

“SYNTHESIS, SPECTRAL CHARACTERIZATION AND MICROBIAL STUDIES OF 3-{(E)-[(2-HYDROXYQUINOLIN-3-YL)METHYLIDENE] AMINO}-2-(METHYLSULFANYL)QUINAZOLIN-4(3H)-ONE COMPOUNDS WITH METAL COMPLEXES”

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ABSTRACT

The complexes of the type ML_2 and $MLCl$ where $M = Co(II), Cu(II), Ni(II)$ and $Zn(II), Cd(II), Hg(II)$ and $L =$ Schiff's base ligand derived from condensation of 3-amino-2-mercapto quinazoline-4(H)-one hydrazide with 3-methylquinolin-2-ol. All the complexes have been characterized on the bases of elemental analysis, conductance measurements and magnetic susceptibility measurement studies. The molar conductance values, the magnetic susceptibility values suggesting them to be octahedral in nature.

Infrared spectral data suggests the neutral bidentate nature of the Schiff's base and coordinates to the metal ions. The 1H NMR and Mass spectral data support the assigned geometry to the complexes. Based on the elemental analysis, insolubility in organic solvents, high melting points and spectral results we have proposed the octahedral structure for $Co(II), Cu(II)$ and $Ni(II)$ complexes and monomeric tetrahedral geometry for $Zn(II), Cd(II)$ and $Hg(II)$ complexes. Schiff's base and its metal complexes have been screened for their biological activity.

Keywords: - Schiff's base, Metal complexes, Spectral studies and Antimicrobial studies.

INTRODUCTION

Coordination compounds have always been a challenge to the inorganic chemist. It was the genius, Alfred Werner, (D. Nicholls, 1973) that realized the co-ordination chemistry and made it to pave way of progress thus it gave way for the developments. Synthesis and structural studies of coordination compounds are certainly important and have been spurred by the progress of the theory of electronic structure. The later has provided insight in to the spectroscopic, magnetic, thermodynamic and kinetic properties of complexes. The development of newer and improved methods as well as easily available of sophisticated instruments is mainly responsible for the renaissance of coordination chemistry. The plenty of information available in

literature clearly indicates that coordination compounds promise to assume important practical roles (Hill and Day 1968).

Quinazolines are versatile nitrogen containing heterocyclic compounds, possessing broad spectrum of biological and pharmacological activities such as anticoagulant, anti-fibrillatory, cardiac stimulant, diuretic, anticonvulsant, antimitotic, anti-inflammatory, anti-HIV, antitubercular, anticancer and hypotensive (Algarswamy *et. al.* 2003). The substituted quinazolines are tested for In vitro antibacterial, antimicrobial and acetyl cholinesterase activities (Pramella, *et.al.* 1992). The 3-position of quinazolinones nucleus with a view to obtain the new molecules with improved hypotensive activity and blood pressure lowering activity (Baiocchi *et.al.* 1993). Some 4-anilino quinazolines have found to be potential and highly selective inhibitory of human immunoglobulin E and epidermal growth factor receptor tyrosine kinase (Mirdula *et.al.* 2002), which regulates the cell growth and proliferation. The quinazoline and their derivatives are well known for their biological activities.

EXPERIMENTAL

All the Chemicals used were of analytical grade and the compounds 3-Amino-2-mercaptoquinazoline-4(H)-one was prepared by the literature method (Srivastava, 1970), Alargar Swamy *et.al.* 2000).

a) Preparation of 3-Amino-2-(methylsulfanyl)quinazolin-4(3H)-One

The 3-Amino-2-(methylsulfanyl)quinazolin-4(3H)-One was prepared by using literature methods further reaction without purification hydrazine hydrate (0.2 mole) was added drop wise to a stirred 3-Amino-2-(methylsulfanyl)quinazolin-4(3H)-One (0.20 mole) in cold condition. After the completion of addition, stirring was continued for 2 hrs. At 60⁰ C and the mixture was poured into ice-water. The solid obtained was filtered washed with water dried and recrystallized from dimehtylformamide and ethanol

