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NOTE

Synthesis of Schiff Base from 2,2'-Diaminodibenzyl with 2-Hydroxy Naphthaldehyde and its Complexes with Mn(II),VO(II) and UO_2(II)

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The Schiff base has been prepared by the condensation of 2,2'-diaminodibenzyl with 2-hydroxy naphthaldehyde. The Schiff bases characterized by elemental analysis and spectral methods. The metal complexes of Mn(II), VO(II) and UO_2(II) have been prepared by the reaction of Schiff base and characterization supported by spectral studies. The analytical and spectral data revealed the octahedral structure for Mn(II) and UO_2(II) complexes and square pyramidal for VO(II) complex.

Key Words: Metal complexes, Schiff base, 2,2'-Diaminodibenzyl.

The Schiff bases and their metal complexes are widely applicable because of analytical[1], industrial[2] and biological importance[3-5]. Herein, the synthesis and spectral studies of Mn(II), VO(II) and UO_2(II) complexes using Schiff base derived by the condensation of 2-2'-diaminodibenzyl with 2-hydroxy naphthaldehyde are described.

All the chemicals used were of a laboratory grade. 2,2'-Diaminodibenzyl was obtained from Fluka Chemicals while 2-hydroxy naphthaldehyde, manganese(II) acetate, vanadyl sulphate and uranyl nitrate were purchased from Aldrich.

Synthesis of Schiff bases: The solution of 2-hydroxy naphthaldehyde (17.22 g 0.1 mol) in 50 mL methanol was added dropwise over 0.5 h to a stirred solution of 2,2'-diaminodibenzyl (10.61 g 0.005 mol) dissolved in 100 mL warm methanol. The rection mass was refluxed on water bath for 3-4 h. The yellow product was filtered hot and washed with sufficient methanol (Yield 87 %).

Synthesis of metal complexes: The Schiff base (0.01 mol) suspended in 75 mL ethanol was added to NaOH (0.02 mol) solution in 2 mL water. The suspension was heated on water bath a reddish-brown clear solution was formed. The reaction mixture was cooled at 10 °C and the corresponding metal salts (0.01 mol) in 25 mL methanol was added dropwise. The resulting

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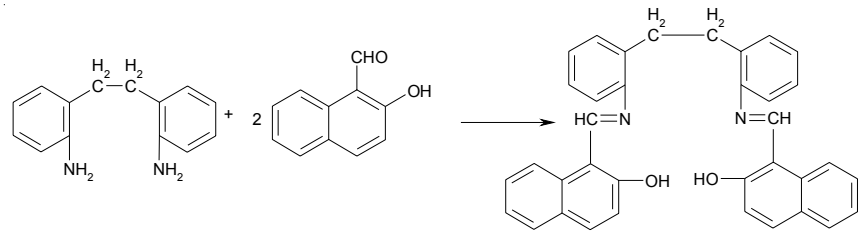
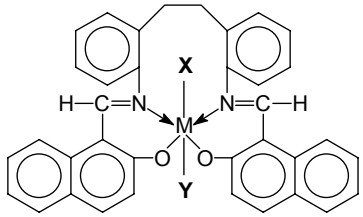
mixture was refluxed under stirring for 4 h on water bath. The separated product was filtered and washed with ethanol. All the complexes were dried in vacuum desiccator.



2,2'-Diamino dibenzyl 2-Hydroxy naphthaldehyde



Structure for Mn(II), VO(II) and UO_2(II) complexes

Mn(II): X = H_2O and Y = H_2O, VO(II): X = O and Y = Nil, UO_2(II): X = O and Y = O

All the complexes are stable, crystalline, intense coloured and non-hygroscopic. They are insoluble in common organic solvent. On the basis of analytical data (Table-1) the metal chelates were found to have 1:1 (metal: ligand) stoichiometry. The molecular weight of ligands are in good agreement with the molecular ion peak in mass spectra. The low molar conductance value of the complexes suggesting that the compounds are non electrolytes[6]. The decomposition temperature of the complexes (Table-1) and thermal analysis shows the thermal stability of compounds.

