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CHARACTERISATION AND BIOLOGICAL ACTIVITY OF ATOMOXETINE-ORTHO VANILLIN SCHIFF BASE & ITS Cu (II) & Ru(II) METAL COMPLEXES

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ABSTRACT

Cu (II) & Ru(II) Schiff base metal complexes were synthesed from the condensation of Atomexetine with Ortho-Vanillin. The characterization of all these metal complexes was performed by Elemental Analysis, UV-VISIBLE, FT-IR, XRD, SEM & Conductometric Analysis. FT-IR spectra give the information about nature of the bonding in Ligand & Metal complexes. UV gives co-ordination between ligand and metal complexes; it shows that octahedral in nature. Scanning electron morphology (SEM) gives morphology of the ligand and complexes. Conductometry gives electrolytic nature of the complexes, the conductometric data shows that the complexes were non electrolytic in nature. Biological activity was performed in Disc Diffusion Method with the different organisms like ES Coli & organisms.

INTRODUCTION:

Schiff bases derived from primary amine and carbonyl compound are an important class of ligands that coordinate to metal ions via azomethine nitrogen and have been studied extensively. The condensation product of an amine and a ketone or aldehyde with general formula of R2C=NR are well known Schiff base compound. In azo methine derivatives, the C=N linkage is essential for biological activity [1], such as they possess remarkable antibacterial, antifungal, anticancer and anti malarial activities[2-5] .Transition metal complexes having Oxygen & donor Schiff bases posses unusual configuration & structural liability &sensitive to Molecular environment[6].Schiff bases are also used as catalysts, intermediates in organic synthesis, pigments, dyes & as corrosion inhibitors [7-10]. Copper(II) complexes derived from 4-nitro-2- [(2-diethylaminoethylimino) -methyl]-phenol as the Schiff base ligand was reported by Wei *et al.* [11] Vanillin is a phenolic aldehyde organic compound with the molecular formula C8H8O3. It is the primary component of the extract of the

vanilla bean. Vanillin Schiff bases have been demonstrated to possess poly valent metal ions [12] . Condensation product of vanillin with amines confers biological activity; as well as having good complexation ability with metal ions [13-15]. The importance of these chiral based ligands is to synthesize the metal complexes of single isomer, which are required to develop the large number of potential applications in cancer therapy [16], DNA targeting [17,18], molecular sensors[19, 20], recognition of anion [21,22] and supra molecular chemistry [23, 24]. The present paper provides a new series of metal complexes of Cu(II), Ru(II) with Schiff base ligands derived from Atomoxitine with a carbonyl like Ortho- Vanillin, which are new to literature. These complexes were characterized by elemental analysis like FT-IR, UV, SEM and conductometric measurements determine its mode of bonding and geometry and biological activity. These complexes showed tetra hedral geometry or octahedral geometry.

MATERIALS: Atomoxetine, Ortho-Vanillin, Con HCl, Cu(II) & Ru(II) metals & Methanol

INSTRUMENTATION: IR Spectral information was found from Perkin Elmer IR instrument, JNTUA College of Engineering & Technology, Pulivendula, Kadapa (Dt), Ap. UV-VISIBLE spectral information from Schimazdu UV-1800 model UV-VISIBLE spectrophotometer in Santhiram college of pharmacy, Nandyal, Kurnool (DT),AP. Conductometic measurements from RGM College of Engineering & Technology, Panem, Nandyal, Kurnool (DT), AP. XRD was performed in JNTU- Anantapur by using panalytical X'pert3. Biological activity in Sri Krishna deveraya University, Anantapuramu, AP.

Synthesis of ortho – Vanillin Atomoxetine Ligand: The Ligand was Prepared by mixing equi molar con of the methanolic solution (10ml) of Atomoxitine & Ortho Vanillin (10ml) with occasional stirring. This mixture was reflexed for two hours by adding few drops of Con.Hcl, Yellowish Dark Brown color solution was obtained. This was cooled to room temperature, after cooling brown color precipitate was obtained. This was washed with methanol &dried in Micro wave owen. The percentage yield of the complex was found to be 65.

