# Synthesis, Characterization and Spectroscopic Technique Analysis of 3-[3-(1H-Indol-3-yl)Acryloyl]-4-Hydroxy-6-Methyl-2H-Pyran-2-one and their metal complexes

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Abstract: In the present research article, the some of first transition series metal complexes derived from (4-hydroxy-3-[3-(1H-indole-3-yl)-acryloyl]-6-methyl-2H-pyran-2-one) were synthesized from Dehydroacetic acid and Indole-2-carboxaldehyde. They correspond well with the general formula  $[M(L)_2(H_2O)_2]$ , where M = Mn(II), Co(II), Ni(II) and Cu(II) and  $[M(L)_2(Cl)(H_2O)]$ , where M = Fe(III) and  $L = C_{17}H_{13}NO_4$ . The ligand was characterized on the basis of elemental analysis, UV, IR, IR

Keywords: Magnetic susceptibility; Chalcone; ligand; XRD; Antimicrobial activity.

#### I. INTRODUCTION

A number of schemes for the preparation of the chalconebuilt on the formation of carbon-carbon bond have been described. Amongstthe straightaldol condensation and ClaisenSchmidt condensation statictake place prominent site  $^{1,2}$ . The leadingway for the preparation of chalcones is the conventionalClaisen-Schmidt condensation in the existence of aqueous alkaliBa(OH) $_2$ <sup>3,4</sup>.On the other handseveral of this approacheshurt from strict reaction circumstances, poisonous reagents, strong acidic as well as basic conditions, lengthyreaction period, low yield and low selectivity. While, some changes have been complete to counter these difficulties. There is yet aessential for the improvement of choosy and improved schemes for the preparation of  $\alpha$ ,  $\beta$ -unsaturated carbonyl compounds  $^{1,2}$ . Ainvestigation of the literature review shown that no work has been complete on transition metal chelates of the chalconeresulting from dehydroaceticacid plus Indole-3-carbox aldehyde. The chelates of Copper(II), Nickel(II), Cobalt(II) Manganese(II) and Iron(III) through this ligand were too synthesized in the solid state then characterized by different analytical, spectral and thermal techniques.

#### II. MATERIAL AND METHODS

Dehydroacetic acid for synthesis was obtained from Merck, Germany & used as supplied. Indole-3-Carboxaldelyde of A.R. grade obtained from AVRA chemicals were used for the synthesis of the ligands. A.R. grade hydrated metal chlorides from Thomas Baker were used for the preparation of the complexes. The carbon, hydrogen & nitrogen content in each sample were measured on a Perkin Elmer (2400) CHNS Analyzer. The IR spectra (KBr), in the range of 4000-450 cm<sup>-1</sup> were recorded on a Perkin Elmer (C-75430) IR spectrometer. The  $^{1}$ H-NMR spectrum of the ligand was measured in CDCL<sub>3</sub>onBruker instrument. The mass spectrum of the ligand was measured in Qc-01 DAD Mass-spectrometer,X-ray diffractograms of the all chelates was recorded in 2 $\theta$  range of 5-70 $^{0}$  by copper Ka radiation initiator at a wavelength of 1.540598 A $^{0}$  at normal temperature. The Ultra-Violet visible spectra of the complexes were recorded on a Shimadzu UV-2202 Spectrophotometer. Magnetic susceptibility measurements of the complexes were performed using a Gouy balance at room temperature using Hg [Co (SCN)<sub>4</sub>] as the calibrant.

# **Synthesis of the Ligand:**

A 0.01 mol of Dehydroacetic acid (DHA), then add fewdrops of piperidine base with constant stirringand then lastly add 0.01 mole of Indole-3-Carboxaldelyde in 30ml of chloroform solvent were refluxed for 6-8 hours, after some times approximately 10 ml of the chloroform-water azeotropecombination was separated by purification<sup>1,2</sup>. Solid type of crystal product separated on sluggishvanishing of the residual chloroform solvent. The subsequent precipitate was filtered using standard funnel, simultaneously washed sometimesthrough ethanol and recrystallization carried out bythe chloroform solution<sup>5,6</sup>.

