



Thermal And Biological Studies Of 3-[3-(3,4-Dimethoxyphenyl)Acryloyl-4-Hydroxy-6-Methyl-2h-Pyran-2-One]with Metal Ion Chelates

B. H. Jawale

Department of Chemistry, B.S.S.Arts Science & Commerce College, Makani.

Tq. Lohara Dist. Osmanabad

Corresponding Author - B. H. Jawale

DOI - 10.5281/zenodo.11165746

Abstract:

Five coordination compounds of Cu(II), Ni(II), Co(II), Mn(II) & Fe(III) with 3-(3-(3,4-dimethoxyphenyl) acryloyl)-4-hydroxy-6-methyl-2H-pyran-2-one derived from 3-acetyl-6-methyl-pyran-2,4(3H)-dione bidentate ligand were synthesized & characterized by elemental analysis, TGA-DTA analysis, magnetic susceptibility, UV-visible, IR, ¹H-NMR spectroscopy, Mass & antimicrobial activity. From the analytical & spectral data, the stoichiometry of these coordination compounds was found to be 1:2 (metal: ligand). The physico-chemical data propose a distorted octahedral and octahedral geometry for the Cu(II) and all the other complexes respectively. The thermal analysis of all the prepared coordination compounds was studied by the TG-DTA method. It is observed that some of the coordination compounds are antimicrobial active & show higher potency than the sole ligand. Complex formation changes significantly the antibacterial as well as antifungal / bioactive behaviour of the sole ligands.

Keywords: *Dehydroacetic acid; Transition metal complexes; Chalcone; Antimicrobial activity*

Introduction:

The chalcones having poly-functional groups deals a lot of practical advances besides distinctive structural atmosphere for chelation. They are as well identified for their biotic, manufacturing and analytical reputation. Chalcones are connected through several biotic actions due to the existence of α , β unsaturated carbonyl moiety⁴². A number of chalcones have shown insecticidal²², tuberculostatic³¹, germicidal^{21,29,31}, bacteriostatic²², fungicidal¹⁹, antileishmanial¹⁴, antiplasmodial¹, antiviral³ and oncogenic¹⁷

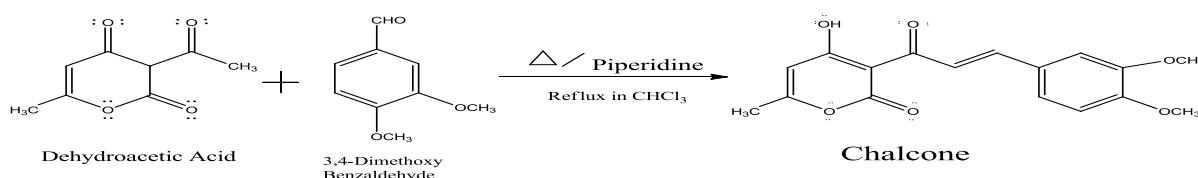
actions.

3-acetyl-6-methyl-(2H)pyran-2,4-(3H)dione (DHA) is a main biotic lively organic material. Investigations have exposed that the mutually antibacterial as well as antifungal properties of DHA organic material¹¹. This organic material is commonly used in food processing. It is used to enrich vitamin-C strength in vegetables processing⁴¹ and as a preservative³². In hydrous solution, even at moderate concentration (0.02–0.2%), 3-acetyl-6-methyl-(2H)pyran-2,4-(3H)dione (DHA) appears an excellent antibacterial action⁴³. Chelation of such

organic material through transition metal ions such as Ni(II), Cu(II) and Fe(III) frequently increases its effects¹⁶ as described for pathogenic moulds¹³.

It is healthy recognized commencing the collected works that 3-acetyl-6-methyl-(2H)pyran-2,4-(3H)dione (DHA) compound have a strong capability to form metal complexes. Also their complexing capability, it moreover displays favourable fungicidal, antiseptic and antiprotozoal effects^{4,7,36}.

