Spectroscopic studies of lanthanide (Ce, Eu) chlorides in ethane-1,2-diol.

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Streszczenie

This paper is a consequence of our earlier studies on the structure of solutions of anhydrous and hydrated lanthanide chlorides in different types of alcohols. Such investigations are important mainly in understanding the spectroscopic behavior of silica gels and glasses obtained by alcohol methods and codoped with Ce^{3+} and other lanthanide ions. Our work focuses on the spectroscopy of Ce(III) and Eu(III) chlorides in ethylene glycol solutions. This alcohol can play a special role, because it has two OH groups, forming relatively strong hydrogen bonding. Moreover, it can coordinate simultaneously to two metal ions. Absorption, emission and emission excitation spectra were measured at 293 and 77 K and are discussed in terms of CF and Ln(III)–solvent interactions. The role of CT state of Eu(III) in description of the composition of solvates is presented. Low temperature europium spectra were applied as spectroscopic probes of solution structure, the number of species existing in it and their symmetries. Basing on these results, the best conditions for gel and glass formation were found. Adiabatic compressibility data make it possible to discuss the role of lanthanide ions as structure-breakers in solution and evaluation of the number of solvent molecules involved in the solvation of these ions.

Słowa kluczowe

Solvation, Electrolytes, Non-aqueous solutions, Cerium chloride, Europium chloride, Ethylene glycol, Adiabatic compressibility coefficient

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