



SYNTHESIS AND CHARACTERIZATION OF 2-[(4-METHOXY-PHENYLMINO)-METHYL]- PHENOL LIGAND WITH Ni(II) COMPLEX

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ABSTRACT

In this study, the novel Schiff base complex has been prepared from aromatic primary amine with carbonyl group containing aromatic compound. The equal molar ratio of para anisidine reacted with salicylaldehyde in the presence of alcohol, this reaction was carried out by the condensation process, 2-[(4-Methoxy-phenylimino)-methyl]-phenol ligand was obtained then the ligand was treated-refluxed with nickel sulphate hexahydrate to formed Nickel(II) Complex of 2-[(4-Methoxy-phenylimino)-methyl]-phenol ligand. The Synthesized complex has been characterized by EDAX, UV, FT-IR, NMR and XRD technique.

1. INTRODUCTION

Coordination chemistry plays an important role in inorganic chemistry. A lot of researchers have done their research work on coordination chemistry. As a result of many studies, special complexes have been discovered. Complexes are formed with transition metals along with some organic compounds as ligands. Most researchers decide this field because of the many applications of coordination chemistry. In the past years, many research results have been published in this regard.

In 1891, the scientist Albert Werner published chemistry of co-ordination Compounds. Prior to this, in 1864, a scientist named Hugo Schiff combined organic molecules such as primary amine and carbonyl compound to produced a chemical called imine. These types of imine derivatives are named as Schiff bases.

Coordination compounds are formed as a result of Lewis acid – base reaction in which the metal ion is the acid (acceptor) and the ligand is the base (donor). A complex forms from a metal ion and a ligand because of a Lewis acid–base interaction. The positively charged metal ion acts as a Lewis acid, and the ligand, with one or more lone pairs of electrons, acts as a Lewis base.

Ligands

Ligands are positively charged or negatively charged particle or neutral atoms or molecule. This can donate a pair of electrons. Ligands bind the central metal atom via one tooth (dent) or more than one tooth to form a dative covalent bond (co-ordinate bond) with the central metal atom or ion. Ligands are Lewis base as they donate electrons. We can imagine that a ligand bites the central metal atom

at one or more tooth (linkage points) is known as denticity. Denticity of Ligands is the number of coordinating or donor groups present in a single ligand. Based on the denticity or number of linkage sites of ligands are classified as monodentate, bidentate or polydentate, ambidentate, chelating and bridging ligands.

Transition Metals

Transition metals are found in the d-block of the periodic table and are defined as having at least one stable ion with partially-filled d-orbitals. Presence of vacant $(n-1)d$ orbitals, which are of appropriate energy to accept one pair and unshared pair of electrons. They are used in catalysis and often form complexes which are composed of a transition metal center.

Complex

A coordination complex is a chemical compound consisting of a central metal atom or ion, which is called the coordination centre, and a surrounding array of bound molecules or ions, that are in turn known as ligands or complexing agents. Transition metals generally form more complex or coordination compound because they have empty valence shell orbitals that can accept pair of an electron from ligand. That means ligands must contain one pair (at least) of the non-bonding electron that can be donated to the metal ion.



Fig.1. Ligand – Metal bond

A complex forms from a metal ion and a ligand because of a Lewis acid–base interaction. The positively charged metal ion acts as a Lewis acid (electron acceptor), and the ligand, with one or more lone pairs of electrons, acts as a Lewis base (electron donor)

Schiff bases

In 1864, Hugo Schiff synthesized Imine base from the reaction of aromatic carbonyl groups with primary amines. Imine derivatives that containing an azomethine group $(-RC=N-)$ or $(-HC=N-)$ and are usually formed by the condensation of a primary amine with an active carbonyl compound. The bond formed by reaction with aldehyde is called aldimine, while the bond formed by reaction with ketone is called ketimine. The group of compounds, imines are often referred to as Schiff bases in his honor.

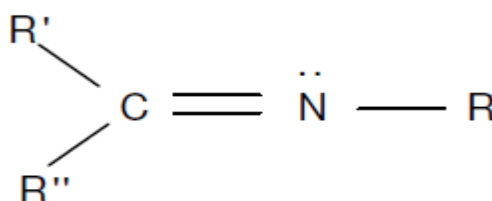
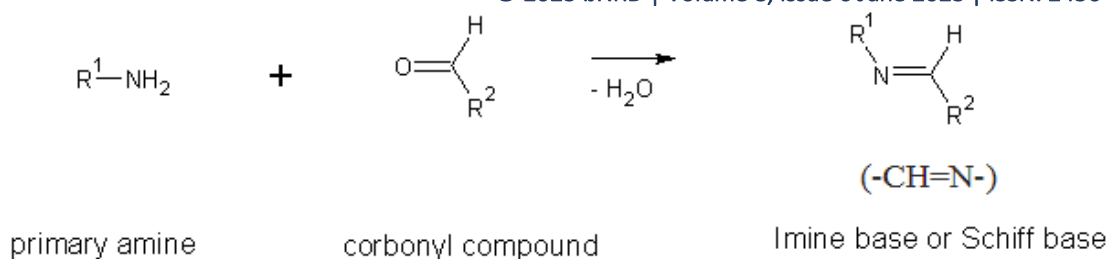


Fig 2: Schiff base

Especially when a functional group like $-OH$ or $-SH$ is present close to the azomethine group so as to form a five or six membered ring with the metal ion. Versatility of Schiff base ligands and biological, analytical and industrial applications of their complexes make further investigations in this area highly desirable.

In recent years, the researchers have attracted enormous attention toward Schiff bases, their metal complexes owing to numerous applications in pharmacology, catalytic activity and nanotechnology.



Scheme 1. Formation of Schiff base

A Schiff base is a nitrogen analog of an aldehyde or ketone in which the C=O group is replaced by C=N-R group. It is usually formed by condensation of an aldehyde or ketone with a primary amine. Where R may be an alkyl or an aryl group. Schiff bases that contain aryl substituents are substantially more stable and more readily synthesized, while those which contain alkyl substituents are relatively unstable. The formation of a Schiff base from an aldehydes or ketones is a reversible reaction and generally takes place under acid or base catalysis, or upon heating

They serve as models for biologically important species and find applications in biomimetic catalytic reactions. Chelating ligands containing N, S and O donor atoms show broad biological activity and are of special interest because of the variety of ways in which they are bonded to metal ions. It is known that the existence of metal ions bonded to biologically active compounds may enhance their activities.

