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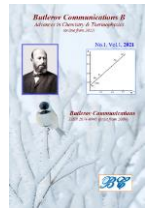

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Effect of chemical structure of sulfonate-containing aromatic polyamides on the properties of moderately concentrated solutions and the structure of the resulting materials

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Abstract

The influence of water-soluble aromatic polyamides with sulfonate groups (PA) structure on the rheological and thermodynamic characteristics of their viscous flow was studied. It was discovered, that the chemical structure and conformation of polymer macromolecules determine the specificity of their structurization in concentrated solutions. It was also shown that for aqueous solutions of sulfonate-containing aromatic polyamides with a concentration of 4 to 10 wt. % at shear stresses ($lg\tau$) up to 2.0 and temperature from 298 to 313 K, the flow curves correspond to non-Newtonian liquid. For poly-4,4'-(2,2'-sodium disulfonate)-diphenylenizophthalamide (PA-1) at low shear rates, high positive values of ΔH and ΔS were observed, which decreased with the application of an external mechanical field, indicating the dominance of disordering processes. The values of ΔH and ΔS for poly-4,4'-(2,2'-sodium disulfonate)-diphenyleneterephthalamide (PA-2) at low shear rates was less than for PA-1, but they increased with the application of an external mechanical field, indicating the presence of orientation processes in the system and the formation of a more ordered and strong structure in the material. It was discovered that an increase in the processing temperature of molding solutions and shear deformations leads to the production of film samples with higher strength characteristics. In general, the ability of films based on PA-1 to deform is significantly higher than that on PA-2. The presence of a crystalline phase in film materials based on aromatic polyamides, the proportion of which varies depending on the conditions of preliminary heat treatment of solutions, was found out by the XRD. According to SEM data, the obtained materials are monolithic films. The surface morphology of these films is determined by the method of preparing molding solutions. The obtained results can be used as a basis for the development of a technology for

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manufacturing film and membrane materials based on sulfonate-containing aromatic poly- and copoliamides.

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