Synthesis of Ortho Vanillin & Atomoxetine -Copper metal Complex: The complex was prepared by mixing an aqueous solution of metal ion with the methanolic solution of ligand in round bottom flask, when these solutions were mixed the mixture of the solution was converted in to dark Green color. This was refluxed for six hours by adding few drops of Con Hcl , on heating blackish Green color solution was obtained. This solution was cooled to room temperature, on cooling green color sharp needles like crystals were obtained. These crystals were washed with ether and recrystallised with methanol. The percentage yield of the complex was found to be 75.

Synthesis of Ortho Vanillin & Atomoxetine -Ruthenium metal Complex: The complex was prepared by mixing an aqueous solution of metal ion with the methanolic solution of ligand in round bottom flask. This was refluxed for six hours by adding few drops of Con Hcl, blackish Green color solution was obtained. This solution was cooled to room temperature, on cooling Bluish Brown color sharp needles like crystals were obtained. These crystals were washed with ether and recrystallised with methanol. The percentage yield of the complex was found to be 77

Table II: Important IR bands of the OV AT ligand & Cu(II) ,Ru(II) complexes

Name of the compound	Water - OH	Phenolic-OH	C=N	M-O	M-N
OVAT	-	3364	1627	-	-
OVAT-Cu	3422	-	1614	-	517
OVAT-Ru	3436	-	1622	623	513

