

## **Conductance studies on complex formation between c-Methylcalix[4]resorcinarene and titanium (III) in acetonitrile-H<sub>2</sub>O binary solutions**

### **ABSTRACT**

Calixresorcinarenes have proved to be unique molecules for molecular recognition via hydrogen bonding, hydrophobic and ionic interactions with suitable substrates such as cations. The study of the interactions involved in the complexation of different cations with calixresorcinarenes in solvent mixtures is important for a better understanding of the mechanism of biological transport, molecular recognition, and other analytical applications. This article summarizes different aspects of the complexes of the Ti<sup>3+</sup> metal cation with c-methylcalix[4]resorcinarene (CMCR) as studied by conductometry in acetonitrile (AN)–water (H<sub>2</sub>O) binary mixtures at different temperatures. Conductance data show that the metal cation/ligand (ML) stoichiometry of the complexes in solution is 1:1 in all cases. Non-linear behaviour was observed for the variation of logK<sub>f</sub> of the complexes vs. the composition of the binary solvent mixtures. Selectivity of CMCR for the Ti<sup>3+</sup> cation is sensitive to solvent composition; in some cases and at certain compositions of the mixed solvent systems, the selectivity order is changed. Values of thermodynamic parameters (ΔG°, ΔH°, ΔS°) for formation of the CMCR–Ti<sup>3+</sup> complexes in AN–H<sub>2</sub>O binary systems were obtained from the temperature dependence of stability constants, and the results show that the thermodynamics of complexation reactions are affected by the nature and composition of the mixed solvents.

**Keyword:** Conductance data; Calixresorcinarenes; Titanium(III); c-methylcalix[4]-resorcinarene; Acetonitrile (AN)-water (H<sub>2</sub>O); Binary mixtures