A exploration of the collected works shown that no research work has been completed on transition metal chelates of the 3-(3-(3,4-dimethoxyphenyl)acryloyl)-4-hydroxy-6-methyl-2H-pyran-2-onechalcone resulting as of 3-acetyl-6-methyl-(2H)pyran-2,4-(3H)dione (DHA) and 3,4-dimethoxy benzaldehyde (Veratraldehyde). The chelates of Nickel(II), Copper(II), Manganese(II), Cobalt(II) and



Preparation Of Metal Complexes:

A 0.2mmol of 3-(3-(3,4-dimethoxyphenyl)acryloyl)-4-hydroxy-6-methyl-2H-pyran-2-onechalcone was taken in round bottomed flask containing 30 ml of chloroform and 0.01 mole of transition metal chloride in 20 ml of anhydrous methanol was added with constant stirring. The PH of the reaction mixture was maintained around 7.0-7.5 by adding 10% methanolic solution of ammonia. It was then refluxed for 2-3hr.

B. H. Jawale

Iron(III) through chalcone were as well synthesized in the solid form and analysed by various physical, analytical and spectral techniques.

Experimental:

A solution of 0.01 mol of 3-acetyl-6-methyl-(2H)pyran-2,4-(3H)dione (DHA), 8-10 drops of piperidine base and 0.01 mole of 3,4-dimethoxy benzaldehyde (Veratraldehyde) in 25 ml chloroform were refluxed for 6-8hrs, numerous quantity of the CHCl₃-H₂O azeotrope mixture was separated by purification^{2,37}. Crystal of chalcone 3-(3-(3,4-dimethoxyphenyl)acryloyl)-4-hydroxy-6-methyl-2H-pyran-2-one product separated on sluggish vanishing of the residual solvent. The resultant precipitate was filtered, washed many times with ethyl alcohol and recrystallized from chloroform^{37,18}.

the subsequent metal chelate was filtered in hot form and washed with ethyl alcohol, then dried over CaCl₂ in vacuum desiccator^{2,37}.

General 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, Shigella boydii by the paper disc plate method³⁹. The compound were tested at concentrations of 1.0 mg ml⁻¹ 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 *Penicillium notatum*, *Saccharomyces Cerevisiae* and *Aspergillus Oryzae* were studied. The ligand and their corresponding metal chelates in DMSO were screened in vitro by the disc diffusion method⁴⁰. The ligands and complexes were dissolved separately in DMSO to obtain concentration of 500 µg disc⁻¹. 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*.

Results and Discussion:

I) Physicochemical Characteristics:

The physical appearances as well as micro analytical records of the 3-(3-(3,4-dimethoxyphenyl)acryloyl)-4-hydroxy-6-methyl-2H-pyran-2-one Chalcone and their transition metal chelates are given in Table I. Elemental investigation indicates 1:2 (M:L) stoichiometry for every chelates^{2,37}. The analytical records of the Chalcone and its transition metal chelates matched healthy by the common formula [M(L)₂(H₂O)₂], where M= Co(II), Mn (II), Cu (II), Ni(II), and [M(L)₂(H₂O)(CL)], where M=Fe(III), L=C₁₇H₁₅O₆. The non-appearance of chloride ion except in the Fe(III) chelate was marked from the Volhard experiment³³ and existence of chelated water molecules was definite by TG/DT analysis. Meanwhile a particular crystal of the chelates could not be isolated after any common solvent, the probable structure was anticipated based on physicochemical, spectral, magnetic susceptibility and thermal results.

Table I: Physicochemical Results of Chalcone and their metal chelates

Compound	M _r g mol ⁻¹	Colour	Yield %	M.P. in (°C)	Found (Calcd.), %			
					M	C	H	O
Ligand HL C ₁₇ H ₁₆ O ₆	316	Orange Yellow	62	162	-	64.09 (64.55)	5.05 (5.10)	30.06 (30.35)
C ₃₄ H ₃₀ FeO ₁₂	686	Golden	30	276	8.08 (8.14)	59.39 (59.49)	4.35 (4.41)	27.90 (27.97)
C ₃₄ H ₃₀ CuO ₁₂	694	Celadon	72	260	9.09 (9.15)	58.25 (58.83)	4.25 (4.36)	27.52 (27.66)
C ₃₄ H ₃₀ CoO ₁₂	689	Orange	82	252	8.51 (8.55)	59.20 (59.22)	4.30 (4.39)	27.68 (27.84)
C ₃₄ H ₃₀ MnO ₁₂	685	Brown	80	212	8.00 (8.01)	59.40 (59.57)	4.40 (4.41)	27.55 (28.01)
C ₃₄ H ₃₀ NiO ₁₂	689	Green Yellow	70	218	8.42 (8.52)	59.10 (59.24)	4.31 (4.39)	27.05 (27.85)

II) Mass Spectra Of Chalcone:

The mass spectrum of the 3-(3-(3,4-dimethoxyphenyl)acryloyl)-4-hydroxy-6-methyl-2H-pyran-2-oneChalcone displayed molecular ion peak at $m/z=317$, which supports the molecular weight of the Chalcone .

