

Solvent effect on the heat of solution and partial molar volume of magnesium perchlorate

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Abstract

For magnesium perchlorate (MP), the solvent effect on the heat of solution and partial molar volumes (PMV) at 25 °C was studied. Since the complete dissociation of magnesium perchlorate is more difficult to achieve as compared with lithium perchlorate (LP), the concentration dependence of the values of the heat of solution and partial molar volume were noted. Only in highly polar solvents with large donor numbers (DN), such as water, dimethyl sulfoxide, N,N-dimethyl formamide, and formamide, the differential and integral values of the enthalpies of solution were the same in the range of concentrations studied. In all solvents studied, the values of the heat of solution of MP were highly exothermic and exceed that of LP by more than 30 kcal mol⁻¹. The values of the partial molar volume of MP were changed from 82.3 cm³ mol⁻¹ in formamide to -2.4 cm³ mol⁻¹ in acetone, and correlate linearly with that of LP (R=0.975). Taking into account the significant change in the properties of molecules in the solvate shell of cation Mg²⁺, the large increase in the reactivity of reactants, activated by such interaction with Mg²⁺ cation is expected. © 2010 John Wiley & Sons, Ltd.

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Keywords

Electrostriction, Heat of solution, Magnesium perchlorate, Partial molar volume