

Poster Presentation

Spectrophotometric Determination of Some Metal Ions via Complex Formation with Carboxylated Tris(2-aminoethyl)amine Chelating Agent

Julnar Masharqah¹, Ibrahim Abu Shqair¹, Ziad Shakhsher²

¹ *Department of Chemistry, An-Najah National University, Palestine.*

² *Department of Chemistry, Al-Quds University, Abu-Dies*

Abstract

An aminopolycarboxylic acid chelating agent tris(2-aminoethyl)aminehexaacetic acid (TAHA) was prepared and characterized. The TAHA was prepared from tris(2-aminoethyl)amine and potassium chloroacetate by nucleophilic substitution reaction. FT-IR spectroscopy was used to ensure the formation and elucidate the purity of the potassium salt and the acid form of TAHA. TAHA forms stable complexes with copper(II) ions and some other metal ions at pH 10. The complexation behavior was studied by spectrophotometry at the complex maximum wavelength. Mixtures of Cu(II) and other metal ions (M^{2+} ; Ca^{2+} , Co^{2+} , Ni^{2+} , Cd^{2+}) were titrated with TAHA at pH 10. $[Cu(NH_3)_4]^{2+}$ complex is more stable than $[M(NH_3)_4]^{2+}$. Thus, at the beginning, TAHA replaces ammonia in $[M(NH_3)_4]^{2+}$ complex until completion. Then it exchanges ammonia from $[Cu(NH_3)_4]^{2+}$ to form Cu(II)-TAHA complex. As expected, TAHA does not form complexes with alkali metal ions. The stoichiometry of ligand - to - metal was found to be 1:1 for the metal ions studied. The stability constant of Cu(II)-TAHA complex was determined to be 1.86×10^5 by using the continuous variation method. The complex showed a good stability for an extended period of time. Beer's law was obeyed over the concentration range 3.0×10^{-4} M – 1.2×10^{-2} M for Cu(II) solution. The results of the quantitative determination of Cu(II) gave LOD and LOQ values of 7.285×10^{-6} M and 2.428×10^{-5} M respectively. The relative standard deviation for five replicate samples was found to be 1.088% and 4.804% for 1.2×10^{-2} M and 3.0×10^{-4} M respectively.