

Fire-Resistant Coatings, Obtained by Layer-by-Layer Assembly, in the System of Silicic Acid Gel – Diammonium Hydrogen Phosphate – Urea

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The paper discusses the influence of flame retardant compositions obtained in the system of silicic acid sol (SiO₂ sol) – flame retardants on the fire retardant properties of thin dense cotton fabrics and low density voluminous tapestry fabrics. The need to develop the optimal composition of a fire-retardant composition for a specific fabric, or to unify it for two main groups of fabric: thin and bulky low-density ones, is substantiated. Experimental coatings were obtained by applying SiO₂ sol, which was obtained by the reaction between liquid glass and acetic acid, followed by application of flame retardant solutions (diammonium hydrogen phosphate (DAMP) and urea) by spraying or by the bath method. As a result of the optimization, using the central composite uniform rotatable plan of the second order, it was established that the main effect of the flame retardant is exerted by diammonium hydrogen phosphate (DAMP). The content or concentration of urea depends on the concentration of DAMP used: if diluted DAMP solutions (9–10 %) are used, trace amounts of urea (0–0.5 %) must be added. In the case of using a concentrated DAMP solution (18–20 %), the concentration of the urea solution should also be increased to 8–10 %. © 2023 Trans Tech Publications Ltd, Switzerland.

Ключевые слова автора

cotton-containing textile materials; fire resistance; fire-resistant coatings; layer-by-layer assembly; liquid glass; SiO₂ sols; sol-gel method

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