The Schiff's base used in the present study was prepared by the reaction between substituted 3-Amino-2-mercaptoquinazoline-4(H)-one (0.10 mole) in ethanol (25mL) and 3-methylquinolin-2-ol, (0.10mole) in ethanol (25mL). The reaction mixture was refluxed on water bath for about three hours. The light yellowish Schiff's base was separated out on partial removal of the solvent. The solution was cooled to room temperature, solids mass was filtered out, washed with ethanol and re-crystallized from ethanol. The synthesis of ligand is as shown in fig. Mol. Formula Mol. Wt. Yield and M. P. are reported in the table.

b) Preparation of Cu(II), Co(II), Ni(II), Zn(II), Cd(II) and Hg(II) Complexes of Schiff's base ligands

A hot ethanolic solution of substituted 3-*[(E)-[(2-hydroxyquinolin-3-yl)methylidene] amino]-2-(methylsulfanyl)quinazolin-4(3H)-one* ligand (0.10 mole) was added a hot ethanolic solution (25 ml) of metal(II) chloride (0.10 mol) the reaction mixture was refluxed on a water bath for 5-6 hrs. to get clear solution. 0.5 g of excess sodium acetate was added to the reaction mixture, just to adjust the pH of the solution. The reaction mixture was further, refluxed for 2 hrs more. The resulting mixture decomposed by pouring into a 100 ml of distilled water with stirring. The suspended solid complex was allowed to settle and collected by filtration, washed with sufficient quantity of distilled water and then with little hot ethanol to apparent dryness and dried in a vacuum over anhydrous calcium chloride in a desiccators (yield, 60-85%).

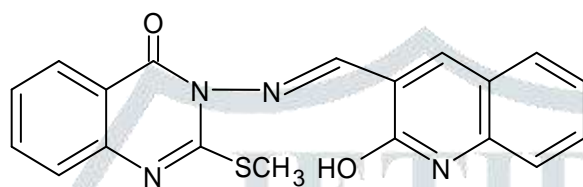


Figure-1

PHYSICAL MEASUREMENTS

All the complexes were analyzed for all metal content by standard procedure (Vogel A. I., 1962). CNH analyses were carried out micro analytically on a Perkin Elmer 240 C. Chloride was determined as AgCl. Electronic spectral of the Cu(II), Co(II) and Ni(II) complexes in DMF (10^{-3} M) solution were recorded using a Elico double beam UV-Vis. spectrophotometer in the range of 200-1100 nm. The conductance measurements were carried out on Elico Conductivity Bridge provided with a dip type conductivity cell fitted with platinum electrodes. The proton magnetic resonance spectra of ligand and their complexes were recorded on a 300MHz using TMS as internal standard and DMSO-D6 as a solvent. IR spectra of the ligand and there complexes were recorded in KBr pallets using IR Spectrometer in the range of $4000-350\text{cm}^{-1}$. The electron spin resonance spectra of all Cu(II) complexes in polycrystalline state (powder spectra) were recorded using tetracyanoethylene (TCNE) free radical as 'g' marker ($g=2.0027$) at room temperature, as well as variable temperature ESR. Magnetic susceptibility of the complexes were determined at room temperature by Gouy balance using mercury(II) tetrathiocyanato cobaltate(II) $\text{Hg}[\text{Co}(\text{SCN})_4]$ as the calibrant. The antimicrobial activities, the compounds synthesized in present investigation were screened for their antibacterial and antifungal activities by cup plate zone of inhibition technique.

RESULTS AND DISCUSSION

The physical appearance and analytical result show that all of the complexes have the stiochiometry ML_2 or MLX . The molar conductance values of the complexes in DMF(10^{-3} M) are in the range 22.45-26.15 $\text{Ohm}^{-1}\text{cm}^2\text{mole}^{-1}$ suggesting non electrolytes. All the complexes posses high melting point (decomposition)

are stable in air are partially or insoluble in common organic solvents and soluble in DMF, DMSO and pyridine.

i) Magnetic Properties

The magnetic susceptibility measurements at room temperature exhibits para magnetism for Co(II), Cu(II), and Ni(II) complexes. The six-coordinate Co(II) complexes exhibit magnetic moments of 4.88 B.M. (Table 1) suggesting octahedral geometry (Prigdis and Lewis, 1964) for Co(II). The Ni(II) complexes show magnetic moment values of 2.89 B.M. slightly higher than the spin only (2.83B.M.) value indicating an octahedral environment around Ni(II) . The observed magnetic moments for the Cu(II) complexes are 1.86 B.M. suggesting a distorted octahedral geometry around Cu(II).

