STABILITY CONSTANTS OF SOME BIVALENT METAL ION CHELATES WITH SCHIFF BASES DERIVED FROM SALICYLALDEHYDE AND SOME α-AMINO ACIDS

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Schiff bases derived from salicylaldehyde and amino acids play an important role as the key compounds for modeling complicated pyridoxal-amino acid Schiff bases which are believed to be intermediate in biologically important animation processes (1). It is accepted that the knowledge of the stability constants of such Schiff bases and their metal complexes may eventually help to throw some light on the inactivation of essential trace metals in biological systems (2). In this study, formation and stoichiometric protonation constants of Schiff bases derived from L-glycine, L-aniline, L-phenylalanine, L-tyrosin and L-serin with salicylaldehyde and stability constants of complexes of bivalent (Cu(II), Ni(II) and Zn(II)) metal ions with these Schiff bases have been determined potentiometrically using a combined pH electrode system calibrated in concentration units of hydrogen ion at 25.0±0.1 °C with an ionic strength of 0.10 M KCl in an inert atmosphere. The data from potentiometric titrations were evaluated by BEST computer program developed by Martell and Motekaitis (3). Formations of Schiff bases have also been investigated by spectrophotometric method. Spectrophotometry of aqueous solutions of salicylaldehyde with amino acids shows that extensive imine formation occurs over wide pH range. The influence of the type of amino acids on the proton affinity of the Schiff bases was examined on the basis of inductive and mesomeric effects. It is shown that the presence of a α-methyl group in the side chain of the amino acid increases the formation and protonation of the imine, whereas β-phenyl group decreases the formation. The order of stability constants for Schiff bases was found to be Cu(II)>Ni(II)>Zn(II), in agreement with the Irving-Williams order of metal ions.

References