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Aspects of co-processing of high-nitrogen cellulose nitrates and their compositions with polyvinyl nitrate by extrusion

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Abstract

The possibility of using a number of plasticizers-solvents (diacetone alcohol (DAA), acetone, LD-70, ethyl acetate (EA)) for co-processing of high-nitrogen cellulose nitrates (CN – 1Pl) and their compositions with polyvinyl nitrate (PVN) by extrusion is investigated. It is shown that nitrocellulose pulp modification by PVN in the amount of 10% by weight in EA and acetone medium facilitates the process of preparing powder masses. Effective viscosities of nitrocellulose pulps in acetone and EA on the shear rate at T = 25±0.5 °C in the range of γ = (35.86-432.21) c^{-1} are determined. It is shown that CN pulp in acetone and CN-LD-70 pulp in EA exhibit non-Newtonian properties to a greater extent and are more structured (by 9-11%) compared to pulps containing PVN. It was found that NC modification by PVN in the amount of 10% by weight in acetone and PVN-LD-70 (10:20) in EA reduces the effective viscosity of the systems by an average of 36% and 57%, respectively. It is shown that the investigated nitrocellulose pulps in EA and acetone have a satisfactory level of plasticity (in the range of 0 to 1) and can be processed by extrusion method used for pyroxylin powders. It is established that EA is a universal solvent that provides the possibility of processing powder masses based on high-nitrogen CN and PVN using two technologies: extrusion and aqueous dispersion.

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