ii) Electronic Spectral Studies

Electronic spectra studies of Cu(II), Ni(II) and Co(II), complexes were carried out in DMF (10^{-3} M) solution in the range of 1100–200nm. On the basis of electronic spectral data of the Cu(II), Ni(II) and Co(II), complexes the ligand field parameters such as Dq , B^1 , β , $\beta\%$, L.F.S.E. and ν_2/ν_1 ratio were calculated and recorded in the (Table 2).

The Cu(II) ion with d^9 configuration in the complex can be either a distorted octahedral or a tetrahedral. The octahedrally coordinated Cu(II), ion has the ground state ${}^2E_g (t_{2g})^6, (e_g)^3$. The only excited state should then be ${}^2T_{2g} (t_{2g})^5, (e_g)^4$, the energy difference being $10Dq$. The 2E_g ground state is highly susceptible to a John–Teller configurational instability and then no regular octahedrally coordinated Cu(II) complexes should exist and this is in accordance with experimental finding of Orgal and Dunita.

The present Cu(II) complexes under investigation exhibit a single broad asymmetric band in the region $12710-16850 \text{ cm}^{-1}$ the asymmetry being on the lower energy side. These observations suggest that all the Cu(II) complexes have a tetragonally distorted octahedral structure. The broadness of the band may be due to dynamic John–Teller distortion. The results are given in respective table.

The Co(II) ion posses the electronic structure $3d^7$ and occurs in both octahedral and tetrahedral geometry. In octahedral Co(II) complexes three spin–allowed transitions are expected corresponding to the transition.

The present Co(II) complexes exhibit two absorption bands in the region $9475 \text{ cm}^{-1}, 19390 \text{ cm}^{-1}$ and 24395 cm^{-1} in DMF (10^{-3} M) solution corresponding to ${}^4T_{1g} (F) \rightarrow {}^4A_{2g} (F)(\nu_2)$ and ${}^4T_{1g} (F) \rightarrow {}^4T_{1g} (P)(\nu_3)$ transitions respectively in an octahedral geometry. However the ν_1 band could not be observed due to the limited spectral range of the instrument and hence these values were calculated using band fitting procedure and found to be in the range of 9475 cm^{-1} . The spectral band position in DMF solutions are data represented in the respective tables. The ligand field parameters Dq and B^1 have been calculated by using the equation fit for ν_2 and ν_3 transition (Hiremath *et.al.* 2001). The calculated values of ligand field stabilization energy 23.90 kcal and ν_2/ν_1 ratio 2.04 are indicative of octahedral stereochemistry for the present Co(II) complexes. All these observations favor an octahedral configuration to the Co(II) complexes.

The ground state of Ni(II) ion in octahedral coordination is ${}^3A_{2g} (t_{2g}^6 e_g^2)$, Ni(II) complexes show three transition in an octahedral field.

The electronic spectra of Ni(II) complexes, under present investigation exhibit two bands in the region 10869, 15267 cm^{-1} and 25641 cm^{-1} in solution state (DMF). These transitions are assigned to ${}^3T_{1g}(F) \rightarrow {}^3A_{2g}(F)\nu_2$ and ${}^3T_{1g}(F) \rightarrow {}^3T_{1g}(P)(\nu_3)$ respectively, in an octahedral geometry.

The calculated values of ligand field stabilization energy 32.05 kcal and ν_2/ν_1 ratio 1.59 is indicative of octahedral stereochemistry for the present Ni(II) complexes. All these observations favor an octahedral configuration to the Ni(II) complexes.

iii) Infrared Spectra of Cu(II), Co(II), Ni(II), Zn(II), Cd(II) and Hg(II) complexes.

The infrared spectral study of metal complexes gives valuable information about the nature of metal ligand bond, molecular symmetry, electronic distribution and stability of the complexes. The coordination causes changes in vibrational frequencies of the ligand, appearance of new bands, splitting of the degenerate modes due to the lowering of symmetry or intensification of spectra in the complexes (Nakamoto 1971).