Versatility of Schiff bases and their transition metal complexes are to important play role in much more chemical field. like Medicinal, Biological, pharmacological, Industrial, Analytical and Catalytic reagents. Schiff bases have a wide range of pharmacological effects and biological activities, including antibacterial, antifungi, antimalarial, anti-inflammatory, anticancer antiviral and antipyretic properties, DNA, due to having an imine (-C=N-) linkage.

Present work in this paper, synthesis and characterization of 2-[(4-methoxy-phenylimino)-methyl]-phenol ligand with Ni(II) complex.

In the divalent state nickel forms a very extensive series of compounds. This is the only oxidation state of importance in the aqueous chemistry of nickel, with the exception of a few special complexes of nickel in other oxidation states. Nickel(II) is the d8 ion and is able to form stable square planar complexes as well as octahedral or tetrahedral. An aqueous solution of nickel(II) not containing strong complexing agents, contains the green hexaquaonickel(II) ion which also occurs in a number of hydrated nickel(II) salts, such as Ni(NO₃)₂·6H₂O. The water molecules in the aquo-ion can be readily displaced, especially by amines to give complexes such as [Ni(H₂O)(NH₃)₄]²⁺, [Ni(NH₃)₆]²⁺ or [Ni(en)₃]³⁺ (en ethylenediamine).

The common anions of Ni(II) compounds include sulfide, sulfate, carbonate, hydroxide, carboxylates and halides. A wide range of coordination geometries is obtained for Ni(II) complexes with coordination numbers of 4 to 6 being common. The octahedral and square planar geometries are most usual, but tetrahedral, trigonal

2. AIM AND SCOPE

Coordination chemistry is one of the most important and rewarding fields of research in inorganic chemistry. Development of complexes have been active area of research during the past years because of their beneficial activities. In recent years, the researchers have attracted enormous attention toward Schiff bases, hence, I have decided to develop a research program in this field. we are also motivated to synthesize some novel ligand with metal complexes.

The main aim of this research is to synthesis of 2-[(4-Methoxy-phenylimino)-methyl]-phenol ligand from para anisidine and salicylaldehyde, fused with Nickel metal from Nickel sulphate salt, by using a modified method than those reported in the literatures.

The synthesized complex was characterized by using different chemical analysis. Here we have done EDAX, NMR, UV, FT-IR AND XRD. This review may help researcher to get and clarify more on their research and this field is always demanding in frontiers in modern chemical sciences.

3.LITERATURE SURVEY

I have visited various research articles to improve my research work. I have mentioned them below

Shabbir M., Akhter Z., Ahmad I., Ahmed S., Ismail H., Bushra M., McKeec V., Bolted M., Synthesis, characterization, biological and electrochemical evaluation of novel ether based on donor bidentate Schiff bases, *Journal of Molecular Structure*, 2016; Vol. 1116, 84–92.

Ashok N Patange, Uttam M Yadav, Pratik A Desai, Pravin U Singare. Synthesis and Antimicrobial Activities of Novel Palladium (II) Complexes of Active Schiff's Base Ligand Derived from 5-Bromo Isatin, *International Letters of Chemistry, Physics and Astronomy*. 2015; 52:22-27.

Patel NH, Parekh HM, Patel MN. Synthesis, characterization and biological evaluation of manganese (II), cobalt (II), nickel (II), copper (II), and cadmium (II) complexes with mono basic (NO) and neutral (NN) Schiff bases," *Transition Metal Chemistry*. 2005; 30(1):13-17.

Thakor YJ, Patel SG, Patel KN. Synthesis, characterization and biocidal studies of some transition metal complexes containing tetra dentate and neutral bi dentate schiff base," *Journal of Chemical and Pharmaceutical Research*, 2010; 2(5):518-525.

Synthesis and charecterizationm of schiff base with Ni(II) complex Juan Fernandez MG, Fred A, Lopez-DURAN, Simon Hernandez-Ortega, Virginia Gomez-Vidales, Norma Macias- Ruvalcaba et al. *Journal of Molecular structure*. 2002; 612:69-79.

Synthesis and spectral study and catalytic activity of Ni(II) complex with schiff base ligandAbd-Elzaher MM. *Journal of the Chinese Chemical Society*. 2001; 48:153-158.

Abd-Elzaher MM. Spectroscopic characterization of some tetradentate Schiff bases and their complexes with nickel, copper and zinc, *Journal of the Chinese Chemical Society*. 2001; 48(2):153-158.

Shivakumar K, Shashidhar P, Vithal Reddy P, Halli MB. Synthesis, spectral characterization and biological activity of benzofuran Schiff bases with Co(II), Ni(II), Cu (II), Zn (II), Cd (II) and Hg (II) complexes. *J Coord. Chem*. 2008; 61:2274-2287.

Yamada, S., Advancement in stereochemical aspects of schiff base metal complexes, *Coordination Chemistry Reviews*, 190, 537-555, 1999.

Badwaik, V.B., Deshmukh, R.D., Aswar A.S., Transition metal complexes of a Schiff base: synthesis, characterization, and antibacterial studies, *Journal of Coordination Chemistry*, 62(12), 2037-2047, 2009.

Mishra, L.K., Keshari, B.N., 1981. Thiohydrazides as complexing agents: Part I- complexes of Ni(II), Co(II & III), Cu(II), Zn(II), Cd(II), Pd(II) & Hg(II) with o-hydroxyphenylthiohydrazide. *Indian J. Chem. Sect-A* 28, 883–887.

