

IONS SEPARATION UNDER EXTERNAL PERIODIC ELECTRIC FIELD ACTION ON SALTS SOLUTIONS IN POLAR DIELECTRIC LIQUIDS

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The aim of study is to demonstrate that separation of solvated ions in solution of mix of salts under the action of external periodic electric field happens because of around ions there are formed clusters consisting of molecules of solvent and the sizes of such clusters have dimensions $\sim 0.1 \mu\text{m}$. In investigations the sizes of clusters theoretically were defined and experimentally value of frequency of external electric field which action excites the effect of separation of the solvated ions was defined. Experiments were done in the Technical Physics chair of the National Research Tomsk Polytechnic University.

At theoretical determination of the dimensions of clusters Poisson's equation was solved and was considered that polar molecules of solvent are oriented under the action of electric field of an ion. The chemical composition of samples of solutions was determined by means of the X-ray excited fluorescent radiation analysis method. Theoretical estimates and results of experiments confirmed the assumption that clusters which are formed around ions in solutions have the dimensions $\sim 0.1 \mu\text{m}$.

Results of investigation testify that placing of volume distributed electric charge of ion in dielectric liquid is accompanied by formation of the supramolecular particles, which we called "clusters", linear sizes of which is significantly more than first and second radiuses of solvation (~ 1 Angstrom) and reach size $\sim 0.1 \mu\text{m}$. At such sizes inertial properties of clusters and their natural frequencies give the chance to operate their movement by means of action of external electric field on solution.

References

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