In this present investigation, the frequency shift splitting, change in intensity of the ligand bands caused by the complex formation when they coordinate to the metal ion have been discussed. The important infrared frequencies of the ligands and their corresponding metal complexes have been presented in the (Table 3).

In view of these reports in the present study the medium strong intensity band in the region 1710 cm^{-1} in free ligand are assigned to quinazoline $\nu(\text{C}=\text{O})$ stretch. The Shifting of these bands to lower wave number side in the complexes indicates the bonding through oxygen of quinazoline $\nu(\text{C}=\text{O})$ group and they become weak or splits in some of the complexes. This indicates the coordination of carbonyl oxygen to metal ion in all complexes. Many worker have reported chromene $\nu(\text{C}=\text{O})$ vibration of Schiff's bases in the various region (Raman *et.al.* 2002) have assigned $\nu(\text{C}=\text{O})$ band in free ligands in the region 1660 and 1643 cm^{-1} these bands are shifting to lower wave number side in the complexes indicates in the bonding through oxygen of chromene $\nu(\text{C}=\text{O})$ group and these become weak or split in some complexes.

Many workers have reported $\nu(\text{C}=\text{N})$ vibrations of Schiff's bases in various regions. Hankare *et.al.* (2001) have assigned -C=N- of imino band in the range 1647–1637 cm^{-1} . In the complexes these bands appear in the range 1630–1610 cm^{-1} these bands are shifted to lower wave number by $10 \pm 5 \text{ cm}^{-1}$ indicating the coordination through azomethine nitrogen. Subrammaniyam *et.al.* (1988), have reported that the bands due to $\nu(\text{C}=\text{N})$ appears around 1620 cm^{-1} in the case of salicylaldimino-biacetylmono hydrazones.

The interpretation of these shifts depends upon the attribution of the observed frequency to $\nu(\text{C}=\text{N})$ vibrations. Based on these reports, the present Schiff's bases shows the band in the region 1612 cm^{-1} due to $\nu(\text{C}=\text{N})$ vibrations. These bands in complexes shift to lower frequency side about 15-50 cm^{-1} and appear in the region 1572–1561 cm^{-1} indicating involvement of azomethine nitrogen in bonding with metal ions.

The mercapto $\nu(\text{SCH}_3)$ band in the free ligand SL_1 bands are observed at 2558 and 2523 cm^{-1} these bands are unaltered or shifted to higher wave number side this indicated non-involvement of $\nu(\text{SCH}_3)$ group in the all complex formation.

ν M-O and ν M-N stretches

The assignment of the band to various $\nu(\text{M-O})$ and $\nu(\text{M-N})$ vibrations in the lower frequency region appears too complicated as the ligand vibration interfere in this region. The assignment made here is therefore tentative and are based on the previous works. The low frequency skeletal vibrations due to $\nu(\text{M-O})$ and $\nu(\text{M-N})$ stretching provide direct evidence for the complexation. Cohan and Rauf (1996), have reported the bands in the region 520-510 cm^{-1} and 450-445 cm^{-1} to $\nu(\text{M-O})$ and $\nu(\text{M-N})$ vibrations respectively. The $\nu(\text{M-N})$ band is usually sharp and strong whereas $\nu(\text{M-O})$ band is generally broad and strong and occurs in the higher frequency side than $\nu(\text{M-N})$ vibrations. This is because a large dipole moment change is involved in the vibration of $\nu(\text{M-O})$ bond in comparison to that of $\nu(\text{M-N})$ bond.

In view of these assignments the non-ligand weak intensity bands observed in the complexes in the region 426-436 cm^{-1} are assigned to $\nu(\text{M-N})$ stretching vibrations in all the complexes and the bands in the region 525-534 cm^{-1} are assigned to $\nu(\text{M-O})$ stretching vibrations in the present study, in all the complexes.