4. EXPERIMENTAL METHOD

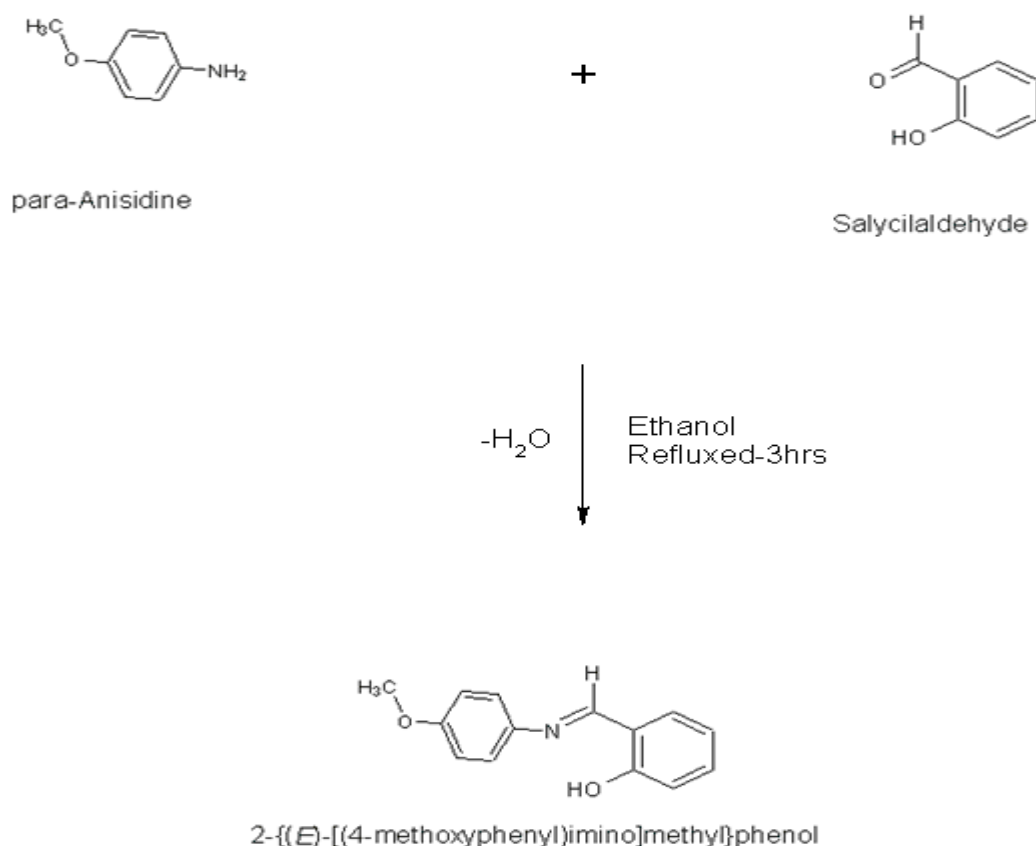
Synthesis of 2-[(4-Methoxy-phenylimino)-methyl]-phenol ligand

The equal molar ratio of para anisidine 15.4g (2.5M) and salicylaldehyde 13ml (2.5M) were dissolved in 50 ml of ethanol in separate beaker. The two solutions are mixed together in a RB flask then the reaction mixture was refluxed for 3 hrs. through the magnetic stirrer then the yield was evaporated to dryness. This reaction process is namely known as condensation reaction. 2-[(4-Methoxy-phenylimino)-methyl]-phenol ligand was obtained.



Fig.3. Apparatus and Instrumentation setup.

Reaction Scheme for synthesis of 2-[(4-Methoxy-phenylimino)-methyl]-phenol ligand



Scheme .2. Synthesis of 2-[(4-Methoxy-phenylimino)-methyl]-phenol ligand

SYNTHESIS OF COMPLEX

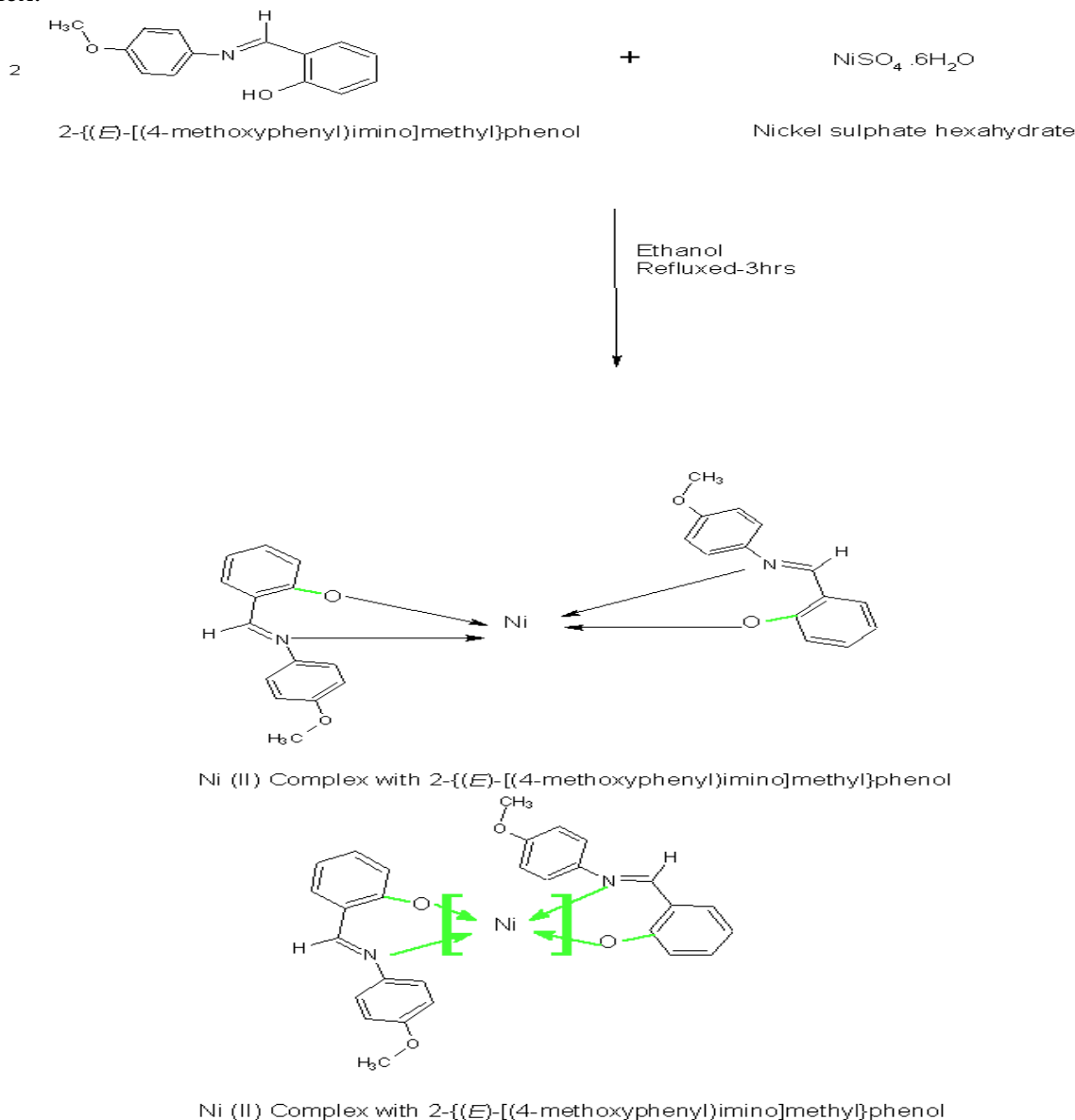
Synthesis of 2-[(4-Methoxy-phenylimino)-methyl]-phenol ligand with Ni²⁺Complex