III) $^1\text{H-NMR}$ Spectrum Of Chalcone:

The ^1H NMR spectrum of 3-(3-(3,4-dimethoxyphenyl)acryloyl)-4-hydroxy-6-methyl-2H-pyran-2-oneChalconein deuterated chloroform at normal temperature appearances the resulting signals. δ 2.30 (singlet, 3H, $-\text{CH}_3$ group for DHA moiety), 3.97 (singlet, 6H, two $-\text{OCH}_3$ group associated with side chainaryl moiety), 5.98 (singlet, 1H, C_5 -hydrogen of dehydroacetic acidmoiety), 6.93-7.32 (multiplet, 3H, for Ar-H in side chain aryl moiety), 7.98 (doublet, 1H, β proton of $\alpha \beta$ unsaturated moiety on chalcone), 8.24 (doublet, 1H, α proton of $\alpha \beta$ unsaturated moiety on chalcone) and 14.82 (singlet, 1H, phenolic $-\text{OH}$ of DHA moiety)^{26,30,35} .

IV) FTIR Spectra OfChalconeAnd Its Complexes:

Applicable FTIR bands that offer great structural confirmation for the formation of 3-(3-(3,4-dimethoxyphenyl)acryloyl)-4-hydroxy-6-methyl-2H-pyran-2-oneChalcone and their transition metal chelates are assumed. The FTIR spectrum of free Chalcone displays bandsat 3093cm^{-1} ν (OH) stretching of the intramolecular phenolic moiety of the 3-acetyl-4-hydroxy-6-methyl-2H-pyran-2-

B. H. Jawale

one DHA moiety, 1714cm^{-1} ν ($\text{C}=\text{O}$) stretching of the lactone carbonyl on dehydroacetic acid ring, 1642cm^{-1} ν ($\text{C}=\text{O}$) stretching of $\alpha \beta$ unsaturated carbonyl group, 1260cm^{-1} ν ($\text{C}-\text{O}$) stretching of phenolic moiety on DHA and 996cm^{-1} ν ($\text{C}=\text{C}$) stretching of $\alpha \beta$ unsaturated double bond^{2,37,27,5}. In the Infrared spectra of Nickel(II), Copper(II), Manganese(II), Cobalt(II) and Iron(III) transition metal complexes, no band was found in between the area of 3165 and 3100cm^{-1} . As a replacement for, a wide-ranging band representative of ν (OH) of chelation water molecules was saw in between the area of 3548 and 3200cm^{-1} . The attendance of chelated water molecules was additionally definite by the attendance of a non-ligand band in between the area 825 and 845cm^{-1} . This was again evidences by thermal investigations. In case of complexes nonappearance of ν (OH) stretching of the intramolecular phenolic moiety at 3100cm^{-1} recommends successive deprotonation of the phenolic $-\text{OH}$ group and chelation of phenoxide ion to the transition metal ion. This was also reinforced by a rising shift in ν ($\text{C}-\text{O}$) stretching of phenolic moiety on DHA^{2,37,28} by $10-50\text{cm}^{-1}$. The ν ($\text{C}=\text{O}$) stretching of $\alpha \beta$ unsaturated carbonyl group was moved to lesser energy with respect to the Chalcone, proposing the involvement of the $\alpha \beta$ unsaturated carbonyl group in the chelation^{27,5}. The FTIR spectrum of Chalcone and their transition metal complexes exhibited a noticeable band at ≈ 1339 and $\approx 956\text{cm}^{-1}$, representative of ν ($\text{C}-\text{O}-\text{C}$) and *trans* – $\text{CH}=\text{CH}$ - absorption. The occurrence of

new bands in between the region 600 and 450 cm^{-1} can be allocated to ν (Metal-Oxygen) vibration²⁰.

