**Modification of paint coatings by incorporation of organomontmorillonites**

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***Keywords:*** *organoclay, montmorillonite, polymer, nanocomposite, coating.* Production of polymer-aluminosilicate nanocomposites with layered silicate montmorillonite used as a nanoadditive is a prospective approach for development of polymer materials with improved properties, including polymer and paint coatings. The performance characteristics of alkyd coatings modified with organomontmorillonites Cloisite 15A, Cloisite 30B were characterized, the structure of organomontmorillonite in the composite coating was determined. The study shows that formation of intercalated nanocomposite leads to improvement of the performance characteristics of composite coatings. The positive effect of organomontmorillonite incorporation shows in cases of both pigmented and non-pigmented alkyd coatings.

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**Degradable compositions based on polyvinyl chloride and bentonite**

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***Keywords:*** *polyvinyl chloride, bentonite, composite material, degradation.*

Polymer composite films based on polyvinylchloride and bentonite of various concentrations have been studied. The influence of technological parameters of the process is studied: the proportion of reagents and the rolling time on the mechanical characteristics of PVC filled films. It is shown that the introduction of natural bentonite leads to the formation of filler agglomerates with dimensions of 30-120 μm, and the resulting films exhibit anisotropy of properties. It is shown that an increase in the rolling time to 10 minutes results in the thermal destruction of the polymer composite material. It has been demonstrated that the introduction of bentonite 1 wt.% Leads to the appearance of biodegradable properties of polyvinyl chloride films, while using 5% by weight of mineral filler, the overall degradability of the polymer materials being studied is due to mechano-degradability.

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**Biopolymer films based on chitosan and polyhydroxybutyrate**

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***Keywords:*** *chitosan, polyhydroxybutyrate, calcium chloride, biopolymer film.*

In this work, a nowel polymer film composition - chitosan/polyhydroxybutyrate/CaCl2 was prepared by solution-cast technique. The morphology of the surface and the structure of biopolymer films were studied by FTIR spectroscopy and optical microscopy. The effect of the concentration of calcium chloride from 0 to 15% on the structure and morphology of the surface of biopolymer films is demonstrated. The increase of CaCl2 content to 10 mass% leads to decrease of the surface heterogeneity of the films. Further increase in the content of calcium chloride provides the formation of network structure. The increase of elasticity of biopolymer films in 1.5 - 2 times with addition of calcium chloride to 10% is presented. The perspectives of materials based on polyhydroxybutyrate, chitosan and calcium chloride as film coatings for medical applications are shown.

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**Effect of temperature on gel formation in sols of aluminosilicates and silicates**

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***Keywords****: silicа sol, gelling kinetics, repair and insulation works.*

It was confirmed that in the acidic and alkaline regions of pH the time dependence of the gelation time of silica sols and aluminosilicates on temperature is satisfactorily described by an equation similar to the Arrhenius equation: **τ** = **τ**0 \* *exp*(*E*a/*RгT*). Arrhenius parameters of gel formation of acid sols of silica powder depend on the concentration of the activator and silica, and a relationship between the activation energy and the pre-exponential factor for acidic and alkaline silica sols is observed. In hydrochloric acid sols of aluminosilicates, the activation energy and pre-exponential gelling factors do not depend on the composition of the gel-forming solution.

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**Optimization of the process for the preparation of sodium isobutylate**

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***Keywords:*** *sodium isobutylate, sodium hydroxide, aromatic hydrocarbons****.***

A method for the synthesis of sodium isobutylate from an aqueous solution of sodium hydroxide and isobutyl alcohol in the presence of aromatic hydrocarbons suitable for use in industrial conditions is proposed. The use of aromatic hydrocarbons in the production of alcoholates increases the intensity of the process and contributes to a more complete separation of water upon stratification of the heteroazeotrope. Partial replacement of isobutanol with an aromatic hydrocarbon increases the solubility of the alcoholate in the mixed solvent, which allows one to obtain concentrated solutions that do not crystallize at room temperature, which greatly extends their use in organic synthesis. The data obtained can be used both in laboratory practice and in the production of sodium isobutylate in the industrial version.

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**Indicators of energy efficiency of mass transfer columns with random packings**

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***Keywords****: mass transfer, random packing, energy efficiency, pressure drop.*

Various expressions for estimating the mass transfer and hydraulic efficiency of packed columns are considered for the cases, in which the main resistance to mass transfer is concentrated in the gas phase (evaporation and absorption processes). Complexes developed by Sokolov V.N., Domansky I.V. as well as energy coefficient by Spalding D.B were used. An expression for calculating a criterion for energy efficiency of a mass transfer process for a packed column was obtained, in which the main parameters are the Murphree mass transfer efficiency, pressure drop and working volume of the apparatus.Results of calculations of the pressure drop and the efficiency criterion for packings having the same specific surface area are shown, which include Raschig and Pall rings, as well as GIAP-NZ and Inzhekhim-2000. Similar calculations were made using the Spalding coefficient. Qualitative agreement of calculation results was noted. Conclusions are drawn about the most energy efficient designs and operating modes of packed columns.

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**On the possibility of domestic engineering to provide processing and environmental equipment production for the implementation of BAT**

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***Keywords:*** [*Best Available Technique*](https://www.multitran.ru/c/m.exe?t=7589607_1_2)*s, basic process equipment, environmental protection equipment, government support.*

The status of the basic process equipment manufacturing operated in case of application of the [Best Available Technique](https://www.multitran.ru/c/m.exe?t=7589607_1_2)s is characterized. The domestic engineering production incentives are described. The BAT equipment is sorted by type and purpose in the context of equipment list related to the application area of the Reference Document on Best Available Techniques in the «Ammonia, Fertilizers and Inorganic Acids production». The possibility of BAT equipment manufacturing in the Russian Federation is estimated as well as recommendations for government support of equipment manufacturers are given. Equipment manufacturers from a group which includes gas cleaning equipment, heat exchange equipment, compressors and superchargers and some other devices, can be considered as potential subjects of state support for its cost-effective production, including within the framework of import substitution programs.

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**Removal of heavy metals from mining wastewater**

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***Keywords:*** *ultrafiltration, nanofiltration, reverse osmosis, mining wastewater, heavy metals.*

Pressure driven membrane processes, such as reverse osmosis (RO), nanofiltration (NF) and ultrafiltration (UF) are widely used in water purification and various wastewater treatment systems. Ultrafiltration is suitable for pre-treatment of nanofiltration and reverse osmosis systems. The main characteristics of nanofiltration and reverse osmosis membranes (flux and rejection) in purification of wastewaters containing manganese ions were studied. The influences of main technological parameters: feed solution concentration and pH value, on flux and rejection of NF and RO membranes are considered. The minimum rejection point (isoelectric point) of NF membrane in purification of wastewaters (including mining ones) from manganese ion has been determined.

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