Asian Journal of Chemistry Vol. 20, No. 4 (2008), 3301-3303

NOTE

Synthesis and Characterization of Mn(II),VO(II) and UO_2(II) Complexes with Schiff Base Derived from 2-Hydroxy Naphthaldehyde and 4,4'-Diaminodibenzyl

ZOEB A. FILMWALA*, SANJAY M. NANDAVADEKAR and RAJU M. PATIL†
Department of Chemistry, Nadkarny Sacasa Research Laboratory
St. Xavier's College, Mumbai-400 001, India
E-mail: dr_zoeb@yahoo.com

In the present studies, the complexes of Mn(II), VO(II) and UO_2(II) prepared from Schiff base have been reported. The Schiff base derived from 2-hydroxy naphthaldehyde and 4,4'-diaminodibenzyl. The Schiff base and metal complexes characterized by elemental analysis, molar conductance, ^{1}H NMR, IR, electronic spectra, magnetic susceptibility studies. The spectral data suggests octahedral structure for Mn(II) and UO_2(II) complexes and square pyramidal for VO(II) complex.

Key Words: Schiff base, 4,4'-Diaminodibenzyl, 2-Hydroxy naphthaldehyde.

The Schiff base and their metal complexes play an important role in the developing of coordination chemistry to catalysis and enzymatic reactions[1,2]. The Schiff base and their transistion metal complexes have also been used in antifungal, hypotensive, hypothermic reagent[3,4], antibacterial, antitubereculosis, anticancer[5] and antiinflammetry[6] reagents. In this paper the synthesis and characterization of Mn(II), VO(II) and UO_2(II) metal complexes of Schiff base derived from 2-hydroxy naphthaldehyde and 4,4'-diaminodibenzyl are reported.

All the chemicals used were of a AR grade, 2-hydroxy naphthaldehyde, manganeous acetate, vanadyl sulphate and uranyl nitrate were purchased from Aldrich. The 4,4'-diaminodibenzyl was obtained from Fluka Chemicals.

Preparation of schiff base: 2-Hydroxy naphthaldehyde (17.22 g 0.10 mol) was dissolved in 100 mL methanol in round bottom flask and warm at 50 ºC under stirring. The 4,4'-diaminodibenzyl (10.62 g 0.05 mol) added with 100 mL warm methanol in above warmed solution in the period of 0.5 h. The mixture was heated to 65 ºC for 3 h. The yellow colour product was filtered at room temperature. The product was washed with sufficient methanol and dried 70-80 ºC yield about 23 g (88.40 %).

---

†Department of Chemistry, Institute of Science, 15 Madam Cama Road, Mumbai-400 032, India, E-mail: sanjaynandavadekar2000@yahoo.com

Preparation of the complexes: The Schiff base (0.01 mol) suspended in 100 mL methanol. To this solution, NaOH (0.02 mol) solution in water was added. The suspension was heated on water bath a reddish-brown clear solution was formed. The reaction mixture was cooled at 5 °C and the corresponding metal salts (0.02 mol) in 25 mL methanol was added drop wise in 0.5 h. The reaction mixture was refluxed under stirring for 4 h on water bath. The separated product was filtered and washed with methanol. All the complexes were dried in open air and kept in vacuum desiccator (Yields 90-95 %).

The physical and analytical data of Schiff base and the metal complexes is given in Table-1. IR spectra of Schiff base show the absorption of -HC=N- azomethine group at 1625.01 cm^{-1}. ^{1}H NMR studies, the spectra of H_2-HNapPDADB azomethine proton (-HC=N-) exhibit at 9.33 ppm. The two phenolic protons were found at 13.18 ppm. The multiplet signal corresponding to aromatic protons occurs in the range 7.00-7.80 ppm, methylene (-CH_2-) protons occur at 3.02 ppm.

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

Compound (Colour)	m.w. (m.p. °C)	Elemental analysis %: Found (Calcd.)				Molar cond.	μ_{eff} (BM)
		C	H	N	M		
[H_2-HNapPDADB]	520.63	82.18	5.50	5.41	–	–	–
(Yellow)	(264)	(83.05)	(5.42)	(5.38)			
$[Mn(HNapPDADB)(H_2O)_2]_2$	1219.69	70.88	4.89	4.50	9.10	0.32	5.85
(Brown)	(287)	(70.93)	(4.96)	(4.59)	(9.01)		
$[VO(HNapPDADB)]_2$	1171.10	73.75	4.50	4.76	8.72	0.34	1.81
(Green)	(280)	(73.84)	(4.47)	(4.82)	(8.69)		
$[UO_2(HNapPDADB)]_2$	1577.28	54.70	3.20	3.55	30.21	0.35	Diamag.
(Dark orange)	(>300)	(54.82)	(3.32)	(3.55)	(30.18)		

All the complexes are stable, crystalline, coloured. Metal content in the complexes were determined by standard literature methods[7]. On the basis of analytical data (Table-1) the metal complexes were found to have 1:1 (metal:ligand) stoichiometry. The complexes are non-electrolytes.