## Reaction:

Scheme 1: Synthesis of Ligand

Analysis of Chalcone Ligand is carried out through CHN analyser, UV spectra, IR spectra, <sup>1</sup>H-PMR Spectra and Mass Spectra.

# **Preparation of Metal Chelates:**

A weigh out 0.2 mole of ligandin slight more was taken in 100ml capacity RBF having 20 ml of dimethyl formamide solvent and dissolvedabsolutely. Alternately the solution of 0.01 mole of metal chloride salt in 20 ml of dimethyl formamide solvent was formerly mix drop by drop to the solution of the ligand. The reaction mixtures remained refluxed for 2 to 3-hours for proper completion of complex and then cooled to get the subsequent metal chelates. If the chelates were not produced after cooling then the reaction mixture was moved on cold distilled water. Theproper precipitate was digested for half an hour. Then the solid crystal type metal chelate (precipitate) separated out was formerly filtered in warm condition. Precipitate was washed with lot of cold dimethyl formamide solution, trailed by petroleum ether solvent(40-60°C) and then finally dry in vacuum desiccator completed anhydrous granular calcium chloride<sup>1,2</sup>.

## **Reaction:**

when X= Cl, M=Fe(III) and X=H<sub>2</sub>O M=Mn(II), Co(II), Cu(II), Ni(II)

## Procedure for the antimicrobial activity:

The ligand and its metal complexes were screened for *in vitro* antibacterial activity against Gram-positive i.e. *Bacillus Megaterium*, *Bacillus Cereus*and Gram-negative i.e. *Escherichia Coli*, *Shigellaboydii* by the paper disc plate method<sup>7</sup>. The compound were tested at concentrations of 1.0 mg ml<sup>-1</sup> in DMSO (0.1ml) was placed on a paper disk (6mm in diameter) with the help of micropipette and compared with a known antibiotic, *viz. Ciprofloxacin* at the same concentrations. To evaluate the fungicidal activity of the ligands and the metal complexes, their effects on the growth of *Penicilliumnotatum*, *Saccharomyces Cerevisiae*and *AspergillusOryzae*were studied. The ligand and their corresponding metal chelates in DMSO were screened in vitro by the disc diffusion method<sup>8</sup>. The ligands and complexes were dissolved separately in DMSO to obtain concentration of 500 µg disc<sup>-1</sup>. The linear growth of the fungus was recorded by measuring the diameter of the colony after 96 hr. The diameters of the zone of inhibition produced by the complexes were compared with *Griseofulvin*.

#### III. RESULT AND DISCUSSION

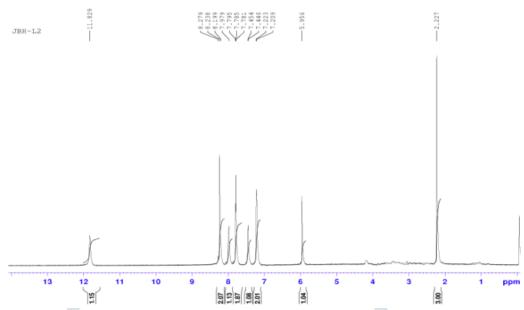
I) Physical and Analytical Study: The elemental studies illustration 1:2 (metal:ligand) ratio for entirely the chelates. The investigative information of the ligand and their metal chelates agreedhealthyby the common formula  $[M(L)_2(H_2O)_2]$ , where M=Copper(II), Nickel(II), Cobalt(II) Manganese(II) and  $[M(L)_2(H_2O)(CL)]$ , where M=Iron(III),  $L=C_{17}H_{13}NO_4$ . The nonappearance of chlorine atom except in the Iron(III) chelate was obvious from the Vol-hard investigation and existence of coordinated water molecule was definite by TGinvestigation. Meanwhile a sole crystal of the chelates cannot be inaccessibleas of any common solvent, the probable structure was anticipated built on investigative, spectral, magnetic moment as well asthermogravimetric and differential thermal analysis evidences<sup>1,2</sup>.

