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Synthesis, Spectroscopic Studies and Pharmacological Activity of Schiff Base Ligand

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ABSTRACT

The synthesized ligand is prepared by the condensation of o-phenylene diamine, salicylaldehyde and acetyl acetone. The metal organic complex is characterized by using different spectroscopic techniques such as IR, UV-Vis and LC-MS. The antimicrobial screening is done with help of Agar disc diffusion method.

KEY WORDS: O-phenylenediamine, Salicylaldehyde, Acetyl acetone.

1. INTRODUCTION

Schiff base ligand and their coordination compounds have gained much importance due to of their several applications as models in biological, analytical, antimicrobial system, biochemical and different biological activities. Studies on cytotoxity of Schiff bases are now attracted biochemists because of their several applications (Rai, 2008). Schiff bases with different chelating metals are prepared with O-phenylenediamine and its variety of applications including microbial, clinical and analytical (Raman & Nagajothi, 2001) were reported. The synthesis, spectroscopic characterization and antimicrobial studies of new type tetradentate Schiff base ligands derived from ortho phenylene diamine, salicylaldehyde and acetyl acetone The ligand has both oxygen and nitrogen donor sites. It coordinates with the metal ion in a tetradentate manner.

2. MATERIAL AND METHODS

IR spectrum is obtained with a Bruker-alpha-T FT-IR spectrophotometer. UV-Visible spectrum is recorded on systronics 2700R UV spectrophotometer. LC-MS Spectrum is recorded on Agilant Triple Quard (LC-MS/MS) mass spectrometer. Proton NMR spectrum is recorded on Bruker-Ascend (400).

Synthesis of Schiff Base: A solution of o-phenylenediamine (0.0325mg 0.5 m mol) is dissolved in methanol and is added to a mixture of Acetyl acetone (0.5m mol) and salicylaldehyde (0.5m mol) in 20 ml of methanolic solution. The mixture is heated and refluxed about 30 minutes. The resulting precipitate is then filtered and washed with methanol.

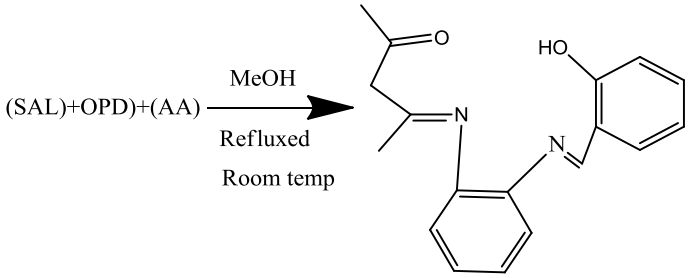


Figure.1. Structure of [(Sal)(OPD)(AA)] ligand

Electronic spectrum of Schiff's base [(Sal)(OPD)(AA)] ligand: The electronic absorption spectra of metal complexes are recorded in DMF in the range from 200 – 800 nm. The UV-Visible spectra showed intense spectral lines around 240, 350 and 450 nm characteristic bands of π-π^* and n-π* transitions (Kalia, 2007) bands are presented in the table.1.

IR spectrum of Schiff's Base ligand: In this FT-IR spectrum the broad lines in the region 3430 cm^{-1} due to hydrogen bonded OH group, it indicates that the Phenolic oxygen atoms, which are present in the Schiff base. Sharp band at 1612cm^{-1} indicates azomethane group (HC=N). The peak at 1728cm^{-1} is ketone group(C=O), the peak at 1276cm^{-1} identified C-O group. All frequencies are presented in the table.2.

LC-MS Spectrum of Schiff's base [(Sal)(OPD)(AA)] ligand: The peak at 317(m/z) is complex bound to one salcilaldehyde, one ortho phenylenediamine, one acetyl acetone and one water molecule, [(SAL)(OPD)(AA)(H_2O] and the peak at 211(m/z) is complex bound to one salcilaldehyde, one ortho- phenylenediamine [(SAL)(OPD)]. The peak at 133(m/z) refer to the [(AA) (H_2O)] and the peak at 423(m/z) refers complex bound to one salcilaldehyde, one ortho phenylenediamine, one acetyl acetone and six water molecules [(SAL) (OPD)(AA)($H_2O)_6$].