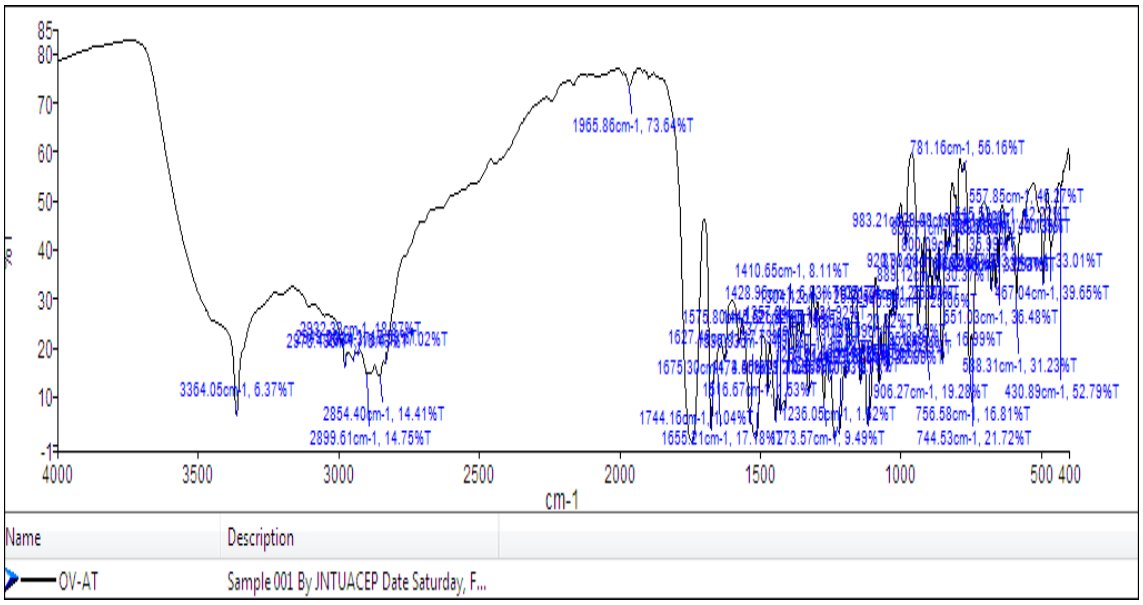


Fig I: IR Spectra of OV-AT Ligand

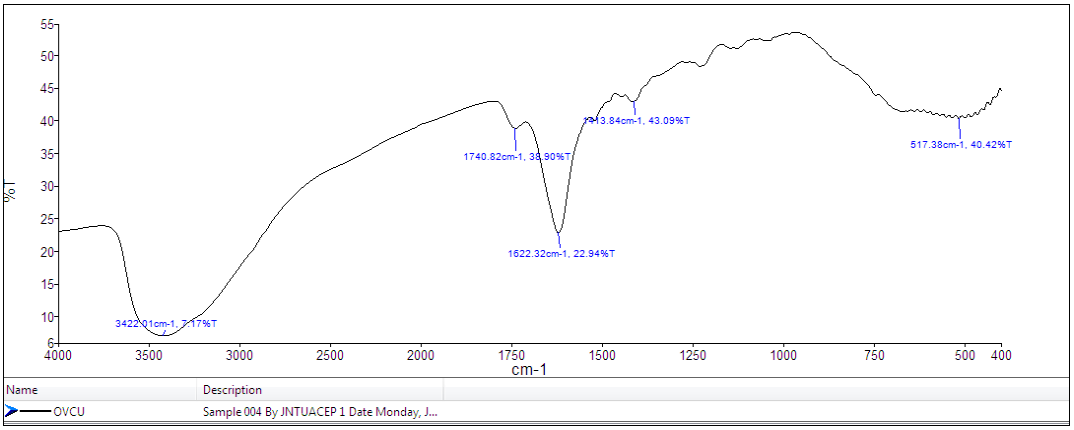


FIG II: IR SPECTRA OF OV-AT Cu (II) Metal Complex

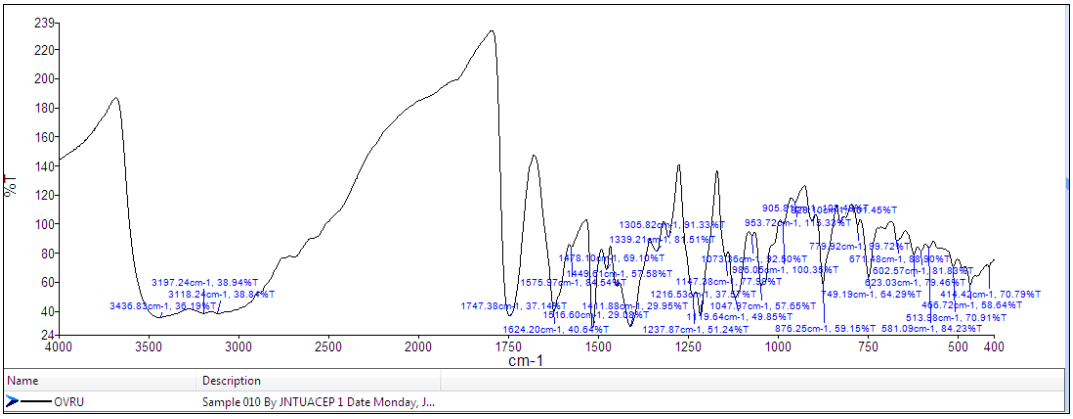


Fig III: IR Spectra of OV-AT Ru Metal Complex

TableIII: UV data of the ligand & metal complexes

S.No	Name of the compound	Absorbance(nm)
1	OV-AT	251
2	OV-AT-Cu	285
3	OV-AT-Ru	330