Compound	M <sub>r</sub> gmol <sup>-1</sup>	Colour	Yield %	M.P. in	Found (Calcd.), %			
					M	C	Н	N
Ligand HL C <sub>17</sub> H <sub>13</sub> NO <sub>4</sub>	295	Yellow	62	225	4	68.09 (69.15)	4.15 (4.44)	4.52 (4.74)
C <sub>34</sub> H <sub>28</sub> ClFeN <sub>2</sub> O <sub>9</sub>	699	Golden	50	260	7.86 (7.98)	57.99 (58.35)	3.91 (4.03)	3.80 (4.00)
C <sub>34</sub> H <sub>30</sub> CuN <sub>2</sub> O <sub>10</sub>	690	Celadon	75	262	9.02 (9.21)	59.01 (59.17)	4.25 (4.38)	3.92 (4.06)
C <sub>34</sub> H <sub>30</sub> CoN <sub>2</sub> O <sub>10</sub>	685	Orange	70	282	8.51 (8.60)	59.45 (59.57)	4.30 (4.44)	3.98 (4.09)
C <sub>34</sub> H <sub>30</sub> MnN <sub>2</sub> O <sub>10</sub>	681	Brown	58	250	8.00 (8.06)	59.80 (59.92)	4.40 (4.44)	4.00 (4.11)
C <sub>34</sub> H <sub>30</sub> N <sub>2</sub> NiO <sub>10</sub>	685	Green Yellow	60	>300	8.42 (8.56)	59.50 (59.59)	4.31 (4.41)	4.05 (4.09)

Table 1.01: Physical and analytical records of ligandand their metal chelates

- II) Mass Spectra of ChalconeLigand: TheMass spectrumstudies of ligand as pure and intensesign to verifythe establishment of productthrough the remark of the mother ion peakat molecular massthe same value then this experimental in the mass fragmentation spectrum of ligand, that the mother ion peak seemflawless band at (296 m/e), this was a blamelesspromise for the formation of the ligand.
- III)  $^1$ H-NMR Spectra of ChalconeLigand: The  $^1$ H nuclear magnetic resonance spectrum of ligand in CDCl<sub>3</sub> at normal temperature appearances the subsequent signals.  $\delta$  2.22 (singlet, 3H, for methyl proton),5.95 (singlet, 1H, C<sub>5</sub>-hydrogen of dehydroacetic acidpraportion), 7.20-7.79 (multiplet, 5H, aromatic hydrogen in indole), 7.97 (doublet, 1H, olefinic proton from  $\alpha,\beta$ -unsaturated system), 8.23 (doublet, 1H, olefinic protonfrom  $\alpha,\beta$ -unsaturated system) and 11.82 (singlet, 1H, phenolic OH of dehydroacetic acid moiety) $^{9,10,11}$ . The  $^1$ H NMR spectra are shown in fig.1.01.

Fig.1.01: <sup>1</sup>HNMR Spectrum of Chalcone Ligand:



IV) IRSpectrumof Ligand and TheirChelates:

Appropriate infrared bands that deliverextensive physical sign for the formation of ligand and their metal chelates are particular in Table 1.02. The infrared spectra of ligand displaysspecific bands on 3402, 3132, 1747, 1697, 1242-1196 cm indicated to the v(N-H) stretching in indole moiety, v(OH) of the intramolecular phenolic assembly of the dehydroacetic acid, v (C=O) (lactone carbonyl in the ring of DHA), v(C=O) (acetyl carbonyl in the dehydroacetic acid moiety) and v (C-O) (stretching in phenolic group on DHA) stretching approach, respectively 1,2,12,13. In the FTIR spectrum of every metal complex, no band was detected in the area of 3165-3100cm<sup>-1</sup>. As an alternative, a wide-ranging band typical of v(OH) of chelation water molecule was detected in the area of 3400-3170cm<sup>-1</sup>. The existence of chelated water molecule was supplementary definite by the presence of a non-ligand band now the area 835-843cm<sup>-1</sup>. The nonappearance of v(OH) (Phenolic group) at 3120-3100cm<sup>-1</sup> ¹recommendssuccessivedeprotonating of the phenolic functional group and direction of phenolic oxygen atom to the transition metal ion. This was reinforced by an rising shift in v (C-O) (phenolic group)<sup>14</sup> by 15-40cm<sup>-1</sup>. The v (C=O) (acetyl carbonyl of DHA) was moved to lesser energy with related to the free ligand, signifying the involvement of the acetyl carbonyl of DHA in the chelation<sup>1,2,12,13</sup>. The infrared spectrum of entirely the compounds displayed a noticeable band at ≈1376 &≈972cm<sup>-1</sup>, distinctive of v (C-O-C) as well astrans –CH=CH- absorption. The occurrence of novel bands in the area of 640-460cm<sup>-1</sup> can be allotted to v (Metal-Oxygen) vibration<sup>1,2,15</sup>.

