

A Technique for the Thermochemical Calculation of Crystal Dissolution Processes

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The values of the heat of dissolution of inorganic substances in various solvents are usually small, and they strongly depend on the structure and nature of both the substance and the solvent. Therefore, it is necessary to develop a technique for calculating these values. We offer a technique for the thermochemical calculation of the crystal dissolution process. The technique is tested on a number of halogenides of alkaline metal crystals. Thermochemical reactions of the process of ionic crystal dissolution in water are carried out. As initial data, the standard enthalpies of crystal formation, ions of these crystals in water, and also the standard dissolution enthalpy of the crystals in water have been used.

Enthalpy values of crystal dissolution are calculated via a thermochemical circuit developed by us. Within the bounds of the Hess law, calculations were made assuming that the thermal effect of the reaction of ion formation does not depend on intermediate stages. The value of the thermal effect of a reaction at $V = \text{const}$ and $p = \text{const}$ defines by the nature, an aggregative state and by the temperature of the initial and final substances.

Taking into account the enthalpy of ion formation of the investigated crystals in water and the enthalpy of the compounds, the enthalpies of dissolution of halogenides of alkaline metals in water at 298 K have been calculated.

The reliability of the calculated values has been checked by comparison with experimental ones. Convergence of calculated and experimental values at 298 K for dissolution of 1 mole of chlorides (bromides) of sodium (potassium) in water is satisfactory. The natural change is found out in a number of halogenides of alkaline metals crystals $MF - MI$ ($M = \text{Li, Na, K, Rb, Cs}$) and LiH / CsH ($H = \text{F, Cl, Br, I}$).