$\nu(\text{M-Cl})$ stretch

The $\nu(\text{M-Cl})$ stretching vibrations are sensitive to the oxidation state and coordination number of central metal ion and useful in predicting the stereochemistry of the complexes, many authors have reported $\nu(\text{M-Cl})$ stretching vibrations in the region 347-364 cm^{-1} .

iv) ^1H NMR Characterization of the Schiff's base ligand SL_1

The Schiff's base Ligand SL_1 showed a sharp peak appears at δ 8.51 (s, 1H, CH=N) due to azomethine group. The nine aromatic protons due to quinazoline and chromene in the phenyl ring have resonated in the region δ 6.92-7.83 (m, 9H, Ar-H) as a multiplet for SL_1 Schiff's base ligands respectively. The mercapto proton has observed in the ligand at δ 2.56 (s, 1H, -SCH₃)

^1H NMR spectrum of Cd(II) complex of ligand SL_1 The azomethine proton has shifted from δ 8.51 to 8.58 (s, 1H, -N=CH) due to coordination of N atom with the metal ion. The nine aromatic protons have observed in the region δ 6.96-7.89 (m, 9H, Ar-H) as a multiplet. The mercapto proton has observed there is no change in proton δ 2.56 (s, 1H, -SCH₃).

v) ESR spectra of Cu(II) complexes

ESR spectral studies of Cu(II) complexes are of much interest because of their ground state are orbitally degenerate in regular geometry and non-degenerate in distorted geometry. Since an orbitally degenerate configuration is susceptible to John-Teller distortion (John and Teller, 1937). Basically the

interpretation of the ESR spectrum of an isolated transition metal ion yields values for two kinds of parameters(1). The spectroscopic splitting constants (g-values) which describe the frequencies between the different electron spin state and (2) the hyper fine coupling constant 'A' which gives a measure of electron spin–nuclear spin interactions. These parameters are affected by the presence of ligand around the central metal ion.

The $g_{||} > g_{\perp}$ values suggest a distorted square pyramidal structure the unpaired electrons lie in the $d_{x^2-y^2}$ orbital with ${}^2B_{1g}$ as the ground state. From the observed values it is evident that the unpaired electrons lie predominantly in the $d_{x^2-y^2}$ orbital with ${}^2B_{1g}$ as the ground state characteristics of elongated octahedral geometry. The complex also show anisotropic ESR spectra with $g_{||} > g_{\perp}$ characteristics of square pyramidal geometry. The $g_{||}$ is the most sensitive function for indicating the covalency being 2.5 or more for ionic compounds and less than 2.5 for covalent compound

If the values of 'G' is greater than '4' the exchange interaction negligible, if 'G' values of less than '4' indicate considerable interaction in solid complexes. The present 'G' values are found to be in the region 4.208 for Cu(II) complexes (Table No.4). It indicates that there is some exchange interaction operating in the solid state (Bew *et. al.* 1972).

MICROBIAL STUDIES

The biological and medicinal potency of coordination compounds has been established by their antitumor, antiviral and antimalarial (Jones *et.al.* 1969) activities. This characteristics property has been related to the ability of the metal ion to form complexes (Kalyman *et.al.*1983). with ligand containing sulphar, nitrogen, and oxygen donor atoms.

The biological activity of any compound or complex is the combination of steric, electronic and pharmacokinetic factors. A possible explanation for the toxicity of the complexes has been postulated in the light of chelation theory (Srivastav 1981). It was suggested that the chelation reduces considerably the charge of the metal ion mainly because of partial sharing of its positive charge with the donor groups and possible n-electron delocalisation over the whole chelate ring. This increases the lipophilic character of metal chelate which favour its permeation through lipid layer's of fungus membranes.

Quinazolines are versatile nitrogen containing heterocyclic compounds, possessing broad spectrum of biological and pharmacological activities such as hypotensive, anticancer, anti-HIV, anti-inflammatory, analgesic, antiviral, anti-tubercular, antimicrobial anti-bacterial, antipyretic, anti-mitotic, anti-convulsant, anti-coagulant, anti-fibrillatory, cardiac stimulant and diuretic (Tripti *et.al.* 2006). The 4(3H)-one quinazolines have been tested successfully against cancer and HIV virus (Seth and Parmar 1965). Their synthetic analogues possess anti-malarial, CNS depressant, hypolipidemic and anti-proliferative activities. The coordination chemistry of quinazoline ligands has received much attention because of its biological implications. The

complexes show enhanced antitumor, antifungal and antibacterial activities compared to the free ligand (Allen *et.al.* 1993).. Quinazoline are opportunistic infections with pneumocystis carinii and toxoplasma gondii are a major cause of morbidity and mortality in patients with the acquired immunodeficiency syndrome(AIDS). The sensitivity of the gram positive bacterial to the tested quinazolines was higher than that of gram negative bacteria (Mills and Masur, 1991).