Table 1.02: Infrared spectroscopicfigures of ligandand their metal chelates

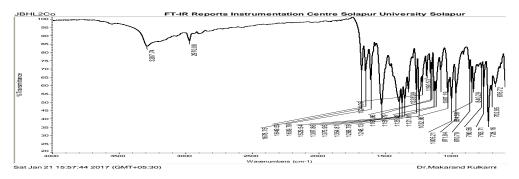
Ligand and Complex	v (N-H) (indole ring)	v (OH) (dehydroac etic acid moiety)	v (C=O) (lactone)	v (C=O) (acetyl carbonyl)	v (C-O) (phenol ic)	v (C=C) (trans)	v (M-O)
Ligand HL C <sub>17</sub> H <sub>13</sub> NO <sub>4</sub>	3402 <sub>(s)</sub>	3132 <sub>(s)</sub>	1747 <sub>(s)</sub>	1707 <sub>(m)</sub>	1242 <sub>(s)</sub>	997 <sub>(m)</sub>	-
C <sub>34</sub> H <sub>30</sub> CoN <sub>2</sub> O <sub>10</sub>	3287 <sub>(s)</sub>	-	1678 <sub>(s)</sub>	1649 <sub>(s)</sub>	1268 <sub>(w)</sub>	971 <sub>(w)</sub>	531 <sub>(w)</sub> 476 <sub>(m)</sub>
C <sub>34</sub> H <sub>30</sub> CuN <sub>2</sub> O <sub>10</sub>	3214 <sub>(m)</sub>	-	1680 <sub>(m)</sub>	1654 <sub>(s)</sub>	1270 <sub>(m)</sub>	975 <sub>(m)</sub>	560 <sub>(m)</sub> 480 <sub>(m)</sub>
C <sub>34</sub> H <sub>28</sub> ClFeN <sub>2</sub> O <sub>9</sub>	3296 <sub>(s)</sub>	-	1681 <sub>(s)</sub>	1647 <sub>(m)</sub>	1270 <sub>(s)</sub>	972 <sub>(s)</sub>	530 <sub>(s)</sub> 488 <sub>(s)</sub>
C <sub>34</sub> H <sub>30</sub> MnN <sub>2</sub> O <sub>10</sub>	3170 <sub>(m)</sub>	-	1675 <sub>(m)</sub>	1645 <sub>(w)</sub>	1268 <sub>(w)</sub>	974 <sub>(m)</sub>	560 <sub>(w)</sub> 462 <sub>(s)</sub>
C <sub>34</sub> H <sub>30</sub> N <sub>2</sub> NiO <sub>10</sub>	3307 <sub>(s)</sub>	-	1681 <sub>(s)</sub>	1647 <sub>(s)</sub>	1268 <sub>(s)</sub>	972 <sub>(s)</sub>	551 <sub>(m)</sub> 531 <sub>(s)</sub>

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Fig.1.02:- FTIR Spectra of Chalcone Ligand:

Fig.1.03:- FTIR Spectra of ComplexCobalt with ligand:



