

Synthesis and characterization of Schiff base and its complexes with Cu²⁺ and Co²⁺

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Abstract-

The new base was prepared from O-Vaniline and Ethelyenediamine with proportion 2:1 and by green method using water as solvent ,From this Schiff base the metal complexes of Cu^{2+} and Co^{2+} were synthesized and characterized based on UV-Visible spectra,NMR spectra and IR spectra.The complexes shows with Octahedral geometry.

Key wards- Schiff base, O-vaniline, Ethelyenediamine

Introduction

The Schiff bases are easily prepared from condensation of aromatic aldehydes and primary amines. Their synthetic utility been widely studied because of their antibacterial, anti tumour and anti fungal(1-4) activities. They are stable at room temperature and pressure. Schiff bases are co-ordinated to essential and non-essential elements which tunes their biological and physiological properties make them to study further.

Schiff bases of O-vaniline are versatile ligands with number of applications in nearly all fields, antibacterial (5,6), as catalysts, (7-9), DNA interactions (10). They are synthesized from 2-Hydroxy-3-methoxybenzaldehyde with amines .O-vaniline schiff bases have very high stability with most of the metals including d-block and f-block elements. The -HC=N- is the active functional group present in schiff base and it is responsible for fungicides and insecticide (11).

Experimental work

Synthesis of Schiff base from o-vaniline and Ethylenediamine-

O-vanillin (10 mmol, 1.52 g) Ethylenediamine (10 mmol, 0.667 mL) in proportion 2:1, firstly o-vaniline dissolve in 30ml of water ,stir for 1 min and after Ethylenediamine (10 mmol, 0.667 mL)added to it slowly with constant stirring till yellow precipitate formed,Reaction (Scheme-1) was monitored by TLC and it completed in 30 Min, after completion of reaction yellow solid formed wash with water and 5ml of ethanol and recrystallized from methanol.Schiff base is insoluble in common solvents but soluble in Acetonitrile, DMSO and DMF.



Scheme-1

Ligand	Formulae Weight	M.P.	Yield %	Colour
OV+En	328	262	80	Yellow

Preparation of the Schiff base metal (II) complexes-

Schiff base dissolved in 10 ml hot ethanol and add it ethenolic solution of metal solution.Common method used for preparation of Schiff base complexes ,namely with Cu^{2+} and Co^{2+} .Reaction mixture with 1:1 Schiff base and metal salt was re fluxed in water bath for about 1Hr,product obtained filtered ,dried (12)

Schiff base + Metal

Schiff base metal complex

Metal- Cu^{2+} and Co^{2+}

 \rightarrow

The electronic spectra of metal complex with Co^{2+} is shown in fig.2.

The uv absorption spectra of Co^{2+} complex shows bands at 311 and 428 nm due to $n \rightarrow \pi^*$ or $\pi \rightarrow \pi^*$ and d-d transion for octahedral complex.

Compound v(OH)phenolic v(C-O)v(C-N)v(C=N) v(O-CH3) v(M-N)v(M-O)OV+En+Cu² 3050b 1239s 1469s 1541w 3051w 737s 569m OV+En+Co² 1442s 3130w 3314b 1245s 1569m 535m 586m

Rezearch Through Innovation

IR Data of Metal Complexes-

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H¹ NMR Spectra Of Schiff base



1 H NMR (500 MHz, 25 °C):

 δ = 3.92 (s, 6 H, of OCH3 group), 3.75 (s, 4 H, -of -CH2CH2-group), 6.9 (m, 6 H, CH aromatic), 8.56 (s, 2 H, CH = N) ppm.13.54 (s,Phenolic -OH group)

UV/Vis spectra -

From UV-Visible spectra the d-d transition band appeared at 395 nm. The band at 586nm appeared due to transition $1A_{1g}$ to $1T_{1g}$ with the octahedral Cobalt(II) ion.Broad band at 320nm indicates n to π^* transition due to nonbonding electrons present on nitrogrn of azomethine group of Schiff base

Electronic Spectra of Schiff base metal complex- Fig-1

Abscis.	ABS		
586.8	1.044		
368.0			
350.0			
320.0			
			1.1



The electronic spectra of metal complex with Co^{2+} is shown in fig.2.



Fig 2

The electronic spectra of metal complex with Co^{2+} is shown in fig.2.

The uv absorption spectra of Co^{2+} complex shows bands at 311 and 428 nm due to $n \rightarrow \pi^*$ or $\pi \rightarrow \pi^*$ and d-d transition for octahedral complex.

Conclusion-

The Schiff base synthesized by green method by using water as a solvent and characterized by NMR ,IR and UV visible spectroscopy.Schiff base is stable at room temperature and pressure and found to be tetradentate coordination site,Schiff base complexes with Cu and Co also stable and coloured solids characterized by NMR ,IR and UV visible spectroscopy.

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