

Potentiometric Study of Binary Complexes of Triethylenetetraminehexaacetic Acid with Cd^{2+} , Co^{2+} , and Pb^{2+} Ions in Aqueous Solutions

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The interaction between triethylenetetraminehexaacetic acid, TTHA, and three divalent metal ions $\text{Cd}(\text{II})$, $\text{Co}(\text{II})$ and $\text{Pb}(\text{II})$ was investigated potentiometrically in two 1 : 1 and 2 : 1 metal to ligand mole ratio systems. The overall equilibrium formation constants were computed by the BEST program. The species distribution diagrams were also depicted using the SPE program. Eight protonation constants were obtained which were assigned for the protonation of nitrogen donors at first and carboxylic groups in continuation. For the 1 : 1 metal to ligand ratio, the main species in the middle pH region is MLH, the concentration of which decreases slowly on going to the basic region. The main complex at basic pH is ML, which becomes the sole species at pH above 10. In the 2 : 1 system, only the M_2L species remain intact in a broad range from pH = 4 to the basic region. Compared to EDTA, TTHA has a higher relative stability with cadmium and so, can potentially present as a suitable candidate for chelation therapy.

Key words: Potentiometry, Aminopolycarboxylic Acid, Formation Constant, Chelation Therapy