From the (Table 5) it is clear that many of ligand and complexes are active towards the organisms used except few of the complexes. The results suggest that metal chelates exhibit higher antibacterial and antifungal activity then that of their free ligand and metal ions. In the case of antibacterial activity all the ligands exhibit more activity then the metal ions. This shows that the Schiff's base, ligands complexes are biologically active compounds.

The Cd(II), Co(II) and Ni(II) complexes in all ligands are moderately active then the ligands toward bacteria *E-coli* and as well as *pseudomonas*. The Cu(II) and Zn(II) complexes are highly active towards bacteria *pseudomonas* and *E-coli* are compared to ligands and the complexes.

All Zn(II) and Cu(II) complexes of all ligands are more active than the ligands where as all other complexes Cd(II), Co(II) and Ni(II) are moderately active against *A-fumigatus* as well as *A-niger*.

In general it is observed that the all complexes more active against fungi tested and all other ligands are less or mordantly active. The results of antibacterial and antifungal activity have been revealed that some of the ligands and complexes have shown a very good activity. It may be because of the presence of metal ion in the complexes form.

CONCLUSION

Based on the stiochiometry and spectro-chemical studies the ligands AMQODC is neutral bidentate, coordinating through the oxygen and nitrogen present in the group. Some of the complexes posses 1:2 (M:L) stiochiometry and we suggest octahedral dimeric structure based on high melting point, insolubility in common organic solvents, analytical and spectral data to Cu(II), Co(II) and Ni(II). Some of the complexes 1:1(MLX) stiochiometry and we suggest that the complexes monomeric tetrahedral structure to Zn(II), Cd(II) and Hg(II) complexes figure-2.

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Table - 1

Physical, Analytical data, Magnetic Susceptibility and Molar Conductance data of [AMQODC] SL₁ ligand and its complexes

Ligand / Complex	Mol. Wt	M.P °C	Yield %	Elemental analysis (%)						μ_{eff} B. M.	Molar conductance $\Delta\text{ohm}^{-1}\text{cm}^2$ mole ⁻¹
				Found / (Calculated)							
				M	C	H	N	S	Cl		
[C ₁₉ H ₁₄ N ₃ O ₂ S ₁]	362.40	280	85	--	62.97 (62.67)	3.89 (3.75)	15.46 (15.58)	8.85 (8.91)	--	--	--
[Cu(C ₃₈ H ₂₆ N ₈ O ₄ S ₂)]	786.03	354	70	8.08 (8.20)	58.04 (57.92)	3.33 (3.45)	14.25 (14.37)	8.16 (8.27)	--	1.86	22.45
[Co(C ₃₈ H ₂₆ N ₈ O ₄ S ₂)]	782.73	335	65	7.53 (7.64)	58.31 (58.47)	3.48 (3.570)	14.32 (14.38)	8.19 (8.24)	--	4.88	24.20
[Ni(C ₃₈ H ₂₆ N ₈ O ₄ S ₂)]	781.48	365	60	7.51 (7.70)	58.40 (58.32)	3.35 (3.40)	14.34 (14.48)	8.21 (8.32)	--	2.89	23.30
[Zn(C ₁₈ H ₁₁ N ₄ O ₄ S ₁)Cl]	448.23	380	65	14.59 (14.57)	48.23 (48.51)	2.47 (2.81)	12.50 (12.61)	7.15 (7.24)	7.91 (7.28)	Dimag.	26.15
[Cd(C ₁₈ H ₁₁ N ₄ O ₄ S ₁)Cl]	495.23	385	64	22.70 (22.35)	43.65 (43.48)	2.24 (2.36)	11.31 (11.45)	6.47 (6.59)	7.16 (7.24)	Dimag.	25.10
[Hg(C ₁₈ H ₁₁ N ₄ O ₄ S ₁)Cl]	583.41	389	72	34.38 (34.12)	37.06 (37.19)	1.90 (1.82)	9.60 (6.74)	5.50 (5.33)	6.08 (6.15)	Dimag.	22.90