# V)Magnetic Measurements And UltravioletSpectra:

The magnetic susceptibility and UV spectral facts are specified in Table 1.03. The UV-visiblespectrum of the copper(II) chelate in dimethylforamidediscovered one broad band at 15130 and 25226cm<sup>-1</sup>for Chalconeligand, predictable to an<sup>2</sup>E<sub>g</sub> $\rightarrow$ <sup>2</sup>T<sub>2g</sub>transition and charge transfer spectra. The practical magnetic susceptibility value for the copper(II) chelateremained in the 2.08  $\mu_B$ . The UV spectroscopic facts <sup>16</sup>combined by the magnetic value propose a distorted octahedral confirmation for the copper(II) chelates <sup>1,2,17</sup>. The ultraviolet spectrum of Nickel(II) chelatespectacle three bands at 9412, 15622 then 24200cm<sup>-1</sup>for ligand, predictable to the <sup>3</sup>A<sub>2g</sub>  $\rightarrow$  <sup>3</sup>T<sub>2g</sub>(F) (v1), <sup>3</sup>A<sub>2g</sub>  $\rightarrow$  <sup>3</sup>T<sub>1g</sub>(F) (v2) also <sup>3</sup>A<sub>2g</sub>  $\rightarrow$  <sup>3</sup>T<sub>1g</sub>(P) (v3) alterations. This is in conformity by previously described values for octahedral Nickel(II) chelates <sup>1,2,18,19</sup>. The nickel(II) chelatemagnetic moment is 3.03  $\mu_B$  checks the suggested geometry. On the accordance this value the range stated for octahedral confirmation. The Cobalt(II) chelated is play three bands at the range of 9559, 18448 and 22665 cm<sup>-1</sup> for ligand predictable to <sup>4</sup>T<sub>1g</sub>(F)  $\rightarrow$  <sup>4</sup>T<sub>2g</sub>(F) (v1), <sup>4</sup>T<sub>1g</sub>(F)  $\rightarrow$  <sup>4</sup>T<sub>1g</sub>(F) (v2) and <sup>4</sup>T<sub>1g</sub>(F)  $\rightarrow$  <sup>4</sup>T<sub>1g</sub>(P) (v3) transitions <sup>1,2,17,20</sup>. The magnetic moment of the Cobalt(II) chelate is 4.66 $\mu_B$  it proposed octahedral configuration.

Table 1.03. Magnetic Susceptibility and UV spectra records (in DMSO) of the ligand and complexes.

Ligand and Complex	v /cm <sup>-1</sup>	Band assignment	μ <sub>eff</sub> / μ <sub>B</sub>	Geometry
Ligand HL	32442	INCT <sup>a</sup>		
$C_{17}H_{13}NO_4$	40545	INCT	-	-
	9559	${}^{4}T_{1g}(F) \rightarrow {}^{4}T_{2g}(F)(v_1)$		
$C_{34}H_{28}ClCoN_2O_9$	18448	$^{4}\mathrm{T}_{1g}(\mathrm{F}) \rightarrow ^{4}\mathrm{A}_{2g}(\mathrm{F})(\mathrm{v}_{2})$	4.66	Octahedral
	22665	$^{4}\mathrm{T}_{1g}(\mathrm{F}) \rightarrow ^{4}\mathrm{T}_{1g}(\mathrm{P})(\nu_{3})$		
C II CoN O	15130	$^{2}\mathrm{E}_{\mathrm{g}}\!\rightarrow^{2}\!\mathrm{T}_{2\mathrm{g}}$	2.00	Distorted
$C_{34}H_{30}CuN_2O_{10}$	25226	INCT	2.08	Octahedral
	14546	$^{6}A_{1} \rightarrow ^{4}T_{1}(G)$		Distanted
$C_{34}H_{30}FeN_2O_{10} \\$	21801	$1   {}^{6}A_{1} \rightarrow {}^{4}T_{2}(G)$		Distorted Oatabadgal
	24449	$^{6}A_{1} \rightarrow ^{4}E(G)$		Octahedral
	17789		5.77	Distorted
$C_{34}H_{30}MnN_2O_{10}$	19571	Laporte and spin forbidden		
	31060			Octahedral
C <sub>34</sub> H <sub>30</sub> N <sub>2</sub> NiO <sub>10</sub>	9412	$^{3}\text{A}_{2g} \rightarrow ^{3}\text{T}_{2g}(F)(v_{1})$		
	15622	${}^{3}A_{2g} \rightarrow {}^{3}T_{1g}(F)(v_{2})$	3.03	Octahedral
	24200	$^{3}A_{2g} \rightarrow ^{3}T_{1g}(P)(v_{3})$		

