

A Conductometric Study of Complexation Reaction Between Meso-octamethylcalix [4] pyrrole with Titanium Cation in Acetonitrile–Ethanol Binary Mixtures

ABSTRACT

The equilibrium constants and thermodynamic parameters for complexation process between titanium (III) cation and meso-octamethylcalix[4]pyrrole were determined by conductivity measurements in acetonitrile–ethanol (AN–EtOH) binary mixture at different temperatures. The conductance data show that the stoichiometry of the (meso-octamethylcalix[4]pyrrole.[Ti(OH)-(H₂O)₅])₂⁺ complex in all binary mixed solvents is 1:1[I:M]. The stability of the formed complex is sensitive to the solvent composition and a non-linear behavior was observed for changes of log K_f of this complex versus the composition of the binary mixed solvents. The values of thermodynamic parameters (ΔH° and ΔS°) for formation of (meso-octamethylcalix[4]pyrrole.[Ti(OH)-(H₂O)₅])₂⁺ complex were obtained from temperature dependence of the stability constant using van't Hoff plots. The obtained results show that the formed complex is enthalpy destabilized, but entropy stabilized and a non-monotonic behavior was observed for variations of standard enthalpy and entropy changes versus the composition of the binary mixed solvents.

Keyword: meso-octamethylcalix[4]pyrrole, titanium (III) cation, Acetonitrile–ethanol binary solvents, Conductometry