

COMPLEXES OF COBALT (II), NICKLE (II), AND COPPER (II) WITH FURFURYLIDENE- NICOTINAMIDE SCHIFF BASE

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The schiff base metal chelates are widely applicable because of their industrial and biological importance and hence have well been studied in past¹⁻⁴. Survey of literature reveals some studies on the antimicrobial and pharmacological activities of furfuraldehyde and continamide derived compounds⁴⁻⁸. We report herein the synthesis, characterisation and antimicrobial activities of some bipoisitive 3d-metal ion chelates of furfurylidene nicotinamide Schiff base.

RESULTS AND DISCUSSION

The analytical data (Table 1) of the complexes show that the complexes have metal-ligand stoichiometry 1:2. The 1620 cm⁻¹ ligand irband shifted to lower side in the complexes (1 585 ± 20 cm⁻¹) suggesting participation of C=N moiety (azomethine group) in complexation⁶⁻⁸. The furan C-O-C moiety bands in the free ligand were observed at 1 080-1 220 and shifts to lower frequency side with varying in

tensities suggest the involvement of furan oxen in coordination foa all the cases⁷⁻¹⁰. The C=O band (1 680 cm⁻¹) due to nicotinamide in the ligand remained unaffected in the complexes thus ruling out its participation in coordination. The presence of water molecules within coordination sphere is supported by the appeearance of bands at 3 500-3 400br, 1 650-1 600 and 825-870 cm⁻¹ in the spectra of the complexes which are attributable to stretching, bending and rocking mode respectively¹¹. The new band at 490-525 and 410-420 cm⁻¹ in the spectra of the metal complexes have been assigned to V_{M-N} and V_{M-O} mode respectively¹¹. Ir spectral evidence rules out the attachment of SO₄²⁻ in coordination¹¹.

The observed magnetic moment values for the Co^{II}, Ni^{II}, and Cu^{II} complexes 5.02, 2.97 and 1.89 B.M. respectively, indicate high-spin octahedral geometry^{11,13}.

TABLE 1- ANALYTICAL AND PHYSICAL DATA OF COMPLEXES

Sl no.	Compd.	Analysis % : Found (Calcd.)				Mol cond. $\text{cm}^{-2} \text{mol}^{-1}$	μ_{eff} B.M.	$V_{\text{max}} (\text{cm}^{-1})$ Azomethine furan ring	
		C	H	N	M			C=N	C-O-C
1	Ligand					-	-	1 620	1 200
2	$\text{Ni}[(\text{C}_{11}\text{H}_8\text{N}_2\text{O}_2)_2(\text{H}_2\text{O})_2]\text{SO}_4 \cdot \text{H}_2\text{O}$	43.3	3.6	9.10	9.6	200	2.97	1 590	1 170
		(43.9)	(4.0)	(9.7)	(9.9)				
3	$\text{Co}[(\text{C}_{11}\text{H}_8\text{N}_2\text{O}_2)_2(\text{H}_2\text{O})_2]\text{SO}_4 \cdot 2\text{H}_2\text{O}$	42.1	3.8	8.9	9.2	195	5.02	1 585	1 180
		(42.9)	(4.5)	(9.2)	(9.7)				
4	$\text{Cu}[(\text{C}_{11}\text{H}_8\text{N}_2\text{O}_2)_2(\text{H}_2\text{O})_2]\text{SO}_4 \cdot \text{H}_2\text{O}$	42.9	3.5	9.1	10.2	180	1.89	1 580	1 160
		(43.0)	(3.9)	(9.5)	(10.6)				

EXPERIMENTAL

Melting points were determined on a melting point Toshniwal apparatus. IR spectra (KBr) were obtained on an Acculab-10 spectrophotometer. Magnetic susceptibility in solid state was measured at room temperature (32°) by Gouy technique. The conductance was determined on a CM 82T conductivity bridge. Purity of the compounds was monitored by TLC on silica gel.

The ligand was prepared by stirring to the methanolic solution of furfuraldehyde (1.656 ml) and nicotinamide (2.44 g) in 1 : 1 ratio and refluxed on a water-bath for ~2 h to yield a pink coloured solid which was washed and crystallised from methanol, m.p. 160° .

Metal chelates were synthesised by adding methanolic solution of the appropriate metal salt to a methanolic solution of the Schiff base (0.02 mol) in 1 : 2 ratio and refluxing the mixture on a water-bath

for ~6 h. A coloured solid appeared on cooling the solution. It was washed with methanol, dried under reduced pressure over anhydrous CaCl_2 and finally in an oven at 80° to yield the metal complexes. The complexes were found air-stable, non-hygroscopic and soluble in DMF and acetone.

Antimicrobial activity : The compounds were screened for antifungal activity against *Aspergillus niger*, *Alternaria solani*, *Collectotricum capsici* and *Alternaria carneus* by agar growth technique¹⁵ at 25 and $50 \mu\text{g ml}^{-1}$ concentrations. Griseofulvin was used as control. The complexes of Ni and Cu were found to be active against *A. niger* and *A. solani*.

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