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Studying the crystallization processes of thallium halides and KRS-6, KRS-5 solid solutions in water and non-aqueous solvents

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Abstract

We explored the crystallization processes of monadic thallium halides and $TlCl_{0.74}Br_{0.26}$ (KRS-6) and $TlBr_{0.46}I_{0.54}$ (KRS-5) solid solutions based on them, both in water and non-aqueous solvents within the temperature range of 303 to 353 K. The crystallization induction periods (τ_{ind}), solution cooling velocities (V), supersaturation coefficients for individual monadic thallium halide ($\gamma = C_n/C_{eq}$) and their solid solution ($\gamma = K_{\alpha,Tn}/C_{\alpha,Teq}$) crystallization in water and non-aqueous solvents were defined experimentally. For thallium halides in the latter, the linear dependence of $lg(\tau_{ind})$ on supersaturation coefficients (γ) were established. We then derived the equations for induction period time (τ_{ind}) in water, formamide, formic acid, ethylene glycol, and ethanol. The scientific approach to the regime development of thallium(I) halide synthesis and purification from the liquid media was also justified.