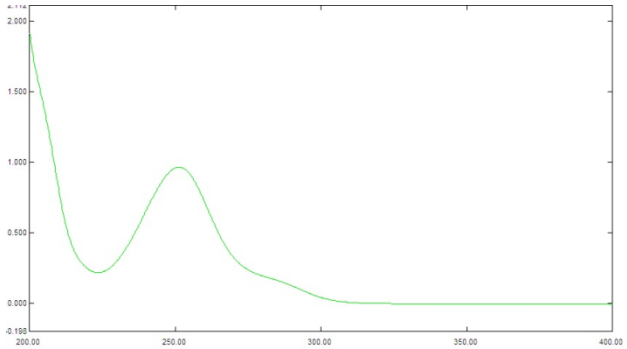


Fig IV: UV spectrum of OV-AT ligand

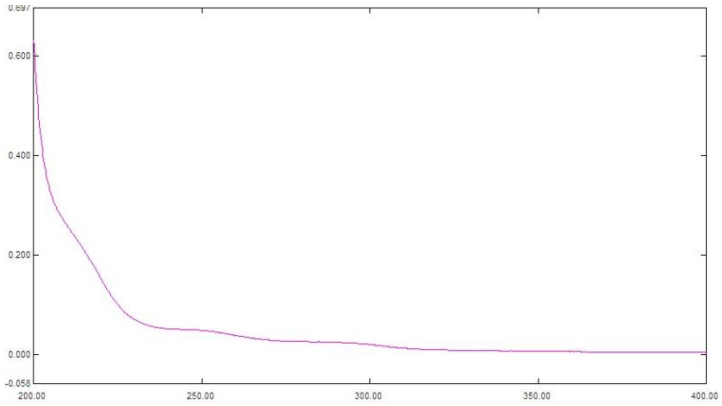


Fig V: UV spectrum of OV-AT-Cu

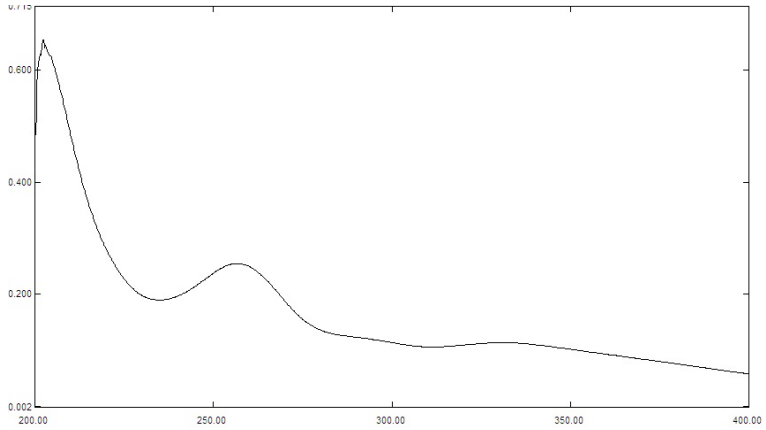


Fig VI: UV spectrum of OV-AT-Ru

Table IV: X-ray Diffraction study of OV-Cu

S.No	d exp	d cal	2Ɵ exp	2Ɵ cal	h k l
1	0.0388	0.0383	5.7825	5.7851	1 1 1
2	0.0608	0.0601	9.0650	9.0646	4 1 1
3	0.0641	0.0637	9.5482	9.5477	4 2 1
4	0.0701	0.0696	10.4505	10.4499	4 2 2
5	0.0776	0.0771	11.5678	11.5671	4 3 2
6	0.0810	0.0801	12.0838	12.0831	4 4 1
7	0.0888	0.0881	13.2516	13.2511	5 3 2
8	0.09805	0.09801	14.6273	14.6269	5 4 1
9	0.1248	0.1243	18.6522	18.6516	6 5 4
10	0.1283	0.1279	19.1802	19.1776	6 6 3
11	0.1459	0.1454	21.8502	21.8496	7 6 4
12	0.1820	0.1816	27.3444	27.3439	8 8 6
13	0.1916	0.1911	28.8150	28.8145	9 9 5
14	0.2168	0.2163	32.6959	32.6955	10 10 6
15	0.2338	0.2331	35.3414	35.3409	12 11 7
16	0.2689	0.2683	40.8684	40.8680	13 13 5
17	0.2945	0.2941	44.9729	44.9723	13 13 10
18	0.3522	0.3516	54.4309	54.4309	15 15 13
19	0.3620	0.3614	56.0672	56.0666	15 15 14
20	0.3709	0.3702	57.0672	57.0666	17 16 12
21	0.4384	0.4381	69.4006	69.4001	18 18 17
22	0.4656	0.4651	74.3915	74.3914	19 19 19

