

The effect of changes in hydration properties of Cl^- anion in aqueous solutions according to NMR-relaxation data

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In order to study the hydration properties of chlorine anion in aqueous electrolyte solutions, the method for determination of solution microstructure parameters, based on the study of concentration dependencies of nuclear magnetic relaxation rates of solvent nuclei [1] at different temperatures, is used.

The first bend of the experimental dependence (see Fig. 1) is connected with the complete filling of all hydrate shells and disappearance of the free solvent structure.

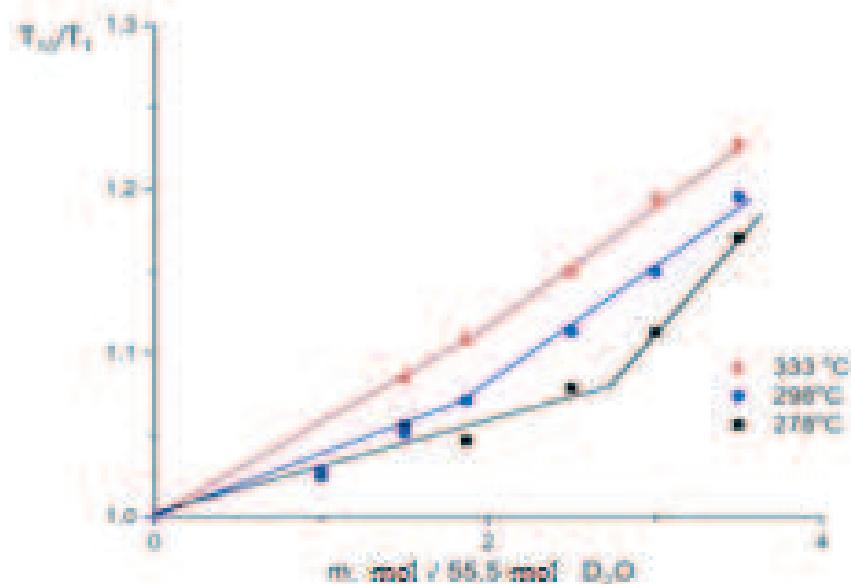


Fig. 1. Isotherms of concentration dependences of relative relaxation rates of deuterons in $\text{NaCl-D}_2\text{O}$ solutions.

It can be seen that as the temperature increases, the bend shifts to the area of lower concentrations. This is due to the fact that at temperatures below 35 °C chlorine anion coordinates 4 molecules of solvent, and at temperatures above 35 °C – 8 solvent molecules.

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References

1. A.V. Donets. The effect of changes in coordination of chlorine and bromine ions in aqueous electrolyte solutions at temperature variation according to NMR-relaxation data. SPbSU (2007).