of waste. Aclation of 2,4-dinitroaniline is inhibited both by the main product and by reaction of by-product, 4-nitrobenzoic acid anhydride, which forms complexes with the catalyst. Formation mechanisms for 4-nitrobenzoic acid anhydride, effect of 4-nitrobenzoic acid and it is anhydride on the rate of acylation reaction of 2,4-dinitroaniline nibu 4-nitrobenzoilchloride in chlorbenzene in the presence of ferric chloride (III), synthesis mechanisms for 2',4,4'-trinitrobenzanilide with implementation of chlorbenzene mother liquid have been investigated. Samples of 5(6)-amino-2-(4-aminophenyl)benzimidazole have been synthesized and characterized.

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**Regularities of macroscopic kinetics of the isobutylene with isoprene copolymerization under conditions of intense turbulent fluctuations**

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***Keywords:*** *butyl rubber, isobutylene, isoprene, suspension copolymerization, physical and chemical hydrodynamics.*

It is for the first time that physical and chemical hydrodynamics of cationic suspension copolymerization process of isobutylene with isoprene was studied by the method of numerical experiment (the catalyst is AlCl3, the solvent is CH3Cl, temperature ≥ 173 K; the reaction volume was limited by a cylinder, where intense turbulent fluctuations were created) It has been established that with the decrease of size of the reaction zone (cylinder diameter from 0.2 to 0.1 m.) and speed of the reaction slurry (from 10 to 1 m. / s.) the decrease is happening of the number average (from 91 700 to 1360) and weight average (from 257 000 to 134 000) molecular weight of the synthesized butyl, and an increase of its polydispersity is taking place (from 2.8 to 110).

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**The comparative analysis of methods helium extraction from natural gas and fields their effective application.**

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***Keywords:*** *helium, helium extraction, Eastern Siberia, membrane technology, membrane separation, cryogenic technology, adsorption, helium storage.*

Different hinds of technologies, ensuring helium extraction from the helium-rich natural gas are given. It is shown that the use of cryogenic helium allocation method is the most effective in the production of LNG, to produce helium and hydrocarbon fractions, as well as in cases of removal of nitrogen from helium-rich gas with the simultaneous production of hydrocarbon fractions. Absorption method is useful when the production of marketable helium from concentrate helium in which helium content exceeds 50 vol. %. Membrane separation technology helium is most effective for problems of excess allocation against market requirements quantities of helium, with a view to their destinations on long-term storage in isolated deposits of the producing fields.

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**Comparison of energy consumption of two types of freeze-drying in the preparation of materials with high porosity**

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***Keywords:*** *vacuum freeze-drying, atmospheric freeze-drying, energy, porosity.*

In the course of this work it was investigated the effect of two methods of freeze drying on the porosity of the material, which was carried out in a vacuum freeze dryer (VFD) and atmospheric freeze dryer (AFD). Both processes differ in mobility of the material within the dryer and the method for supplying energy to the material. VFD is a classic drying trays, where the material in the drying process is stationary. AFD is operated at atmospheric pressure, where the material flow of cold air is dried while in a fluidized bed. The materials used were mannitol and dextran. For both methods of drying the energy costs of the process es were calculated and compared.

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