



RESEARCH ARTICLE

Synthesis and Anti-microbial Activity Study on Complexes of *o*-Nitro Benzaldehyde Oxaloyl Hydrazone with Cu(II), Zn(II) and Co(II) Salts

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ABSTRACT

Complexes of *o*-Nitro benzaldehyde oxaloyl hydrazone (O-NBOH) with Cu(II), Zn(II) and Co(II) chloride have been synthesized. They have been characterized by elemental analysis, IR and PMR spectral studies and screened for antimicrobial activity. The result show that complexes are non electrolyte two and four coordinated, the ligands acts as monodentate and show good to moderate antimicrobial activity.

**Key words:** Antimicrobial activity, Cu(II), Zn(II) and Co(II) complexes

INTRODUCTION

Compounds containing an azomethine group (-CH=N) are known as Schiff base. Schiff bases are generally bi, tridentate and chelate ligands, capable of forming very stable complexes with transition metals. Schiff bases and their complexes show analytical (Renuka *et al.*, 2012), biological and pharmaceutical activities such as antitumor (Terzioolu 2003), antitubercular (Buttger 1961), antiinflammation (Todeschini, *at al.* 1998), pharmacological agents (Kitaev 1970). Substituted hydrazones are used for the treatment of Schizophrenia (Schiff 1964), leprosy (Buckingham, *et al.* 1987), plant growth regulators (Syamal and Maurya 1987), insecticides (Hafez, *et al.* 1960), rodenticides (Haksar, *et al.*, 1974; Fay and Piper 1962; Satpathy and Sahoo 1970), antifungal (Hafez 1986), vasodilators (Rao and Ganorkar 1983), antibacterial (Silva, *et al.* 2005), antiviral, antimalarial and analgesic, A detailed survey of literature reveals that biological activity of the ligand can be enhanced on chelation with metal ions.

In view of the importance of Schiff bases both as chelation and biological agents, it has been proposed to prepare ligand (O-NBOH) and its various complexes with metal ions like Co(II), Zn(II) and Cu(II).

PREPARATION OF LIGAND

*o*-Nitro benzaldehyde oxaloyl hydrazone (C<sub>16</sub>H<sub>12</sub>O<sub>6</sub>N<sub>6</sub>(O-NBOH) from (O-NBOH) oxalic acid hydrazide and acetic acid and *o*-nitro benzaldehyde was prepared by a Ruorn method. The percentage of elements present are calculated to be C = 50.0C%, N = 31.25, N = 20.18. Experimentally determined values are found to be C = 49.80, H = 31.20, N = 20.16.

PREPARATION OF THE COMPLEX

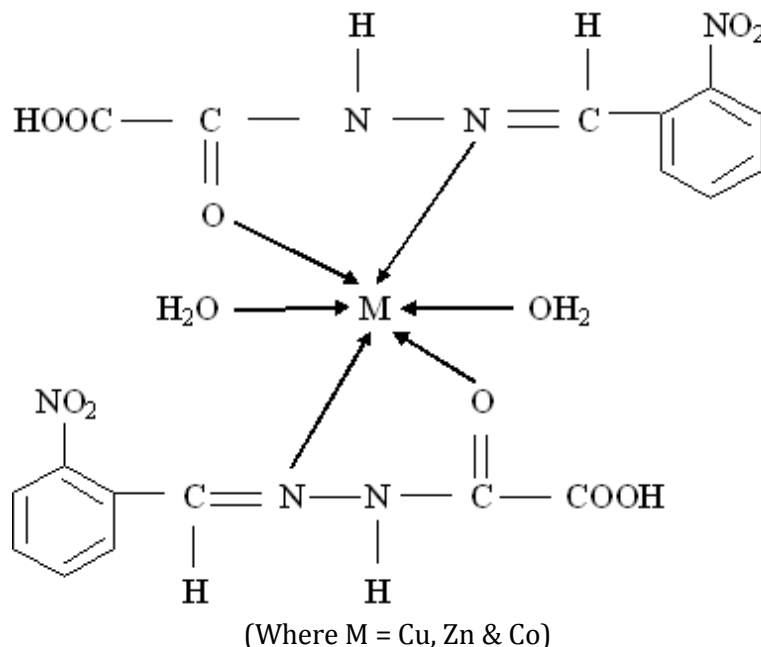
Each metal salts (1 mol) was refluxed with the ligand *o*-NBOH (2 mol) dissolved in methanol and filtered for 1-2 hrs. The complex obtained was washed with ethanol filtered and dried under vacuum.

1. [Cu(C<sub>16</sub>H<sub>12</sub>O<sub>6</sub>N<sub>6</sub>)(H<sub>2</sub>O)<sub>2</sub>](NO<sub>3</sub>)<sub>2</sub>.
2. [Zn(C<sub>16</sub>H<sub>12</sub>O<sub>6</sub>N<sub>6</sub>)(H<sub>2</sub>O)<sub>2</sub>](NO<sub>3</sub>)<sub>2</sub>.
3. [Co(C<sub>16</sub>H<sub>12</sub>O<sub>6</sub>N<sub>6</sub>)(H<sub>2</sub>O)<sub>2</sub>](NO<sub>3</sub>)<sub>2</sub>.

Conductivity data were obtained using freshly prepared dimethyl formamide solution at 25°C with digital conductivity meter. The IR spectrum in the 4000 - 400 cm<sup>-1</sup> range were recorded with KBr pellets using Nicolet IR spectrometer. PMR spectrum was recorded on Burker 400 spectrometer.

All the complex synthesized are nearly insoluble in most organic solvent. The conductivity measurements data in DMF solution show that only Cu(II) complex are electrolytic, all the other complexes are non-electrolytes.

**Fig.1:** Structure of the metal complexes



**Table 1:** IR Spectral data of Complex

S.N.	Complex (Colour)	Elemental cal Analysis (Found)			IR Spectral data (cm <sup>-1</sup> )				
		C	H	N	N - H	C = O	N - N	C = N	O - H
1.	[Cu(O-NBOH).2H <sub>2</sub> O] (Blue)	31.60 (31.55)	18.43 (18.40)	2.63 (2.60)	3150	1670	1065	1580	860
2.	[Zn(O-NBOH).2H <sub>2</sub> O] (White)	31.85 (31.82)	18.58 (18.53)	2.65 (2.61)	3150	1670	1080	1585	850
3.	[Co(O-NBOH).2H <sub>2</sub> O] (Brown)	31.84 (31.80)	18.57 (18.52)	2.65 (2.60)	3160	1675	1080	1585	855

### PMR SPECTRUM

The changes in the proton NMR spectrum of the complexes compared to that of ligand also indicate bonding between metal and pyridine like nitrogen. It is observed that the signals of NH, proton on C and C, and NH<sub>2</sub> show down field shifting in the complexes (0.08-0.25). This indicated the deshielding of the protons due to complexation

### IR SPECTRUM

The bands at 1630 cm<sup>-1</sup> assigned to C = N str. in the ligand show down ward shift of 30 - 50 cm<sup>-1</sup> in the complexes. This suggests bonding through pyridine like Nitrogen benzimidazole.

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