2 : 1 Molar ratio of ligand and metal salt, 15.5g (1.52M) of ligand and 10.0g(0.76M) of nickel sulphate hexa hydrate were dissolved in 50ml of ethanol separately. A solution of nickel sulphate hexa hydrate was added into the solution of ligand. Then the reaction mixture was refluxed for 3 hours through the magnetic stirrer and kept overnight at room temperature then complex was evaporated to dryness and filtered.



Fig.4.synthesized Complex
2-[(4-Methoxy-phenylimino)-methyl]-phenol ligand with Ni²⁺Complex

Reaction Scheme for synthesis of 2-[(4-Methoxy-phenylimino)-methyl]-phenol ligand with Ni(II) Complex.



5.RESULTS AND DISCUSSION

SEM AND EDAX ANALYSIS

Elemental analyses

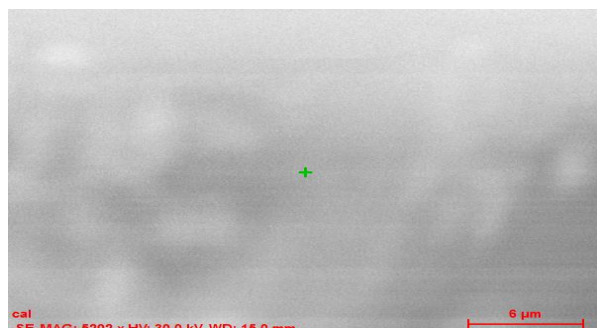
Elemental analyses were carried out on a Bruker Nano GmbH Berlin, Germany Esprit 1.9. Date: 05-Apr-23 10:44:29 AM, Real time: 21079, Life time: 20477 Pulse density: 2443, Primary energy: 30, Take off angle: 35, Tilt angle: 0 Azimut angle: 45, Detector type: XFlash 5010, Window type: slew AP3.3 Detector thickness: 0.45, Si dead layer: 0.029, Calibration, lin.: 4.999, Calibration, abs.: -477.152, Mn FWHM: 124.742, Fano factor: 0.109, Channels: 4096.

The SEM images of the Ni(II) complex were viewed at different magnifications and the micrographs obtained are presented in Fig. 4. The micrograph of nickel complex indicated an ice rock like shape which may be due to the tightening of voids on the outer surface by coordination of ligand with the metal

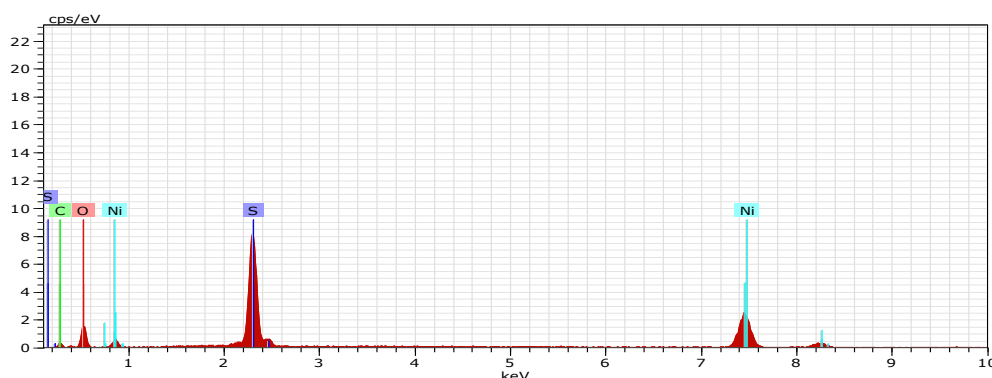
ion. Moreover, Energy dispersive X-ray analysis (EDAX) of ligand and its Ni(II) complex was also performed to check the elemental composition of prepared materials. EDAX spectra clearly shows that complexation successfully occurred. The elemental analysis agrees quite well with the speculated structure of the sample. This is a high percent yield, indicating a successful synthesis. The analytical data shows that the theoretical and calculated values of the percentage of elements are in good agreement.