Affording to the exceeding stated records, the Chalcone performed as mono-

deprotonated bi-dentate and the chelation happens through the α β unsaturated carbonyl group and phenolic oxygen of 3-acetyl-4-hydroxy-6-methyl-2H-pyran-2-one DHA moiety.

Table II: Important IR spectralband of Chalcone and its metal chelates

Ligand & Complex	ν (OH) (dehydroacetic acid moiety)	ν (C=O) (lactone)	ν (C=O) (acetyl carbonyl)	ν (C-O) (phenolic)	ν (C=C) (trans)	ν (M-O)
Ligand HL $\text{C}_{17}\text{H}_{16}\text{O}_6$	3093 _(s)	1714 _(s)	1642 _(m)	1260 _(s)	996 _(m)	-
$\text{C}_{34}\text{H}_{30}\text{FeO}_{12}$	-	1710 _(s)	1644 _(s)	1306 _(w)	1002 _(w)	536 _(w) 486 _(m)
$\text{C}_{34}\text{H}_{30}\text{CuO}_{12}$	-	1705 _(m)	1656 _(s)	1311 _(m)	979 _(m)	562 _(m) 478 _(m)
$\text{C}_{34}\text{H}_{30}\text{CoO}_{12}$	-	1682 _(s)	1665 _(m)	1303 _(s)	984 _(s)	529 _(s) 478 _(s)
$\text{C}_{34}\text{H}_{30}\text{MnO}_{12}$	-	1676 _(m)	1641 _(w)	1303 _(w)	983 _(m)	550 _(w) 442 _(s)
$\text{C}_{34}\text{H}_{30}\text{NiO}_{12}$	-	1689 _(s)	1637 _(s)	1303 _(s)	981 _(s)	547 _(m) 526 _(s)

V) Magnetic Measurements And Electronic Absorption Spectra:

The Magnetic susceptibility as well as electronic absorption spectral information are assumed in Table III. The records are of bearing for the suggested structure of the chelates. The electronic absorption spectrum of the Copper(II) chelates in dimethylformamide exposed one comprehensive band at 15128 and 25126 cm^{-1} for Chalcone, predictable to a ${}^2\text{E}_g \rightarrow {}^2\text{T}_{2g}$ electronic transition also charge transfer. The detected magnetic measurement value for the Copper(II) chelate are $2.09\mu_B$ ^{2,37}. The ultraviolet spectral records⁸ attached through the magnetic measurement value propose a distorted octahedral configuration for the Copper(II) chelate⁹. The UV spectrum of Nickel(II) chelate found three bands at

9372, 15625 and 24213 cm^{-1} for Chalcone, predictable to ${}^3\text{A}_{2g} \rightarrow {}^3\text{T}_{2g}(\text{F})$ (ν_1), ${}^3\text{A}_{2g} \rightarrow {}^3\text{T}_{1g}(\text{F})$ (ν_2) and ${}^3\text{A}_{2g} \rightarrow {}^3\text{T}_{1g}(\text{P})$ (ν_3) electronic transitions. This is in keeping through formerly described values for octahedral Nickel(II) chelates^{15,34}. The considered value the range stated for octahedral configuration. The magnetic moment value of Nickel(II) $3.03\mu_B$ checks the suggested geometry^{2,37}. The UV spectral investigation of Cobalt(II) chelates appearance three electronic transitions at 9569, 18348 and 22675 cm^{-1} for Chalcone predictable to ${}^4\text{T}_{1g}(\text{F}) \rightarrow {}^4\text{T}_{2g}(\text{F})$ (ν_1), ${}^4\text{T}_{1g}(\text{F}) \rightarrow {}^4\text{A}_{2g}(\text{F})$ (ν_2) and ${}^4\text{T}_{1g}(\text{F}) \rightarrow {}^4\text{T}_{1g}(\text{P})$ (ν_3) electronic transitions^{9,15,34,10}. The magnetic susceptibility value of the Cobalt(II) chelate are $4.66\mu_B$, it indicates Cobalt(II) chelate shows octahedral geometry.

Table III: Magnetic Susceptibility and UV data of Chalcone and its Chelates.

