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## Structural transformations and phase transitions in aqueous solutions of gadolinium nitrate in the course of freezing

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### Abstract

The microstructure of  $Gd(NO_3)_3$  aqueous solutions in the course of cooling at different rates is investigated using electron paramagnetic resonance. The local concentrations of  $Gd^{3+}$  ions in microregions are estimated, the concentration boundary at which the solution is completely vitrified throughout its volume is revealed, and the temperature of vitrification of liquid microregions (eutectic temperature) and the eutectic composition are determined. It is found that the adsorption of  $Gd^{3+}$  aqua ions on the capillary surface affects the crystallization of water and the process of concentration of the solute. It is demonstrated that the anomalous experimental dependence  $\delta H(C_0)$ , which is observed for vitrified water-glycerol solutions with a uniform distribution of paramagnetic centers over the sample, agrees well with the theoretical curve in the case when allowances are made not only for the dipole-dipole interactions but also for the inhomogeneous broadening of the EPR lines in the spectra with an incompletely resolved fine structure. © 2003 MAIK "Nauka/Interperiodica".

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