Application Note

Company / Department



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Spectrum: sample 11246

El	AN	Series	un. C	norm. C	Atom. C	Error (1 Sigma)
			[wt.%]	[wt.%]	[at.%]	[wt.%]
O	8	K-series	27.23	34.48	45.16	5.21
C	6	K-series	14.15	17.92	31.26	4.34
S	16	K-series	17.51	22.17	14.49	0.70
Ni	28	K-series	20.09	25.44	9.08	0.58

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1. Page

Fig .5. SEM AND EDAX image of [Ni(II) Complex with 2-[(4-Methoxy-phenylimino)-methyl]-phenol ligand

UV SPECTRA OF COMPLEX

The UV spectra were recorded by METTLER TOLEDO Spectrometer using DMSO solvent (Dimethyl sulfoxide) at room temperature. Model : UV-VIS Spectrophotometer, Number : 20-1950-01-0029, Spectral Bandwidth : 2.00 nm, Scan Spectrum Performance, Scan Range : 200.00 to 800.00 nm, Measure Mode : Abs, Interval : 1.00 nm, Speed : Fast, Data File : C:\Program Files\UV-VIS\UVWin Software v6.0.0\Data\21PCH016.spd, Create Date/Time : Friday, March 24, 2023 12:17:14 PM, Data Type : Original, Method File:, Analyse Note, Analyser

Table 1.No. P/V Wavelength(nm) Abs Comment

Peak	Wave length	λ_{\max} absorptions
1 Peak	341.00	0.368
2 Peak	257.00	0.411
3 Peak	219.00	0.920

The UV-Visible spectra of 2-[(4-Methoxy-phenylimino)-methyl]-phenol ligand With Ni^{2+} complex were recorded in DMSO at room temperature. The compound showed intense band in the range of 219-341nm. The electronic spectral study also proves the generation of a square planar Ni^{2+} center when

the complexes are present in solution. UV-vis spectra of the Ni^{2+} complexes exhibit three absorption bands between 219–341 nm regions. The absorption band exhibits a d-d transition at 219–341 nm regions, a charge transfer transition (CT) at 330–340 nm region which may be assigned to the ligand-to-metal charge transfer and the bands in the range 220–250 nm may be due to intra ligand transition. The absorption bands appearing in the range of 319–370 nm are due to the occurrence of $n \rightarrow \pi^*$ transitions (carbonyl compounds 205 – 280 $-\text{C}=\text{O}$). These bands shift to a slightly higher wavelength on complexation. For all the complexes $n \rightarrow \pi^*$ transitions are red shifted, due to coordination of azomethine nitrogen to the central metal ion.

For Cu(II) centres the visible spectra exhibits broad band in the range of λ_{max} at 628–655 nm which are specifically consistent for five-coordinate geometry and are correlated to d-d transition of Cu(II) ions. In case of complexes, some new bands appeared in the range of 416–447 nm, which were attributed to ligand to metal charge transfer.

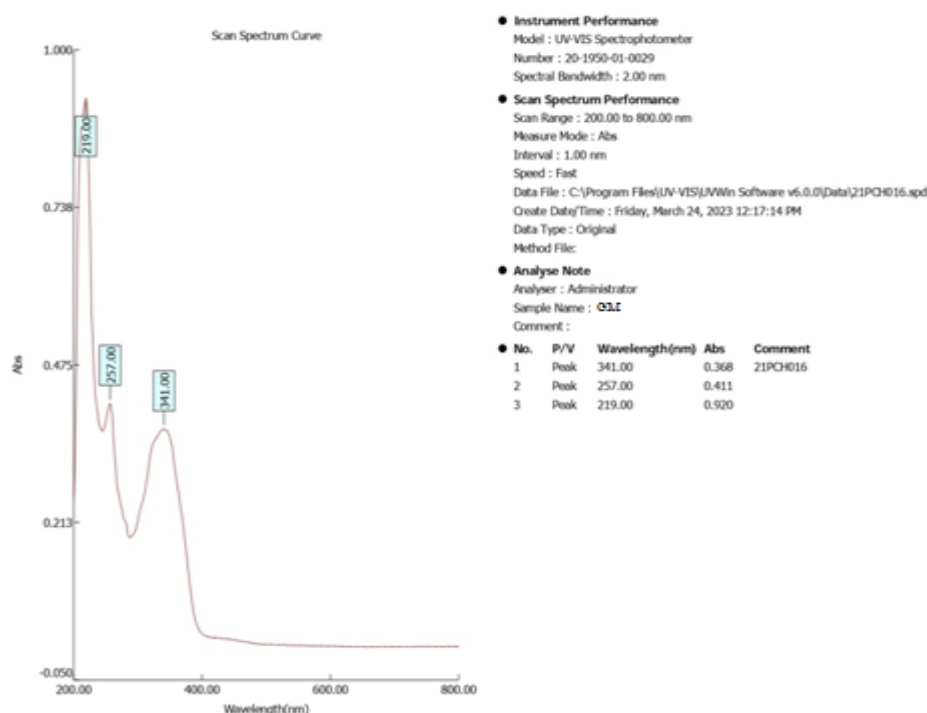


Fig.6. UV Spectrum of Ni(II)Complex with 2-[(4-Methoxy-phenylimino)-methyl]-phenol ligand

NMR- SPECTROSCOPIC STUDY

^1H -NMR

The NMR spectra were recorded by BRUKER Spectrometer (400 MHz) using internal reference TMS and solvent DMSO. Proton nuclear magnetic resonance (proton NMR, hydrogen-1 NMR, or ^1H NMR) is the application of nuclear magnetic resonance in NMR spectroscopy with respect to hydrogen-1 nuclei within the molecules of a substance, in order to determine the structure of its molecules. In samples where natural hydrogen (H) is used, practically all the hydrogen consists of the isotope ^1H (hydrogen-1; i.e. having a proton for a nucleus). A full ^1H atom is called protium.

Nuclear magnetic resonance (NMR) spectroscopy is the most valuable spectroscopic technique available to organic chemists. NMR spectroscopy can be used to provide a 'map' of the carbon-hydrogen framework of an organic molecule. More specifically, NMR spectroscopy is concerned with the spin-state transitions of particular atomic nuclei (of non-zero spin quantum number) upon absorption of radio frequency energy, when placed in a strong magnetic field. The position of signals along the spectrum (the chemical shift) is sensitive to the environment of the hydrogen atoms, i.e. it reveals the different types of hydrogen present: (n + 1) rule it must have neighbouring hydrogens.