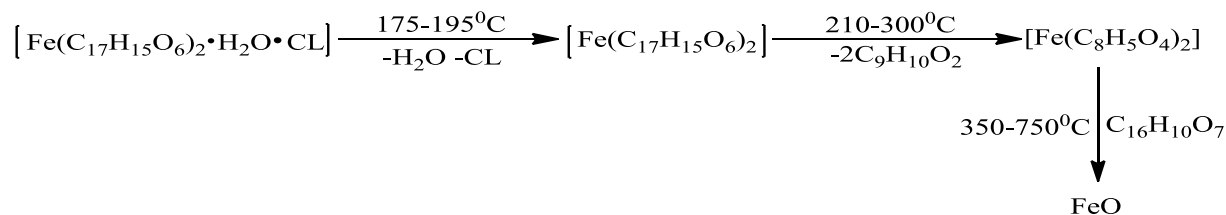
Chalcone and Complex	ν / cm^{-1}	Band assignment	$\mu_{\text{eff}} / \mu_{\text{B}}$	Geometry
Ligand HL $\text{C}_{17}\text{H}_{16}\text{O}_6$	32442 40545	INCT ^a INCT	-	-
$\text{C}_{34}\text{H}_{30}\text{FeO}_{12}$	14556 21692 24450	${}^4\text{T}_{1g}(\text{F}) \rightarrow {}^4\text{T}_{2g}(\text{F})(\nu_1)$ ${}^4\text{T}_{1g}(\text{F}) \rightarrow {}^4\text{A}_{2g}(\text{F})(\nu_2)$ ${}^4\text{T}_{1g}(\text{F}) \rightarrow {}^4\text{T}_{1g}(\text{P})(\nu_3)$	8.93	Octahedral
$\text{C}_{34}\text{H}_{30}\text{CuO}_{12}$	15128 25126	${}^2\text{E}_g \rightarrow {}^2\text{T}_{2g}$ INCT	2.09	Distorted Octahedral
$\text{C}_{34}\text{H}_{30}\text{CoO}_{12}$	9569 18348 22675	${}^6\text{A}_1 \rightarrow {}^4\text{T}_1(\text{G})$ ${}^6\text{A}_1 \rightarrow {}^4\text{T}_2(\text{G})$ ${}^6\text{A}_1 \rightarrow {}^4\text{E}(\text{G})$	4.66	Octahedral
$\text{C}_{34}\text{H}_{30}\text{MnO}_{12}$	17794 19569 31056	Laporte and Spin Forbidden	5.77	Distorted Octahedral
$\text{C}_{34}\text{H}_{30}\text{NiO}_{12}$	9372 15625 24213	${}^3\text{A}_{2g} \rightarrow {}^3\text{T}_{2g}(\text{F})(\nu_1)$ ${}^3\text{A}_{2g} \rightarrow {}^3\text{T}_{1g}(\text{F})(\nu_2)$ ${}^3\text{A}_{2g} \rightarrow {}^3\text{T}_{1g}(\text{P})(\nu_3)$	3.03	Octahedral

The Iron(III) chelate of Chalcone displays three electronic transitions at 14556, 21692, 24450 cm^{-1} predictable to ${}^6\text{A}_1 \rightarrow {}^4\text{T}_1(\text{G})$, ${}^6\text{A}_1 \rightarrow {}^4\text{T}_2(\text{G})$ and ${}^6\text{A}_1 \rightarrow {}^4\text{E}(\text{G})$ transitions. These values suggest octahedral confirmation for Iron(III) Chelate^{9,15,25}. The magnetic moment value of Fe(III) 8.93 μ_{B} checks the suggested geometry^{2,17}. The electronic absorption spectrum of Manganese(II) chelate of Chalcone shows feeble bands at 17794, 19569 and 31056 cm^{-1} . These bands remain together Laporte and Spin-forbidden. However, due to sudden distortion of the octahedral configuration nearby the Manganese(II) metal cation, feeble bands sometimes do seem^{9,15}.

