**The opportunities of electrochemical air regeneration technology on the base of molten carbonate fuel cells**

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***Keywords:*** *air regeneration system, molten carbonates fuel cell, carbon dioxide concentrator.*

Development of promising technology of electrochemical regeneration of air is necessitating by increase of people lifetime in an atmosphere of the closed airspace and insufficient reliability of existing systems is required. The analyses of the oxygen generation technology and carbon dioxide removal from air and CO2 concentration have been produced. Recovery system comprising a proton exchange membrane electrolyzer and carbon dioxide concentrator operating on fuel cell technology with molten carbonate electrolyte (MCFC) is proposed. Traditionally MCFC is used for power generation and the flue gases treating with CO2 concentration of up to 30%; there are minor details for it working at concentrations of CO2 less than 1%. The test results of proposed system demonstrator shows its effectiveness.

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**The temperature influence on the kinetic of acid’s decomposition of high reactivity phosphate raw by nitric acid**

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***Keywords****: phosphate ores, acid decomposition, kinetic, ionometric and photometric analysis methods.*

The kinetic of nitric acid decomposition of polpinsky phosphorite with polydisperse structure in the temperature range (20-50 C) has been investigated. Permanent and periodic monitoring of the process was carried out by photometric and ionometric methods of analysis respectively. Kinetic parameters of process are determined. Due to the high reactionary ability of polpinsky phosphorite caused by its chemical composition and structure, the possibility of carrying out decomposition’s process on energy saving technology is shown. As an industrial way of processing of polpinsky phosphorite it is expedient to be guided by technology of production complex fertilizers by nitric-sulfuric acid’s way at a temperature of 20-25 C. It should be noted that decomposition of the Kola apatite concentrate is carried out in the similar way at an optimum temperature (45 - 50 °C) which decrease leads to slowing of decomposition process.

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**The study of the crude bioglycerol anion exchange aftertreatment process**

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***Keywords:*** *Ion exchange purification, anion exchange resin, bioglycerol, tannin, salt of higher fatty acids, inorganic anions.*

This paper studied the ion-exchange post-purification process of bioglycerol obtained in the biodiesel production and pre-purified by ultrafiltration and electrodialysis. Purified glycerol can be used as raw material for the production of automotive antifreeze. Were investigated the composition of pre-treated bioglycerol. The main impurities that give color bioglycerol, are tannins with different structures. Also as impurities in the bioglycerol are salts of higher fatty acids and inorganic salts such as chlorides, phosphates and sulfates of sodium. The test was selected eight samples of anion exchangers with different properties. Each anion exchange resin was tested as in OH- and in Cl- form. The criterion of efficiency of the anion exchange resin is the maximum volume of decolorized and desalted glycerin obtained in one cycle of the anion exchanger, ceteris paribus.

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**Investigation of equilibrium in the ternary system, biodiesel-methanol- glycerin**

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***Keywords****: glycerol, biodiesel, methanol, calcium diglyceroxide, equilibrium, Binodal curves, NRTL equation.*

This work reports experimental liquid–liquid equilibrium data for ternary systems comprised of mixture of biodiesel (from rape seed oil), methanol and glycerol. Liquid–liquid equilibrium data are essential in order to predict the proportions in which these compounds exist and subsequently proceed with a more efficient process for the separation of the reaction product of transesterification. The phase equilibrium behavior of biodiesel-methanol-glycerol system was determined at T = 293, 313 and 333 0K and atmospheric pressure. The solubility curves were determined by the cloud-point method in isothermal conditions. The liquid-phases compositions were measured by gel permeation chromatography. Additionally, binary parameters for glycerol/methanol, methanol/ biodiesel and glycerol/ biodiesel have been estimated by NRTL model.

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**Investigation of forming polymer coatings based on aqueous epoxy emulsions**

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***Keywords****: epoxy resin, hardeners, water emulsion.*

The results of the study of the process of curing epoxy compositions comprising an aqueous emulsion of epoxy-diane resin ED-20 brands, NPEL 128, CHS-EPOXY 530 and crosslinking agents of different chemical nature. Thermographic method was used for investigation of processes occurring during heating experimental compositions, electron microscopic method for investigation the - structure of the coatings. It is shown that aqueous compositions cure in the presence of a crosslinker NC-558 more fully takes place at temperatures of 80°C and 100° for 2 hours, PEPA - 100° C - 2 h. The structure of the coatings with hardeners NC-558 and PEPA is a dense cluster of particles (gum drops), circular shape, uniformly distributed over the volume of cross-linked material. The presence of epoxy systems regardless of brand resins and hardeners Epilink 701 Anguamine 401 promotes a deeper degree of cross-linking of epoxy compositions. The structure of the films in the presence of water-based curing agents layered. The physicochemical properties of coatings was vestigated.

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**The feasibility study of preliminary design for complex water treatment system**

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***Keywords****: preliminary design, source data, capital expenses, prime cost, section of water treatment, mechanical filters, microfilters, reverse osmosis, stage of separation, partition/sectioning.*

We developed preliminary design of the water treatment system for drinking and process water that contains elements of technology, architecture and construction sections. This development was done in accordance with the the original data source containing the type: of water intake - surface water reservoir, seasonal water temperature, composition and concentration of impurities, as well as performance requirements and quality of purification. In this work we provide the technological scheme, selection and calculation of basic equipment and filtering materials. Further we present the feasibility study of the proposed technical solutions, including assessment of the capital expense and prime cost of the purified water. Also the configuration of the equipment that is installed at the section of water treatment is accomplished.

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