Determination of the Stoichiometry, Stability Constant of Complexes Formation and Thermodynamic Parameters between 15-Crown-5, 1, 4, 8, 11-Tetrathiacyclotetradecane and 1, 7-Diaza-12-crown-4 Macrocyclic Ligands in Acetonitrile – Methanol Binary Solvent Mixtures

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The complex formation between Pb^{2+} and Ag^+ metal cations with 15-crown-5 (15C5), 1, 4, 8, 11-tetrathiacyclotetradecane (TTCTD) and 1, 7-diaza-12-crown-4 (DA12C4) macrocyclic ligands was studied in AN (acetonitrile) – MeOH (methanol) binary solvent mixtures using conductometric method. The stability constant of complexes obtained from fitting of molar conductivity data using GENPLOT computer program, also in all cases, the stoichiometry of the complexes was obtained 1: 1 [M: L]. The Pb^{2+} cation formed a more stable complex with 15C5 in AN–MeOH (mol% AN= 75 and 50) binary solvent mixtures than Ag^+ cation and the $\log K_f$ of (TTCTD. Ag^+) complex derived bigger than (TTCTD. Pb^{2+}) complex. A non-linear behavior was observed between the $\log K_f$ of the complexes versus the composition of a component of solvent in AN–MeOH mixtures. The values of standard enthalpy changes (ΔH°) for complexation reactions were obtained from the slope of the van't Hoff plots. The obtained results show that in most cases, the complexes are enthalpy destabilized but entropy stabilized and the positive values of entropy compensates of complex formation enthalpy.

Keywords: 15-crown-5, 1, 4, 8, 11-tetrathiacyclotetradecane, 1, 7-diaza-12-crown-4, Pb^{2+} and Ag^+ metal cations, Conductometry, Genplot.

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