The IR spectral data of metal complexes shows a strong and sharp band due to ν(C=N) shifted to lower frequency as comparing to Shiff base. The appearance of a new low intensity band at 506, 470 and 482 cm^{-1} in complexes are attributable to ν(M-O) vibrations[8] and at 638, 615 and 536 cm^{-1} due to ν(M-N) vibrations[8]. The band of ν(V=O) vibration[9] shows at 980 cm^{-1} and ν(O=U=O) shows at 921 cm^{-1}. The magnetic moment value of the Mn(II) complex is 5.85 BM. The magnetic moment obtained for the VO(II) complex is 1.81 BM. The UO_2(II) complex is diamagnetic in nature. The electronic spectra of Mn(II) complex exhibit three bands at 18,504, 25,622, 28,693 cm^{-1} correspond to transition $^6A_{1g} \rightarrow {}^4T_{1g}(G)$ (V_1), $^6A_{1g} \rightarrow {}^4T_{1g}(G)$ (V_2) and $^6A_{1g} \rightarrow {}^4E_g(G)$ (V_3). The electronic spectra of VO(II) complex exhibit three bands at 21,748, 16,722, 13,490 cm^{-1}. The Mn(II) and UO_2(II) complexes have octahedral structure[10], VO(II) complex shows squar pyramidal structure[11]. Proposed Structures for Mn(II), VO(II) and UO_2(II) complexes shown in Fig. 1.

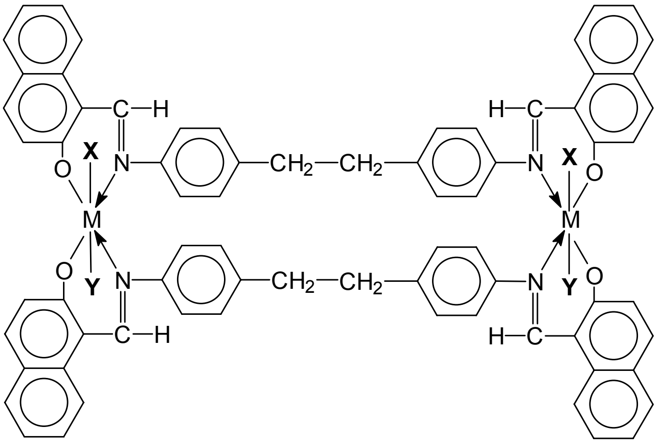

Fig. 1. Proposed structures for Mn(II), VO(II) and UO_2(II) complexes; Mn(II): X = H_2O and Y = H_2O, VO(II): X = O and Y = Nil, UO_2(II): X = O and Y = O

REFERENCES

1. G. Wilkinson, R.D. Gillardand and J.A. Mccleverty, Comprehensive Coordination Chemistry, Pergamon Book Ltd, New York, Vol. 6, edn. 2 (1987).
2. M. Nath and R. Yadhav, *Bull. Chem. Soc. (Japan)*, **70**, 1331 (1997).
3. K. Srinivasan, P. Michand and J.K. Kochi, *J. Am. Chem. Soc.*, **108**, 2309 (1986).
4. W.U. Zishen, G. Ziqui and Y. Zhenhuan, *Synth. React. Inorg. Met. Org. Chem.*, 20335 (1990).
5. C. Postmus and J.R. Ferrqro, *Inorg. Chem.*, **8**, 1851 (1969).
6. K. Srinivasan, S. Perrier and Kochi, *J. Mol. Catal.*, **36**, 297 (1986).
7. A.I. Vogel, A Textbook of Quantitative Inorganic Analysis, Longman, ELBS, London, edn. 3 (1962).
8. Z.A. Filmwala, S.M. Nandavadekar and R.M. Patil, *Asian J. Chem.*, **19**, 4697 (2007).
9. R.C. Maurya and P. Sharma, *Indian J. Chem.*, **38A**, 509 (1999).
10. P.S. Mane, S.S. Gujarat, B.R. Arbad and T.K. Chondhekar, *Indian J. Chem.*, **40A**, 648 (2001).
11. D.U. Warad, C.D. Satish, V.H. Kulkarni and C.S. Bajgur, *Indian J. Chem.*, **39A**, 775 (2001).

(*Received*: 20 August 2007; *Accepted*: 21 January 2008) AJC-6250