

COMPARISON OF STABILITY CONSTANTS OF MACROCYCLIC COMPLEXES
Cu(II) AND Co(II) DEPENDING ON THE CO-LIGANDS

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Abstract

Stability of metal complexes may be affected by various factors like nature of central metal ion and ligand, chelating effect, etc. Some parameters like distribution coefficients, conductance, refractive index, etc. are useful for the determination of stability constants. Various modern techniques are used to determine the stability constant of simple as well as mixed ligand compounds. The stability constant is one of the crucial physicochemical parameters, necessary for the correct interpretation of the complex and determination of the metal-ligand reaction properties.

Stability constants of some binuclear mixed ligand Co(II) and Cu(II) complexes with macrocycle *tpmc* = N,N',N'',N'''-tetrakis(2-pyridylmethyl)-1,4,8,11-tetraazacyclotetradecane and different co-ligands are compared. The stoichiometric ratio of the compounds was determined spectrophotometrically at 20 ° using Job's methods of continuous variation for Cu(II) complexes and Job's method of continuous variation and Rose-Drago method for Co(II) complexes [1-4]. The values of stability constants *K* and Gibbs free energy ΔG were calculated and compared.

The values $\log K$ are in the range of 2.76 – 4.80 obtained for Cu(II) complexes with *tpmc*, [Cu₂(X)*tpmc*](ClO₄)₃·*n*H₂O with bridging anions X⁻ = F⁻, Cl⁻, Br⁻, I⁻, NO₂⁻ [5] and [Cu₂(gly)*tpmc*](ClO₄)₄·2H₂O/ CH₃CN with glycine/alanine. For Co(II) *tpmc* mixed ligand complexes of formulas, [Co₂(L)*tpmc*](ClO₄)₂, L = benzoate anion, phthalate dianion, isophthalate dianion and terephthalate dianion values $\log K$ are in the range 5.25-5.37. It can be concluded that copper (II) complexes with halogenous and monocarboxylic ligands are less stable than cobalt(II) complexes with aromatic dicarboxylic co-ligands. Negative values for ΔG mean that the formation of Cu(II) and Co(II) complexes is energetically favourable and that the reactions proceed spontaneously.

References

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