Reference peak 7.26–8.27 (12H, m, Ar-H), 8.80 (1H, Ar-CH=N-), 7.55 (d, 1H, Ar-H), 7.84 (d, 1H, Ar-H), 9.86 (1H, $-\text{N}=\text{CH}-$), 14.10 (s, 1H, $-\text{SH}$), 7.84 (d, 1H, Ar-H), 10.42 (s, 1H, $-\text{N}=\text{CH}-$), 13.91 (s, 1H, $-\text{SH}$) 2.69 (t, 2H, $-\text{CH}_2-$), 3.34- (H-OCH₃/CH₃), 9.912 (H-CHO)

Spectra of Schiff base complex observed multiplet signals at 2.50, 3.34 (CH₂-H), 6.98, 7.57 (Ar-H), 8.15 ($-\text{NH}$), 8.89 ($-\text{CH}=\text{N}$), 10.02 ($-\text{CH}=\text{N}-\text{MC}$), 13.25 and 15.42 ppm. The signals around 3.34 ppm

are due to methylene protons($\text{CH}_2\text{-H}$). In the case of Metal (II) complex, the signal of azomethine(-CH=N), protons of metal complexes was found at 10.02ppm after complexations to the metal ion inferring co-ordination through the azomethine nitrogen atom of the ligands. 8.15 (-NH), 8.89(-CH=N), ppm, which clearly indicates the confinement between metal ion and imine nitrogen. The observed NMR data were found to be in good correlation with the expected values.

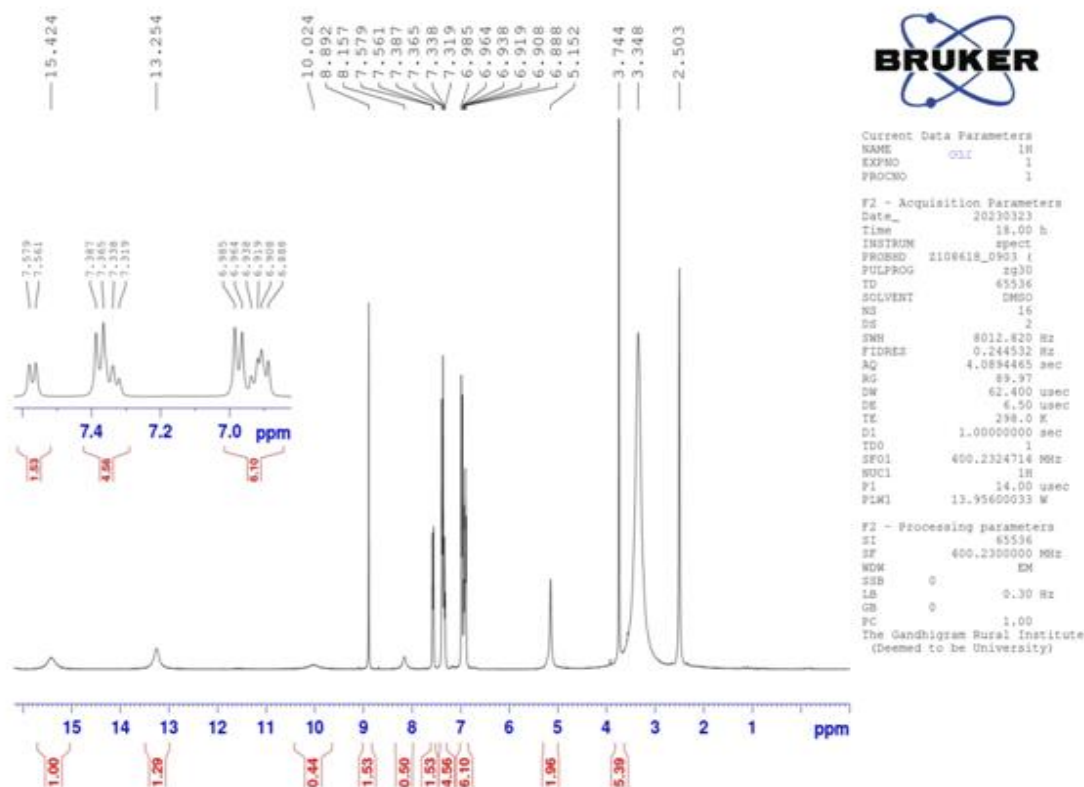


Fig.7. NMR – Spectrum of Ni(II)Complex with 2-[(4-Methoxy-phenylimino)-methyl]-phenol ligand

THE FOURIER TRANSFORM-INFRARED SPECTRA

FT-IR transform Fourier Transform InfraRed Spectroscopy is a technique that is extremely useful to the characterization of organic materials and certain inorganic compounds. The obtained FT-IR spectrum were provided information about the position of functional groups and molecular structure. Reference dada: The IR spectra were recorded by SHIMADZU-FTIR-8400 spectrophotometer in the frequency range of $4000\text{-}400\text{ cm}^{-1}$ by KBr powder method. IR (KBr) cm^{-1} : The frequencies of ligands and their respective metal complexes helps in understanding the binding modes of the ligand with the metal.

The most explicit IR bands recorded for the synthesized compounds with the probable assignment are given below : 3350 , 3280 (N-H), 1638 (C=O), 1586 (C=C), 1240 (C=S), 1150 (C-N), 862 , 822 , 770 ; 3023 , (aromatic C-H), 2935 (azomethine C-H), 1605 (Ar-CH=N-Ar), 1562 , 3018 (aromatic C-H), 2955 (azomethine C-H), 1603 (Ar-CH=N-Ar), 1568 (-C=C-), 1332 (-N=O), 3020 (aromatic C-H), 2947 (azomethine C-H), 1620 (Ar-CH=N-Ar), 1558 (-C=C-), $1108\text{-}1035$ (-C-Cl), $3400\text{-}3320$ (-O-H), 3028 (aromatic C-H), 2960 (azomethine C-H), 1610 (Ar-CH=N-Ar), 1560 (-C=C-). 780 C-O, 820 C-C, 1500 N-C, 1600 N - O or N - H, $3500\text{-}3500$