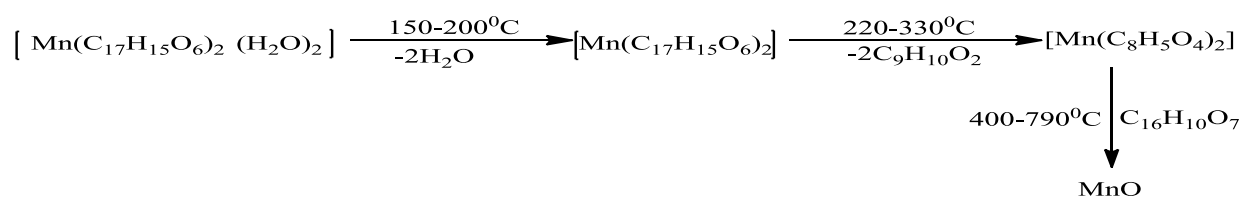
VI) TG-DTA Analysis:

The Iron(III), Manganese(II) and Copper(II) chelates of 3-(3-(3,4-dimethoxyphenyl)acryloyl)-4-hydroxy-6-methyl-2H-pyran-2-one Chalcone were preferred for a thermal investigation. In the TG/DTA investigation of the Iron(III) chelate, a prone slope in

between the temperature range 175 and 195 °C on the thermogravimetric curve, by a molecular weight damage of 7.0% (calcd 7.9%), point out the elimination of one water molecule as well as one chloride ion. An endothermic peak in between the temperature range 180 and 240 °C was detected on the differential thermal analysis curve ($\Delta t_{\text{min}} = 192^\circ\text{C}$). The Iron(III) chelate endures to decay in a subsequent stage between the temperature range 210 and 300 °C, through 37.0 % molecular weight beating (calcd 37.8%)^{2,23}. A equivalent exothermic peak in between the temperature range 250–280 °C ($\Delta t_{\text{max}} = 265^\circ\text{C}$) on the differential thermal analysis are recognized to the deduction of the non-chelating fragment of the Chalcone. The next step means third phase relates to the decay of residual portion of the Chalcone in between the temperature range 350–750 °C by the weight damage 41.78 % (calcd 41.95 %). The weight of the absolute residue was 10.2 % (calcd 10.6 %), equivalent to Iron oxide.



The thermogravimetric curve of the Manganese(II) chelate of 3-(3-(3,4-dimethoxyphenyl)acryloyl)-4-hydroxy-6-methyl-2H-pyran-2-one Chalcone found three disintegration steps. On the thermogravimetric curve of the Manganese(II) chelate, the initial step expressions a sharp slope in between the temperature range 150–200°C through a molecular weight damage of 5.0 % (calcd 5.2%), representing the elimination of two chelated water molecules^{2,24}. An endo-thermic peak in between the temperature range 150–200°C ($\Delta t_{\min} = 175^\circ\text{C}$) on the differential thermal analysis curve relates to the dehydration stage. The dehydrated material in second phase decay between a less temperature range



On the thermal studies of the Copper(II) chelate, the weight loss initiates at 120°C through an tending slope in between the temperature range 160–190°C by a weight damage of 6.5% (calcd 7.0%), representing the deduction of two chelated water molecules. An endothermic peak in between the temperature range 150–200°C ($\Delta t_{\min} = 158^\circ\text{C}$) on the differential thermal analysis curve moreover relates to the

B. H. Jawale

starting 220–330°C, by a 37.0% molecular weight beating (calcd 37.3%). An exothermic peak between the temperature range 240 and 400°C by a $\Delta t_{\max} = 270^\circ\text{C}$ on the differential thermal analysis curve resembles to this weight damage. This phase may be recognized to the deduction of the non-chelated portion of the Chalcone^{2,24}. The third stage in between the temperature range 400 and 790°C relates to the disintegration of the chelated portion of the Chalcone, through a molecular weight beating 47.0 % (calcd 47.6%). A wide-ranging endotherm is detected for this phase. The weight of the absolute remains resembles to stable Manganese oxide, 12.60% (calculated, 12.9%).

dehydration. In the second stage of the decay endures on the thermogravimetric curve in between the temperature range 260 and 345°C, through a molecular weight beating of 37.0 % (calcd 35.7 %) besides the exothermic peak ($\Delta t_{\max} = 299^\circ\text{C}$) on the differential thermal analysis curve may be recognized to the deduction of the non-chelated portion of the Chalcone. In the third phase in between the temperature

Antimicrobial Activity:

The synthesized ligand and its coordination compounds were evaluated for their *in vitro* antimicrobial activity against Gram-negative (*Shigella boydii*, *Escherichia Coli*) and Gram-positive

(*Bacillus Cereus*, *Bacillus Megaterium*) bacterial strains and against *Saccharomyces Cerevisiae*, *Penicillium notatum* and *Aspergillus Oryzae* antifungal strains.