TABLE-1
PHYSICAL AND ANALYTICAL DATA OF SCHIFF BASE AND METAL COMPLEXES

Compound (Colour)	m.w. (m.p. ºC)	Elemental analysis %: Found (Calcd.)				μ_{eff} (BM)
		C	H	N	M	
[H_2-HNapODADB] (Yellow)	520.63 (182)	83.10 (83.05)	5.41 (5.42)	5.36 (5.38)	–	–
[Mn(HNapODADB)(H_2O)$_2$] (Brown)	609.84 (253)	70.87 (70.93)	4.86 (4.96)	4.49 (4.59	9.10 (9.01)	5.80
[VO(HNapODADB)] (Green)	585.55 (247)	73.80 (73.84)	4.40 (4.47)	4.78 (4.82)	8.61 (8.69)	1.81
[UO_2(HNapODADB)] (Dark orange)	788.64 (291)	54.76 (54.82)	3.40 (3.32)	3.56 (3.55)	30.15 (30.18)	Diamag.

IR spectra of Schiff base show the absorption of -HC=N- azomethine group at around 1617 cm^{-1}. The presence of a strong band at 1290 cm^{-1} shows the typical of phenolic stretching band of ν(C-O). The Schiff base is further supported by ^1H NMR spectra. In the spectra of H_2-HNapODADB the azomethine proton (-HC=N-) shows at 8.13. The sharp low-field signals for the two phenolic protons were found respectively at 13.20 ppm. The multiplet signal corresponding to aromatic protons occurs in the range 6.91-7.84 ppm while resonance signals due to methylene (-CH_2-) protons occur in the range 3.16 ppm.

The magnetic moment value of the Mn(II), VO(II) complexes are 5.80 and 1.81 BM, respectively. The UO_2(II) complexes are diamagnetic in nature.

The electronic spectra of Mn(II) complex exhibits three bands 19,672, 26,413 and 29,180 cm^{-1}, The VO(II) complex exhibit three bands in the region 13,513, 16,943 and 21,464 cm^{-1}.

The proposed structure of complexes was further confirmed by IR spectral data. A strong and sharp band of ν(C=N) shifted to lower frequency at 1616 cm^{-1}. The appearance of a new, low intensity band in the region 643 to 526 cm^{-1}, 521 to 467 cm^{-1} in the spectra of complexes due to ν(M-N) and ν(M-O) vibrations[7], respectively. The spectra of VO(II) complex show new band at 973 cm^{-1} which are assigned[8] to ν(V=O) vibrations. In the UO_2(II) complex band at 926 cm^{-1} are assigned to ν(O=U=O) modes[9]. The spectral data shows octahedral structure to Mn(II) and UO_2(II) complexes and square pyramidal structure to VO(II) complex.

The Schiff base and their metal complexes were screened for antibacterial activities by ditch plate method[10]. The activity of the compounds was tested against *Escherichia coli, Salmonella typhi, Bacillus subtilis* and *Staphylococcus aurus*. The Schiff base and complexes were found inactive at both concentrations 3 mg. 5 mg. against different types of bacteria used.

REFERENCES

1. N.J. Murphy, N.J. Rose and W.H. Goodwin, *Inorg. Chim. Acta*, **67**, 159 (1982).
2. S.F. Tan and K.P. Ang, *Transition Met. Chem.*, **9**, 390 (1984); **13**, 64 (1988).
3. R. Qureshi and S.A. Iqbal, *Asian J. Chem.*, **2**, 321 (1990).
4. A. Kumar, G. Singh and R.N Handa, *Indian J. Chem.*, **38A**, 617 (1999).
5. J. Mohan and S. Kataria, *Indian J. Heterocycl. Chem.*, **6**, 317 (1997).
6. W.J. Geary, *Coord. Chem. Rew.*, **7**, 81 (1971).
7. J.R. Ferraro, Low Frequency Vibration of Inorganic and Coordination Compounds, Plenum Press, New York (1971).
8. K. Nakamoto, Infrared Spectra of Inorganic and Coordination Compounds, Wiley Interscience, New York (1970).
9. R.C. Maurya and P. Sharma, *Indian J. Chem.*, **38A**, 509 (1999).
10. C.H. Collins and P.M. Cyne, Microbiological Methods, Butter-Worth, London, edn. 4 (1976).

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