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## Electron paramagnetic resonance of Gd<sup>3+</sup> aqua complexes in vitrified aqueous solutions and Gd<sup>3+</sup> aqua ions adsorbed on the capillary surface

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### Abstract

Electron paramagnetic resonance (EPR) spectra of Gd<sup>3+</sup> aqua complexes are measured in dilute aqueous solutions of Gd(NO<sub>3</sub>)<sub>3</sub> ( $C < 0.2$  M) at room temperature. A partial resolution of the fine structure observed in the spectra is characteristic of solid disordered systems and results in an increase in the effective width of the EPR line with a decrease in the Gd<sup>3+</sup> concentration. This phenomenon is explained in terms of adsorption of Gd<sup>3+</sup> aqua ions on the surface of the measuring capillaries. The fine structure is revealed in the EPR spectra of Gd(NO<sub>3</sub>)<sub>3</sub> aqueous solutions, namely, the Gd(NO<sub>3</sub>)<sub>3</sub> solutions vitrified at a temperature of 77 K (with an addition of 10-15 vol % glycerol) and Gd(NO<sub>3</sub>)<sub>3</sub> solutions quasi-vitrified at 298 K (with an addition of 70-90 vol % glycerol). Analysis of the EPR spectra demonstrates that these solutions contain two types of aqua complexes with fine structure parameters  $D_1 = 180$  G and  $D_2 = 580$  G. Reasoning from a comparison with x-ray diffraction data, the fine structure parameters  $D_1$  and  $D_2$  are assigned to higher symmetric eight-coordinate and lower symmetric nine-coordinate Gd<sup>3+</sup> aqua complexes, respectively. © 2003 MAIK "Nauka/Interperiodica".

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