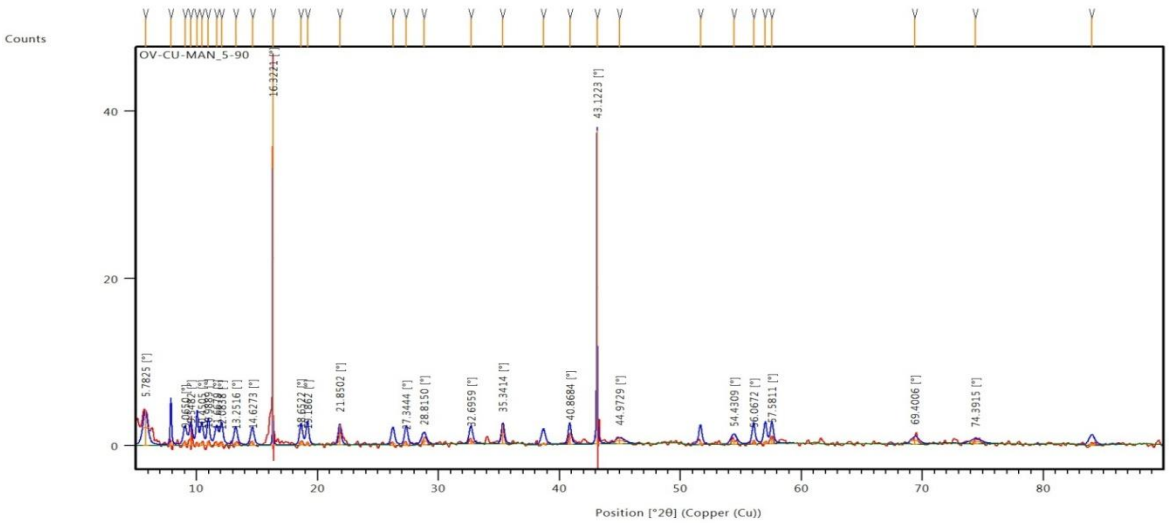


Fig VII: XRD data of OV-AT-Cu

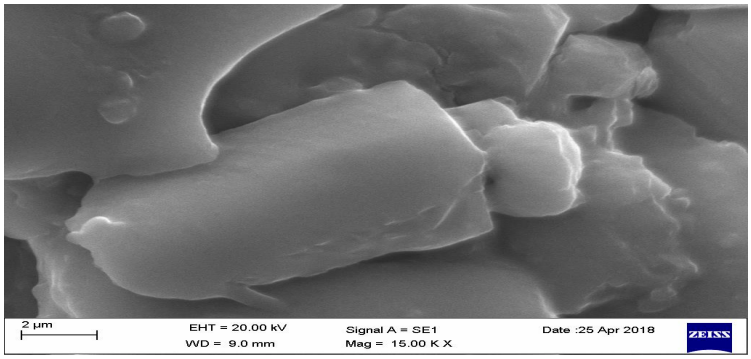


Fig VIII: SEM image of OV-AT ligand

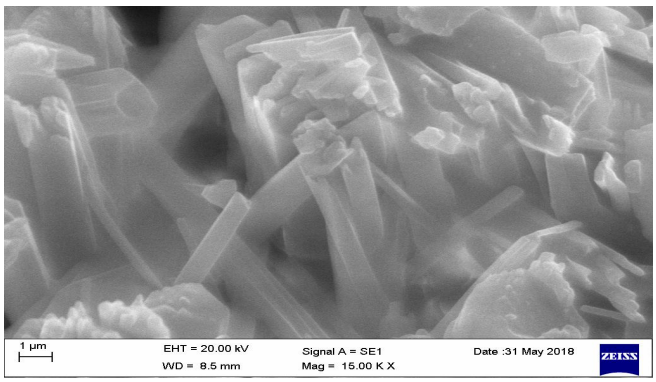
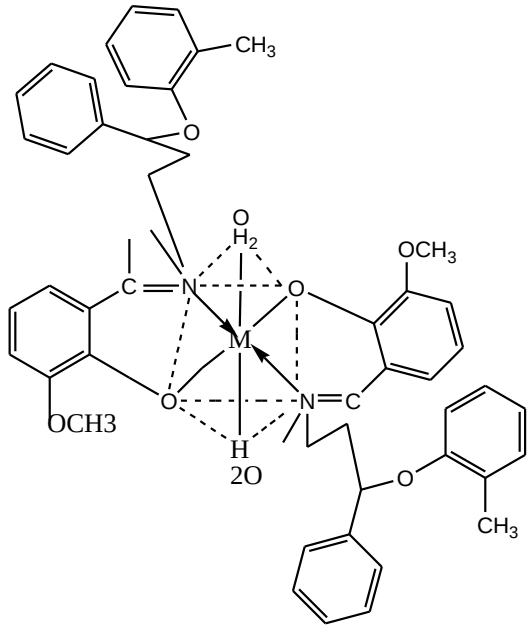


