

Research Paper :

## Complexes of transition metals with tridentate N-(2-thiazole) benzamide-2'-carboxylic acid and oxine

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### ABSTRACT

Complexes of the type  $[ML_2]$  and  $[MLL'.H_2O]$  [ where, M = Cu(II), Ni(II), Co(II), Zn(II) and Mn(II); HL = N-(2-thiazole)-2'-carboxylic acid; and L' = oxine] have been synthesized. The complexes are octahedral in nature. The synthesized ligand behaves as tridentate OON donor. The characterization of the complexes has been done on the basis of analytical, molar conductance, magnetic susceptibility, molecular weight, infrared and electronic spectral data. Antibacterial activity of these ligands and their metal complexes has been determined on gram-positive (*Staphylococcus aureus*) and gram-negative (*Escherichia coli*) bacteria at 37°C and antifungal activity has been determined on common fungi viz., *Aspergillus niger*, *Aspergillus nidulense* and *Candida albicans* at 28°C. It has been found that the biocidal activity of these ligands increases on being coordinated with suitable metal ion.

**Key words :** I.R./electronic spectra/mixed ligand complexes/ternary complexes/metal chelates

Oxine, heterocyclic acids and their derivatives have long been established as potential antimicrobial agents and drugs<sup>1,2</sup>. The information about the role of metal complexes in biological systems, their concentration and presence in different equilibrium is of immense importance. Conflicting reports exist in the literature about the N, S and O, donor ligands and their transition metal complexes which play an important role in the biocidal action of biological systems and their metal complexes have been found more biological active in comparison to either the free ligands or the involved metal ions<sup>3-8</sup>. Similar observations have been noted on the oxine<sup>9</sup> and its transition metal complexes<sup>10</sup>.

In view of the biological importance of the thiazole moiety, several workers have studied the coordination behavior of simple and substituted thiazoles with transition<sup>11-14</sup> and non transition metal ions<sup>15</sup>. In continuation of our earlier work<sup>16-26</sup>, it was therefore, thought worthwhile to undertake studies on binary and ternary metal complexes involving N-(2-thiazole) benzamide-2'-carboxylic acid and oxine as ligand with a view to explore their biocidal activity.

### MATERIALS AND METHODS

All the chemicals used were of analytical reagent grade.

### Synthesis of N-(2-thiazole ) benzamide-2'-carboxylic acid and metal chelates :

N-(2-thiazole) benzamide-2'-carboxylic acid (TBCA)

was synthesized by constant stirring followed by refluxing (5 hours) equimolar amount of phthalic anhydride and 2-amino thiazole. The compound thus obtained was filtered, washed with benzene and recrystallised (melting point 184°C). The metal complexes have been synthesized as reported earlier<sup>17</sup>.

### Physical measurements :

The infrared spectra of the ligands and their corresponding metal complexes were recorded on Perkin-Elmer-521 spectrophotometer. The electronic spectra of metal complexes were recorded on Cary-14 spectrophotometer using DMSO as solvent. Molar conductance of the complexes was measured in their DMSO solution using Toshniwal conductivity meter. Elemental analyses were carried out by microanalytical technique and metal contents were estimated by standard methods<sup>27</sup>. The molecular weight of the compounds was determined by cryoscopic method in dimethylsulfoxide (DMSO). Magnetic measurements were carried out at room temperature by Gouy's method. The values were corrected for diamagnetism by applying Pascal's constant. Thermal gravimetric analysis was carried out at Regional Sophisticated Instrumentation Center, Nagpur in a constant flow of nitrogen keeping the heating rate 15°C min<sup>-1</sup> for each run.

### RESULTS AND DISCUSSION

The results obtained from the present investigation are below :