The lower frequency band appeared at $548\text{-}827\text{ cm}^{-1}$ in the metal complexes due to C-S/N). A broad band in the region $3355\text{-}3445\text{ cm}^{-1}$ assigned as (OH) indicates the presence of water molecules in the complexes. The metal ligand bands appear in the region $347\text{-}362\text{ cm}^{-1}$ and $490\text{-}515\text{ cm}^{-1}$ in all the complexes that have been assigned to (M-S) and (M-N), respectively. The band appearing at $1615\text{-}1603\text{ cm}^{-1}$ in the IR spectra of ligands is due to $\nu(\text{C=N})$ group which shifted to lower frequency region $1607\text{-}1593\text{ cm}^{-1}$ on complexation with metal atom, these shifting in spectra justified that lone pair of nitrogen is involved in bonding with the metal centre. A band at $3297\text{-}3241\text{ cm}^{-1}$ is observed due to $\nu(\text{O-Hb})$ group which gets disappeared in complexes due to deprotonation of phenolic O-H on complexation with the metal atom. Furthermore, some new bands in complexes were observed in the range $539\text{-}511\text{ cm}^{-1}$

which are due to $\nu(\text{M}-\text{N})$ [51]. The above results imply that ligands behave in a tridentate manner and the metal complexes have pentacoordinated geometry.

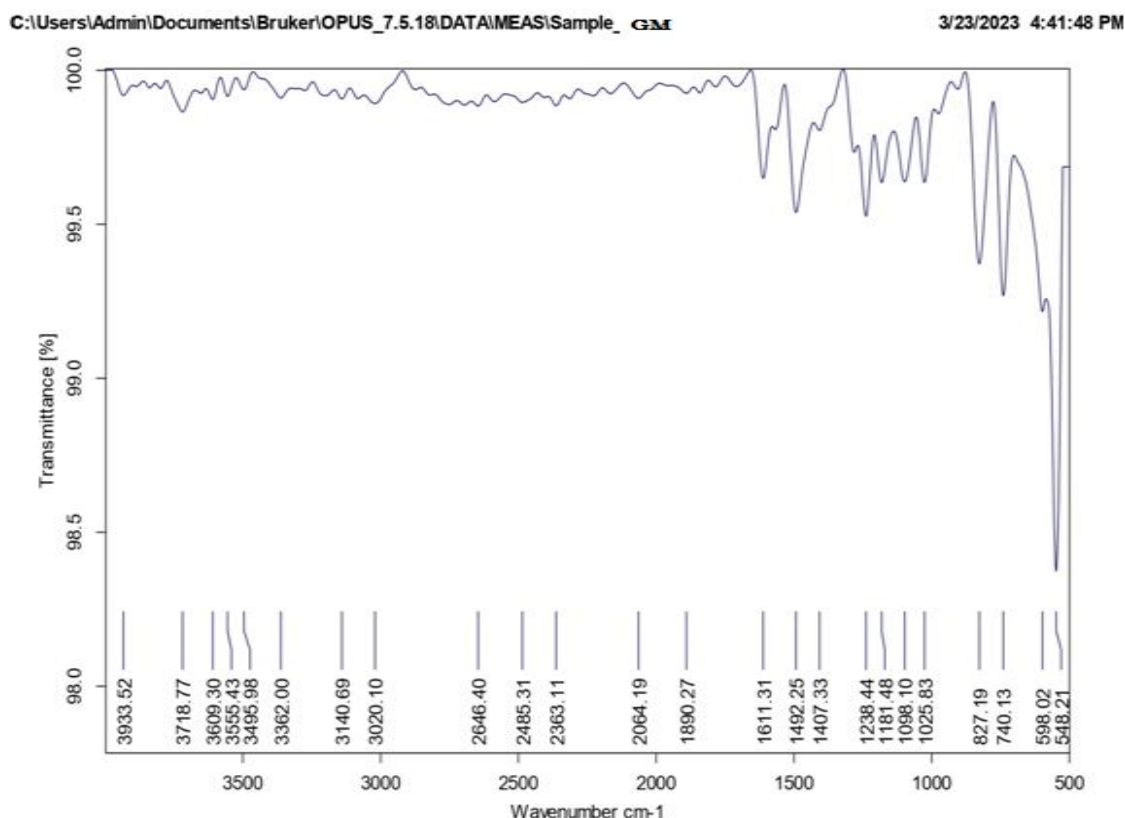


Fig 8..FT-IR Spectrum of Ni(II)Complex with 2-[(4-Methoxy-phenylimino)-methyl]-phenol ligand

X-RAY DIFFRACTION

Bruker (Eco D8 Advance) X-ray Diffraction Instrument. X-ray powder diffraction (XRD) is a rapid analytical technique primarily used for phase identification of a crystalline material and can provide information on unit cell dimensions. The analyzed material is finely ground, homogenized, and average bulk composition is determined. The intensities were corrected for empirical absorption effects using SADABS. The structure was solved by direct method. All non-hydrogen atoms were refined anisotropically by full-matrix least squares, with a riding model for the hydrogen atoms, using the SHELXTL package.

The 2θ value with maximum intensity of the peak for the compound was found to be $26.5511 (2\theta)$ which corresponds to $d = 3.35453 \text{ \AA}$. The 2θ values for the prominent peaks have been listed in. The entire important peaks have been indexed and unit cell calculations have been made for cubic symmetry of the complex. The observed values of interplanar distance have been compared with the calculated ones. It was observed that there is good agreement between the calculated and observed values. The experimental values of $\sin 2\theta / \text{common factor}$ are recorded for each peak in. The $(h^2 + k^2 + l^2)$ are 1, 2, 3, 5, 9, 12, 17, 20 and 30. The absence of forbidden no 7, 15, and 23 conforms the cubic symmetry. The experimental values are in good agreement with $(h^2 + k^2 + l^2)$ values of primitive type cubic cell, with lattice parameter equal to $a = b = c = 9.9518$. The target of X ray diffraction is to determine the probable structure of the metal complex. To accomplish this target we must be able to express mathematically the nature of the measured interference pattern in terms of the position of the various atoms within the crystal. Literature survey shows that transition metals complexes generally crystalline as well as amorphous in nature with tetrahedral, octahedral or square planar geometry.