Table IV: Antibacterial effect of Chelator and its transition metal chelates

Test Compound	Inhibition zone diameter (mm)							
	<i>Bacillus Megaterium</i>		<i>Bacillus Cereus</i>		<i>Shigella Boydii</i>		<i>Escherichia Coli</i>	
	Concentration, 0.5mg ml ⁻¹	Concentration, 1mg ml ⁻¹	Concentration, 0.5mg ml ⁻¹	Concentration, 1mg ml ⁻¹	Concentration, 0.5mg ml ⁻¹	Concentration, 1mg ml ⁻¹	Concentration, 0.5mg ml ⁻¹	Concentration, 1mg ml ⁻¹
Chelator C₁₇H₁₆O₆	07	08	10	12	06	08	07	09
C ₃₄ H ₃₀ FeO ₁₂	-	-	14	16	-	-	11	13
C ₃₄ H ₃₀ CuO ₁₂	16	18	20	22	15	17	17	19
C ₃₄ H ₃₀ CoO ₁₂	12	14	18	20	14	16	13	15
C ₃₄ H ₃₀ MnO ₁₂	15	17	18	20	09	11	09	10
C ₃₄ H ₃₀ NiO ₁₂	12	14	-	-	11	13	-	-
Ciprofloxacin	34	36	50	54	28	30	30	32

The antibacterial record tells that transition metal chelates displayed enriched actions equaled to the free chalcone chelator. Such improved

antibacterial effects of transition metal coordinated compound can be elucidated on the origin of chelation theory⁴⁵; in addition to overtone's conception⁴⁴.

Table V: Antifungal Effects of Chelator and its transition metal chelates.

[Yield of Mycelial dry weight in mg (% inhibition)]

Compound	<i>Aspergillus Oryzae</i>		<i>Saccharomyces Cerevisiae</i>		<i>Penicillium Notatum</i>	
	250 ppm	500 ppm	250 ppm	500 ppm	250 ppm	500 ppm
Chelator (L5) C₁₇H₁₆O₆	88(08)	72(10)	68(12)	52(14)	58(12)	52(14)
C ₃₄ H ₃₀ FeO ₁₂	76(14)	68(16)	72(17)	53(19)	65(17)	53(19)
C ₃₄ H ₃₀ CuO ₁₂	44(22)	35(22)	32(18)	23(20)	48(18)	23(20)
C ₃₄ H ₃₀ CoO ₁₂	36(20)	20(21)	38(16)	29(18)	32(16)	29(18)
C ₃₄ H ₃₀ MnO ₁₂	72(16)	56(18)	54(14)	48(16)	66(15)	48(16)
C ₃₄ H ₃₀ NiO ₁₂	78(14)	62(15)	66(14)	45(16)	77(14)	45(16)
Griseofulvin	40	42	39	40	32	34

The inhibition of growing of trial fungus detected for all chelates was not

caused by any transition metal ions or chalcone ligand only, however was by

reason of increasing result of equally transition metal ion as well as chalcone ligand in the chelates.

Conclusion:

The transition metal chelates of Chalcone are comparatively at high temperature signifying its great thermal stability. Magnetic susceptibility measurements showed diamagnetic environment and existence of paired electrons in chelates. TG/DTA investigation of the chelates provides information about disintegration form and similarly supports occurrence of chelated and lattice water molecules in metal chelates. Antimicrobial activity it is found that the complexes are more active than their parent ligand.