The Iron(III) chelate of Chalconeligand appearance three bands at 14546, 21801, 24449 cm<sup>-1</sup>predictable to the  $^6A_1 \rightarrow ^4T_1(G)$ ,  $^6A_1 \rightarrow ^4T_2(G)$  also $^6A_1 \rightarrow ^4E$  (G) transitions. The UV spectra put forward distorted octahedral geometry<sup>1,2,20,21</sup>. The ultraviolet spectrum of Manganese(II) chelate of ligand spectaclesfeeble bands at the 17789, 19571 plus 31060 cm<sup>-1</sup>. These

transitions are together Laporte plus spin-forbidden.On the other hand, caused bypromptdistortion of the octahedral configurationnearby the metal cation, feebletransitionsoccasionally do seem<sup>1,2,17,18,</sup>.

## VII) XRDStudy of Chalcone Ligand and its Metal Complexes:

The X-ray diffraction studies of newly prepared Copper(II), Nickel(II), Cobalt(II) Manganese(II) and Iron(III) complex with ligand was taken from Instrumentation Centre of Solapur University, Solapur. The powder X-ray diffractograms of the all chelates was recorded in  $2\theta$  range of  $5-70^{\circ}$  by copper Ka radiation initiator at a wavelength of 1.540598 A $^{\circ}$  at normal temperature.

The leading refluxes remained used to conclude resultant inter planar distances. The XRD was then indexed individually, miller indices were measured, lattice parameter a, b, c in addition to interfacial angles  $\alpha$ ,  $\beta$ ,  $\gamma$  remained define by powder-X computer software programme<sup>1,2</sup>. The above X-ray diffraction data of transition metal complex has been tabulated in the following Fig.1.04 and tables 1.04 are as fallows.

Fig. 1.04: X-ray Diffractogram of Cu-Ligand:

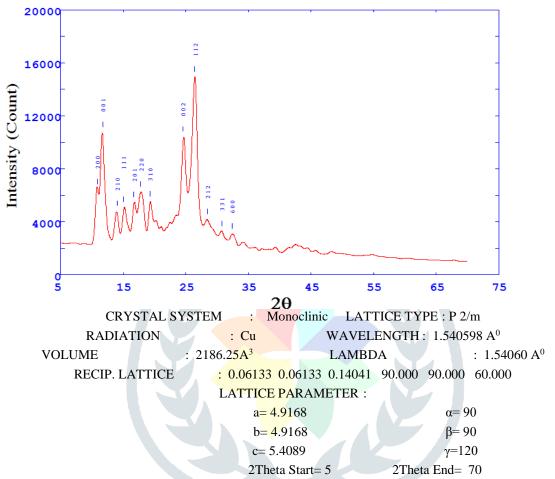


Table 1.04 :XRD data of Cu-Ligand Complex

	Table 1:04 :2000 data of Cu-Digana Complex							
Н	K	]	L TH(OBS)	TH-ZERO	TH(CALC)	D(OBS)	D(CALC	RI%
2	0	0	5.41986	5.62366	5.42190	7.86069	8.15228	33.2
0	0	1	5.87839	6.08218	6.20896	7.27008	7.12219	54.2
2	1	0	7.02469	7.22848	7.18058	6.12192	6.16254	23.1
1	1	1	7.52906	7.73285	7.79464	5.72482	5.67971	23.6
2	0	1	8.35440	8.55819	8.25715	5.17626	5.36360	24.2
2	2	0	8.90463	9.10842	9.41937	4.86597	4.70672	30.0
3	1	0	9.63826	9.84205	9.80771	4.50645	4.52207	24.1
0	0	2	12.25183	12.45562	12.49237	3.57143	3.56110	52.8
1	1	2	13.21473	13.41852	13.37187	3.31936	3.33073	76.5
2	1	2	14.22348	14.42727	14.46734	3.09170	3.08332	17.4
3	3	1	15.36978	15.57357	15.56064	2.86916	2.87149	13.4
6	0	0	16.19512	16.39891	16.46720	2.72843	2.71743	12.4

From the X-ray diffraction spectrumanalyzed data were illustrated in above Table 1.04 that the Cu(II) complex have a Monoclinic crystal system<sup>22</sup>.

