

Research Paper :

Ligand field parameters of some transition metal ion complexes of 1-(4-aminobenzoyl)-2-[1-(5-chloro-2-hydroxyphenyl) ethylidene] hydrazine and their anti bacterial activity

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ABSTRACT

Potentiometric studies have been carried out on transition metal complexes of Mn^{+2} , Co^{+2} , Ni^{+2} , Cu^{+2} , Zn^{+2} with hydrazones synthesized from 4-amino benzoic- acid hydrazide and 5-chloro-2-hydroxy acetophenone. The dissociation constants of ligand and formation constants of its metal complexes have been determined by Calvin-Bjerrum pH titration technique, as adopted by Irving and Rossotti at $27 \pm 0.1^\circ C$ and at an ionic strength of 0.1M in 60:40 (v/v) dioxane water medium. The order of the stability of complexes is $Cu^{+2} > Ni^{+2} > Co^{+2} > Mn^{+2} > Zn^{+2}$ for the ligand ACEH. All the metal complexes screened for their antibacterial activity. The result indicates that the growth of the tested organism was inhibited by most of the compounds.

KEY WORDS : Transition metal ion complexes, Potentiometric study

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Hydrazones are used as intermediates in synthesis [1], as functional groups in metal carbonyls [2], in organic compounds [3, 4] and in particular in hydrazone Schiff base ligands [5–8], which are among others employed in dinuclear catalysts [9]. Furthermore, hydrazones exhibit physiological activities in the treatment of several diseases such as tuberculosis. This activity is attributed to the formation of stable chelate complexes with transition metals which catalyze physiological processes [10–12]. They also act as herbicides, insecticides, nematocides, rodenticides, plant growth regulators, sterilants for houseflies, among other applications [10-13]. In analytical chemistry hydrazones find applications as multidentate ligands for transition metals in colorimetric or fluorimetric determinations [14, 15]. In continuation of our research work [16-17] on the transition metal complexes of hydrazones, we report here the results of pH metric study of the formation of metal complexes of above ligand.

EXPERIMENTAL METHODOLOGY

4-amino benzoic acid hydrazide and 5-chloro-2-hydroxy acetophenone were synthesized by reported method [18-19]. The hydroxy hydrazones were synthesized by the equimolar mixture of ethanolic solution

of hydrazide and substituted hydroxy ketone were refluxed for three hours. The mixture was poured in cold water and then filtered. The solid product thus obtained was crystallized in ethanol.

We report here the formation constant of transition metal complexes of 1-(4-aminobenzoyl)-2-[1-(5-chloro-2-hydroxyphenyl) ethylidene] [ACEH].

The pH metric titrations were carried out against 0.1M KOH solution with a Systronic digital pH meter with glass calomel electrodes to determine the pH. The meter has an accuracy of ± 0.01 pH and reproducibility of ± 0.02 pH in standard scale operation. The instrument was standardized against 0.05M potassium hydrogen phthalate solution (pH=4) in the beginning of each titration. The metal ion solutions were prepared from the corresponding acetate (BDH, AR) and were standardized by conventional methods [20]. Solutions of ligands were prepared in pure [21] dioxane. Standard carbonate free KOH (E. Merck) solution was prepared by the method of Allen and Low [22]. Potassium nitrate and nitric acid were used to maintain constant ionic strength. The buffer solution was kept in a Pyrex flask and a few drops of toluene were added as a preservative. The total volume 50ml and ($\mu = 0.1M KNO_3$) of each system were kept constant in the beginning of each titration. All other