In my present work, the powder X ray diffraction of complex of BH scanned in the range of $0 - 800$ at wave length 1.5406 \AA . The X ray diffraction was performed to obtain further evidence about the structure of the metal complex. The diffractogram of Ni-complex patterns were indicated crystalline nature of Ni-complex and square planar

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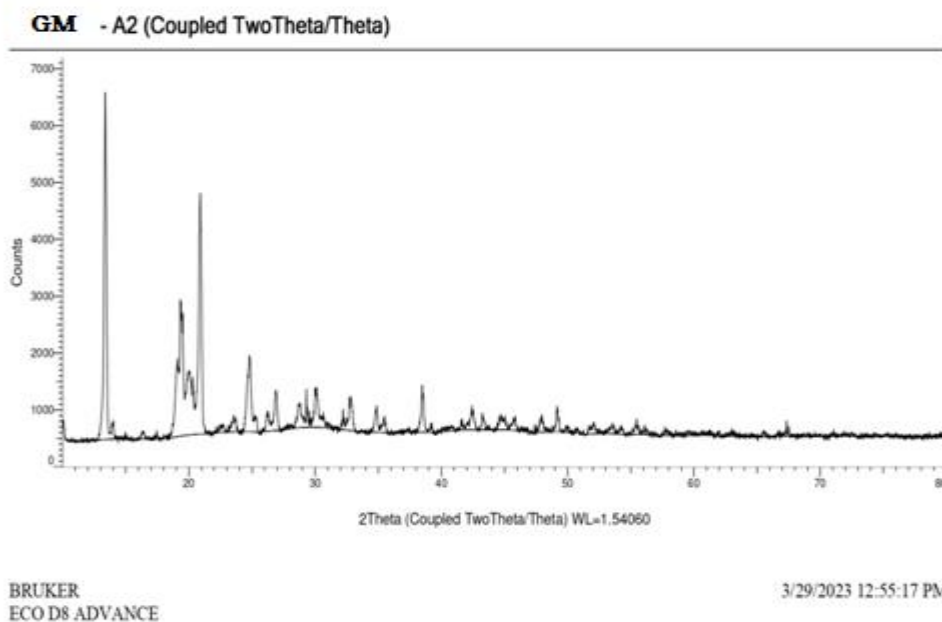


Fig. 9. XRD Spectrum of Ni(II)Complex with 2-[(4-Methoxy-phenylimino)-methyl]-phenol ligand

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Index	Name	Angle	d Value	Net Intensity	Gross Intensity	Rel. Intensity
0	Peak #1	13.386	6.60937	5878	6357	100.0 %
1	Peak #2	13.950	6.34318	233	718	4.0 %
2	Peak #3	16.354	5.41566	129	618	2.2 %
3	Peak #4	19.135	4.63443	1236	1765	21.0 %
4	Peak #5	19.414	4.56847	2067	2606	35.2 %
5	Peak #6	20.000	4.43603	1128	1685	19.2 %
6	Peak #7	20.898	4.24726	4180	4754	71.1 %
7	Peak #8	23.579	3.77015	266	879	4.5 %
8	Peak #9	24.795	3.58795	1338	1952	22.8 %
9	Peak #10	25.261	3.52277	256	866	4.4 %
10	Peak #11	26.252	3.39196	352	974	6.0 %
11	Peak #12	26.902	3.31147	703	1341	12.0 %
12	Peak #13	28.763	3.10138	394	1079	6.7 %
13	Peak #14	29.335	3.04216	443	1134	7.5 %
14	Peak #15	30.091	2.96743	675	1366	11.5 %
15	Peak #16	32.228	2.77537	343	995	5.8 %
16	Peak #17	32.814	2.72713	558	1193	9.5 %
17	Peak #18	34.851	2.57223	390	993	6.6 %
18	Peak #19	35.480	2.52809	266	861	4.5 %
19	Peak #20	38.506	2.33610	682	1286	11.6 %
20	Peak #21	41.629	2.16774	69.5	716	1.2 %
21	Peak #22	42.449	2.12776	334	983	5.7 %
22	Peak #23	43.295	2.08814	194	844	3.3 %
23	Peak #24	45.782	1.98030	170	811	2.9 %
24	Peak #25	47.940	1.89608	250	855	4.3 %
25	Peak #26	49.192	1.85072	384	998	6.5 %
26	Peak #27	49.927	1.82519	116	724	2.0 %
27	Peak #28	53.560	1.70963	167	749	2.8 %
28	Peak #29	54.249	1.68954	116	688	2.0 %
29	Peak #30	55.465	1.65534	263	833	4.5 %
30	Peak #31	67.322	1.38973	176	710	3.0 %

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Index	1
Name	03.L A2.raw #1
Parent	2Theta
Sample Name	CHE 016 - A2
File Name	CHE 016 - A2.raw
Scan Type	Coupled TwoTheta/Theta
Scan Status	Completed
Start	10.000
End	80.008
Step Size	0.020
Time per Step	32.0
Temperature	25 °C (Room)
Goniometer radius	255.0
2-theta	10.000
Theta	5.000
Anode	Cu
ka1	1.54060
ka2	1.54439
ka2 Ratio	0.50000
kβ	1.39222
Generator kV	40.0
Generator mA	25.0
Detector Name	LynxEye
Detector opening angle	2.452
Sample rotation speed	0.000
Slit Mode	Fixed
Compute Crystallinity	Yes
Crystallinity - From	10.000
Crystallinity - To	80.008
%-Crystallinity	70.3 %
%-Amorphous	29.7 %
Global Area	388.0
Reduced Area	272.7
Operator Name	Lab Manager
Creation Date/Time	3/29/2023 12:55:17 PM

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6. CONCLUSION

In this present work, 2-[(4-Methoxy-phenylimino)-methyl]-phenol ligand With Ni(II)Complex was synthesized successfully and characterized by EDAX, UV, NMR, FT-IR, and XRD technique. The spectral data of this work were Coincide with the standard and proposed literature data.

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