Fig IX: SEM image of OV-AT-Ru complex

Expected structure of the metal complexes:



Where M = Cu & Ru

Table V Biological activity of the ligand & complexes

S.No	Name of the Compound	ES Coli	B Subtils	Klebsiella
1	OVAT Ligand	10	11	9
2	OVAT-Cu	12	14	13
3	OVAT-Ru	13	15	14

RESULTS & DISCUSSIONS:

Instrumentation:

IR Spectral data of the ligand its metal complexes: IR spectroscopy was performed by using KBr pellets in JNTU-A college of Engineering & Technology, Pulivendula. To understand the nature of the complex it was compared with ligand. A strong band observed at 1627cm^{-1} indicates the formation of Imine (>C=N) functional group present the ligand these bands for Cu(II) & Ru(II) were 1614cm^{-1} & 1622cm^{-1} respectively Shows that the formation of covalent bond between metals and ligands due to reduced electron density on Nitrogen atom. A strong band observed at 3364cm^{-1} showed phenolic OH of the ligand, this on complexation with metals this band disappeared showed the co-ordination between metal and OH of the Vanillin. The broad bands at 3422cm^{-1} and 3436cm^{-1} respectively for OVAT-Cu & OVAT-Ru showed the presence of water molecules in the complexes, these were not observed in ligand. The bands at 517cm^{-1} and 513cm^{-1} in the complexes shows the complexation between metal and ligands & the Characteristic band at 623cm^{-1} for Ru(II) metal complex showed the coordinated covalent bond between metal and oxygen. The characteristic frequencies were

represented in the TableII & spectras in fig from I-III

UV Spectral Data: UV spectrum of the ligand and its metal complexes performed using Schimazdu UV-1800 model Spectophotometer. The Absorbance values shows the co-ordination between metal and complexs. The absorbance values shows the octahedral geometry of the complexes. The absorbance values represented in the table III and spectrum shows in the figure IV- VII

XRD SPECTRAL DATA: XRD gives the information about the percentage crystallinity of the complex, it a quantitative technique. XRD spectrum performed by using panalytical x'pert3 model difractometer. It gives the diffractograms(22) from 5-74 shows poor crystalline nature of the complex. The calculated miller indices values and d-values represented the table, these values suggest that a good agreement between 2Ɵ values and d-values. The values represented in the table IV & Spectrum in Fig VII

SEM ANALYSIS: Scanning electron micrography of the ligand and complexes were examined to understand the nature of the surface area. Generally SEM analysis gives the morphology of the surface, the SEM images express the co-ordination between metal and ligand with differences in voids on the surface areas of the ligand and complexes were appears as big ice cubes and small plants in the garden, these variations shows the co-ordination of the metal and complex

CONDUCTOMETRIC ANALYSIS: Conductometric data was perfoemed on digital conductivity meter at 30^0c using Methanol as a solvent, the values between 55-57 $ohm^{-1}cm^{-1}mol^{-1}$ shows the complexes were non electrolytic in nature.

BIOLOGICAL ACTIVITY: The activity was tested against the organisms like ES Coli, Bacillus Subtils & Klebsiella by utilizing paper disc diffusion method. The activity of the complexes were more than ligands, this was explained by chelation theory, as per this theory chelation increase the activity of the complexes due to reduced electron density on metal ion by transfer of charge. The activity of the ligand and complexes represented in the table V

Conclusion: The Schiff base was synthesized from Atomexetine and Ortho-Vanillin. OVAT-Cu, OVAT-Ru are prepared by the reaction between Schiff base and metal chlorides in the ratio (2:1).The anti bacterial studies of Schiff base and complex have been studied which indicate that activity increases with the chelation. The metal complexes non electronic in nature.The studies show that metal complexes show octahedral structure.

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