

PRACTICAL WAXS METHOD FOR DETERMINATION OF DISTORTIONS AND SIZES OF CELLULOSE CRYSTALLITES

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ABSTRACT

The wide angle X-ray scattering (WAXS) is widely used method to evaluate sizes of cellulose crystallites by means of the Scherrer's equation. However, the Scherrer's methodology has a limitation, since a width of X-ray diffraction peaks depends not only on the size of crystallites but also on other factors, such as instrumental effect, second-order distortion degree of crystalline lattice, δ , and factor $\Delta=4\delta \operatorname{tg}\Theta$. The method of measuring the instrumental factor (b) is well known, but δ and Δ factors are ignored that leads to understated sizes of crystallites. In this research a simple procedure was proposed to determine δ and Δ factors, as well as actual sizes of $\text{CI}\beta$ crystallites. Values of δ were calculated using average deviation of interplanar spacing in the distorted lattice from its value in undistorted crystalline lattice. It was also shown that δ and Δ factors are linear functions of interplanar spacings (d) of crystalline lattice. After finding the δ and Δ factors, the correction for broadening of diffraction peaks was calculated, which allows to determine the actual width (D_a) and actual length (L_a) of crystallites. Study of various samples of $\text{CI}\beta$ showed that tunicate cellulose has the largest crystallites: $D_a = 13$ nm and $L_a = 400$ nm. Actual sizes of crystallites in isolated celluloses of other origin (herbaceous plants, wood, bast fibers, cotton fibers, etc.) were smaller: D_a was in the range of 4.2 to 10 nm, whereas L_a in the range of 48 to 116 nm.

STUDYING THE RHEOLOGICAL PROPERTIES OF CURATIVE NAFTALAN OIL WITH NANOSYSTEM OF SILVER COMPOSITION

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ABSTRACT

The article is devoted to research in the field of influence of silver nano particles of Naftalan oil of Azerbaijan. Naftalan oil is one of the brands of the Republic of Azerbaijan. It is used in medicine and in various branches of the country's economy. New results have been obtained in the field of nanotechnology. These results allow us to increase the range of application of Naftalan oil in various areas of the national economy

PREPARATION OF NANO MICRO DISPERSIONS OF MODIFIED CARBAMIDE FORMALDEHYDE OLIGOMERS OF ENHANCED STABILITY

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ABSTRACT

An alternative technology for filling cellulose materials with synthetic mineral nanodispersed filler is proposed. Composite polymer compositions for the introduction into cellulose material have been developed. A multifactor experiment was performed using the regression equations. Based on the mathematical processing of the experimental data, the properties of the developed composite nanodispersed compositions were found to depend on the ratio of their components.

COMPOSITION, STRUCTURE AND PROPERTIES OF POROUS HEAT-RESISTANT COMPOSITE MATERIALS REVIEW

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ABSTRACT

In this paper, the main types of porous heat-resistant materials are considered. The analysis and comparison of concepts that characterize the behavior of materials at high temperatures are analyzed: Refractoriness, Thermal resistance, Heat resistance, Dross resistance, High-temperature strength. A comparison was made of various chemicals that have the greatest thermal stability and refractoriness. The porous heat-resistant inorganic composite materials produced by the industry. The physical-chemical and mechanical characteristics of various porous refractory materials manufactured industrially are presented. Materials with a regular and quasi-regular porous structure are considered. Such materials include so-called cellular, honeycomb or "lattice" materials, which find increasing use in modern industry. An example of such materials is a foam ceramic - a sintered ceramic material with a foam-like structure. Separately, was considered a special group of materials having pore opal structure. Synthetic opals have been intensively developed in recent years due to the fact that they are model objects for the development and investigation of new spatially periodic structures possessing nonlinear optical properties. Such structures include composites based on classical and inverted opals, in which the pores are filled with various dielectric, semiconductor or metallic substances. Optical properties of these systems are determined by the size of close-packed particles, as well as by the permittivity of the components.

COLLOIDAL SOLUTIONS IN THE PREPARATION OF INORGANIC COMPOSITES AND CERAMICS

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ABSTRACT.

In this paper, we present a review of the use of colloidal solutions in the preparation of inorganic composites and ceramics. Sol-gel direction in the technology of ceramics and inorganic composites, which is the formation of materials from solutions using sol-gel processes, has been intensively developed in recent years. One of the main types of raw materials in these processes are colloidal solutions - sols of oxides of various metals. The most important factors characterizing the perfection of the process of synthesis of sols are aggregative stability, the maximum attainable concentration, monodispersity of the sol. In the presented review, methods for obtaining metal oxide sols. The most common methods of obtaining sols are dialysis and electro dialysis, ion exchange, peptization of gels, hydrolysis and electrolysis of metal compounds. The influence of various factors on the stability of sols. The most important characteristics of sols that determine their behavior are chemical composition, particle size, their size distribution, concentration, pH value, viscosity. Based on the analysis of various literature data, we have shown the possibilities of using sols for the preparation of inorganic composites and ceramics.