Antimicrobial Screening of Schiff's base [(SAL) (OPD) (AA)] ligand: The Schiff's base is screened in vitro for anti-microbial activity against *E.coli*, *B.subtilis* and *A.niger* by Agar-well diffusion method (Atlas, 2004). The Schiff's base showed high potency towards anti-microbial activity against *E.coli* and *B.subtilis* but low potency with fungal organisms. The results of the anti-microbial activities are presented in the table.4.

The minimum inhibitory concentrations (MIC) are calculated as the highest dilution showing complete inhibition of the tested strains and are reported in the table.3.

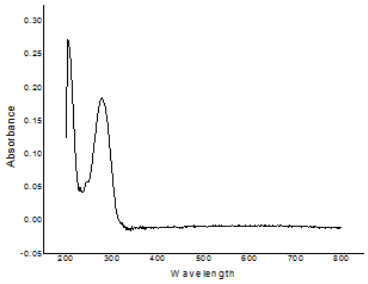


Figure.2. Electronic spectrum of Schiff's base [(Sal)(OPD)(AA)] ligand

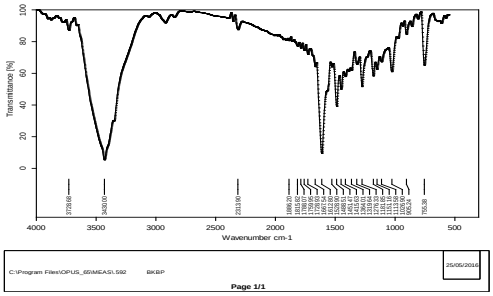


Figure.3. IR spectrum of Schiff's base [(Sal)(OPD)(AA)] Ligand

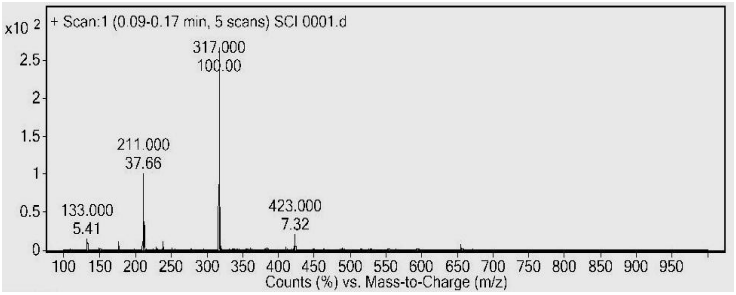
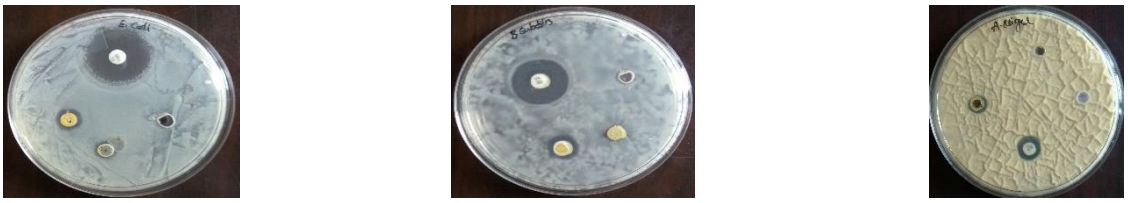


Figure.4. LC-MS Spectrum of Schiff's base [(Sal)(OPD)(AA)] ligand



Zone of inhibition – bacteria *E.coli, B.subtilis, A.niger*

3. RESULTS AND DISCUSSIONS

Table.1. Electronic spectral data of Schiff's base

Ligand	Absorbance	μ/cm^{-1}	Assignment
L	338	295	π - π*
	445	224	n-π*

Table.2. IR Spectral data of Schiff's base

Ligand	$^{\mu}$C=O	$^{\mu}$C=N	$^{\mu}$OH
L	1700.31	1641.47	3228.95

Table.3. Determination of MIC values for Anti-microbial Activity of Schiff's base

Micro organism	concentration	
Bacteria	**5mg**	**10mg**
E. coli	-	+
B. subtilis	-	+
Fungi		
A. Niger	-	+

Table.4. Zone of inhibition of schiff's base

Micro organism	MIC values
Bacteria	**Inhibition zone (mm)**
E. coli	8
B. subtilis	8
Fungi	**Inhibition zone (mm)**
A. Niger	7

4. CONCLUSION

In this communication our results on the synthesis of Schiff base ligand and the antimicrobial studies. These scientific observations for schiff's base are revealed that they are good in microbial activity.

5. ACKNOWLEDGMENTS

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