Table -2

Ligand	Complexes (Molecular Formula)	Transition in cm ⁻¹			Dq cm ⁻¹	B ¹ cm ⁻¹	β	$\beta\%$	v ₂ / v ₁	L.F.S.E. k.cal.
		v ₁ *	v ₂	v ₃						
SL ₁	[Co(C ₃₈ H ₂₆ N ₈ O ₄ S ₂)]	9475	19390	24395	1029	771	0.75	21.30	2.04	23.90
SL ₁	[Ni(C ₃₈ H ₂₆ N ₈ O ₄ S ₂)]	10869	15267	25641	935	832	0.80	19.76	1.40	32.05
SL ₁	[Cu(C ₃₈ H ₂₆ N ₈ O ₄ S ₂)]	12710-16850			1448	--	--	--	--	24.78

Table – 3

Infrared Spectra of the Schiff's base ligand [SL₁] and its Complexes

Ligand / Complexes	quinazole	quinoline	ν _{C=N}	ν _{M-O}	ν _{M-N}	ν _{M-Cl}
	ν _{C=O}	ν _{C=N}				
SL ₁	1710	1558	1612	--	--	--
Cu	1660	1562	1569	532	428	--
Co	1656	1568	1576	534	435	--
Ni	1652	1562	1565	528	425	--
Zn	1668	1570	1567	530	426	347
Cd	1660	1572	1557	525	429	364
Hg	1670	1561	1566	531	436	352

Table – 4

ESR Spectral Parameters of Cu(II) complexes .

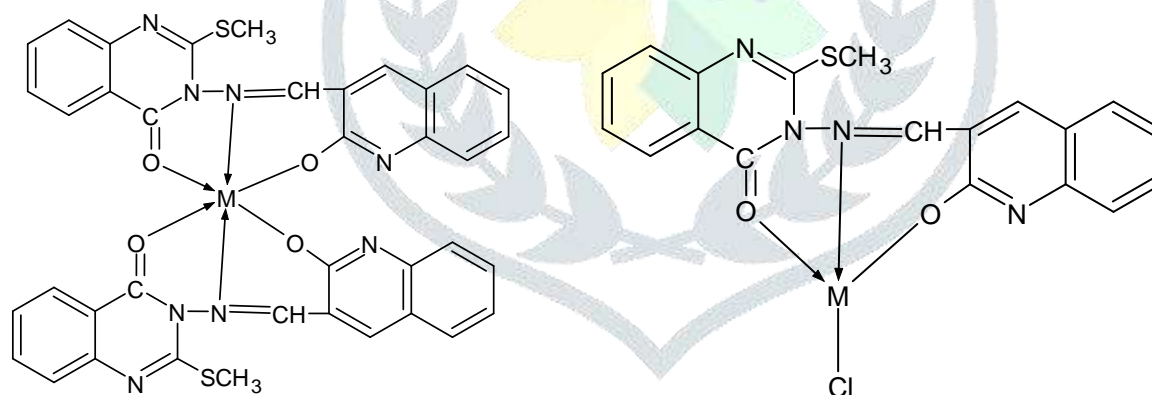
Ligand	Molecular Formula	g	g _⊥	g _{av}	g _{iso}	G
SL ₁	[Cu(C ₃₈ H ₂₆ N ₈ O ₄ S ₂)]	2.230	2.041	2.105	2.168	4.208

Table - 5

Antibacterial and Antifungal activity Results of Schiff's base and its metal complexes

Ligand/Complexes	Zone of inhibition (m.m)			
	Bacterial		Fungal	
	<i>E.Coli</i>	<i>S.aurios</i>	<i>A.niger</i>	<i>A.fumigatus</i>
SL ₁	13	11	10	11
Cu SL ₁	18	17	16	17
Co SL ₁	14	13	13	14
Ni SL ₁	15	14	14	13
Zn SL ₁	19	17	18	17
Cd SL ₁	14	15	13	14
Standard				
Streptomycin	24	22	--	--
Nystatine	--	--	25	26
Control (DMF)	08	08	04	04

Proposed structure for the metal complexes of the Schiff's base ligands



M=Cu(II),Co(II) and Ni(II)

M= Zn(II), Cd(II) and Hg(II)

Figure-2

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