## **Antimicrobial Activity:**

Antimicrobial activity was assayed by paper disc plate method by measuring inhibition zones in mm. in vitro antimicrobial activity of all synthesized compounds and standard have been evaluated against four strains of bacteria which include *Bacillus Megaterium*, *Bacillus Cereus* Gram-negative i.e. *Escherichia Coli, Shigellaboydii* against three

fungal strains like *Penicilliumnotatum*, *Saccharomyces Cerevisiae* and *AspergillusOryzae*. The standard used was *Ciprofloxacin* and *Grysofulvin*.

	Inhibition zone of bacterial & fungal growth in mm									
Compound		Antimicrol	oial activity	Antifungal activity						
	Bacillus Megateriu m	Bacillus Cereus	Escherich ia Coli	Shigellab oydii	Penicilli umnotat um	Saccharo myces Cerevisia e	Aspergill usOryzae			
	Conc <sup>n</sup> ,1m	Conc <sup>n</sup> ,1	Conc <sup>n</sup> ,1m	Conc <sup>n</sup> ,1m	Conc <sup>n</sup> ,0.	Conc <sup>n</sup> ,0.	Conc <sup>n</sup> ,0.			
	g/ ml	mg/ ml	g/ ml	g/ ml	5mg/ ml	5mg/ ml	5mg/ ml			
Ligand HL C <sub>17</sub> H <sub>13</sub> NO <sub>4</sub>	10	08	08	12	04	-	02			
C <sub>34</sub> H <sub>28</sub> ClCo N <sub>2</sub> O <sub>9</sub>	22	12	19	13	12	10	10			
C <sub>34</sub> H <sub>30</sub> CuN <sub>2</sub> O <sub>10</sub>	24	14	24	23	14	12	14			
C <sub>34</sub> H <sub>30</sub> FeN <sub>2</sub> O	20	16	08	12	10	-	-			
$C_{34}H_{30}MnN_2$ $O_{10}$	26	20	10	16	11	18	16			
C <sub>34</sub> H <sub>30</sub> NiN <sub>2</sub> O	16	14	18	18	12	20	18			
Ciprofloxaci n	36	54	32	30	-	-	-			
Grysofulvin	-		-	- 1	34	40	42			

From the results of antimicrobial activity of ligand and complex it is clear that the complexes shows enhance activity than the ligands. The increase in antimicrobial activity is due to faster diffusion of metal complexes as a whole through the cell membrane or due to the combined activity of the metal and ligand<sup>23</sup>.

# IV. CONCLUSION

Preparation of Chalconeligand, physicochemical and spectroscopiclikes UV, ¹H-NMR, IR and Mass was studied.¹H-NMR spectrum suggest decent involvement of trans hydrogen in CH=CH vinyl moiety as chalcone formation.Molecular ion forms at equal to the mass of corresponding ligandthis was a strong evidence for the formation of the ligand.The Chalconeligand has one phenolic –OH group from Dehydroacetic acid (DHA) and one α,β unsaturated carbonyl moiety which are connected to the Indole ring. The chalcone ligand forms metal complex having coordination integer six. ChalconeLigand acts as uninegativebidentate in nature.The complexes remain insoluble in common organic solvents, however soluble in Dimethylsulfoxide as well as Dimethylformamide. Ultraviolet spectrum values of the complexes shifted towards lower or higher frequencies compare to the ChalconeLigand, which confirm the chelation of the ligand to the transition metal ions.Studies of FTIR spectrum of the chelates tells that the Chalcone Ligand coordinates to transition metal ions via phenolic –OH group, carbonyl oxygen as well as coordinated water molecules. Existence of metal-oxygen stretching vibrations was confirmed by this type bonding in chelates.The X-ray diffractogramoutcomes of the chelates shown monoclinic crystal system for Cu(II), Ni(II), Mn(II) and Co(II) chelates while hexagonal for Fe(III) chelate with P-type lattice.

The analytical data shows 1:2 metal to ligand stoichiometry, we have proposed distorted octahedral geometry for Cu(II), Mn(II) & Fe(III), other Ni(II), Co(II) are octahedral geometry. Antimicrobial activity it is found that the complexes are more active than their parent ligand.

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