References:

1. A.Kharazmi, M.Chen, T.G.Theander and S.B.Christensen, *Am.Trop.Med.Parasitol*, 91 (1997) 891.
2. B.H. Jawale, and S.M. Lonkar, *World Journal of Pharmaceutical Research*, Vol 6(8) 1957 Aug 2017.
3. B.K.Dewindt, KvanEmeran and K.Andries, *Antivir.Res*, 25 (1994) 67.
4. B.Schleiffenbaum, O.Spertini and T.F.Tedder, *J.Cell.Bio*, 119(1) (1992) 229.
5. Carugo, O., C.B. Castellani, M.Rizzi, *Polyhedron* 1990;9;2061.
6. Carvajal J., Roisnel T., *Graphic Tool for Powder Diffraction* (2004)112-118.
7. D.SuryaRao and M.C.Ganorkar, *Curr.Sci*, 49 (1980) 511.
8. Eichhorn G. L., J. C. Bailar, *J. Am. Chem. Soc.* 1953;75;2905
9. Figgis B. N., Interscience, London, 1966;56;654.
10. Gudasi K. B., Patil S. A., Vadavi R. S., Shenoy R. V., Patil M. S., *J. Serb. Chem. Soc.* 2006;71;529.
11. K.Kakemi, T.Arita, M.Sezaki, T.Kiriyama, *Yakuzaigaku*, 18 (1958) 77.
12. Karthikeyan, J., Parameshwara, P., Shetty, A.N., Shetty, P., *Indian journal of chemical technology*, Vol.12, 2005, p.361.
13. L.Sacconi, *Trans.Met.Chem (NY)* (1969) 4.
14. L.Zhai, J.Blom, m.Chen, S.B.Christensen and A.Kharazmi, *Antimicrob. Agents.Chemother*, 39 (1995) 2742.
15. Lever A. B. P., *Inorganic Electronic Spectroscopy*, Elsevier, Amsterdam, 1968;89;789.
16. M.Das and S.E.Livingstone, *J.Cancer*, 17 (1978) 463.
17. M.J.Kamoda, *J.Agr.Chem.Soc, Japan*, 28 (1954) 791.
18. Munde A.S., Jagdale, A.N., Jadhav, S.M., Chondhekar, T.K., *J.Korean Chem. Soc.* 2009;53;4.
19. N.P.Buu-Hoi and N.D.Xuong, *J.Org.Chem*, 23 (1958) 29.
20. Nakamoto, K., *Infrared spectra of inorganic & coordination compounds*, Wiley, New York, 1970;159;167;214.
21. O.Nerya, R.Musa, S.Khatib, S.Tamir, J.Vaya, *Phytochemistry*, 65(10) (2004) 1389.

22. P.F.Devit, A.Timoney and M.A.Vickars, J.Org.Chem, 26 (1961) 4941.
23. Patange,V.N., B.R. Arbad, V.G. Mane & S.D. SalunkeTrans Met. Chem.2007;32; 944.
24. Patangevaibhav, Ph.D Thesis, Dr.BabasahebAmbedkarMarathwada University, Aug 2008.
25. Prasad R. N., Mathur M., J. Serb. Chem. Soc. 2002;67; 825.
26. R.Gren, Dent.Apoth.Ztg, 111 (1971) 219.
27. Ramarao,N., V.P. Rao, V.J. TyagaRaju, M.C. Ganorkar, Indian J.Chem.1985;A24;877.
28. Rao,P.V., A.V. Narasaiah, Indian J. chem. A 2003;42;1896.
29. S.C.Kushawaha, Proc.Natl.Acad.Sci, 49 (1972) 639.
30. S.Forsen and M.Nilsson, Acta.Chem.Scand, 14 (1960) 1333.
31. S.S.Mishra and Bholanath, Ind.J.Appl.Chem, 34 (1971) 260.
32. S.Tamaka, Kolumin.Eissi, 25 (1956) 138.
33. Sallam S.A. and Ayad M.I., Journal of the Korean Chemical Society, Vol.47(3), 2003.
34. Satpatty K. C., Panda A. K., Mishra R., Pande I., Transition Met. Chem. 1991;16;410.
35. V.Drevenkar, A.Deljac and Z.Stefanac, Polyhedron, 2(16) (1983) 447-453.
36. V.G.Stanley, S.Woldesenbet and G.Cassandra, Poul.Sci, 75(1) (1996) 42.
37. Vaibhav N. Patange, Rajendra K. Pardeshi and Balasaheb R. Arbad J. Serb. Chem. Soc. 73 (11) 1073–1082 (2008).
38. VishnoiN.k., Advanced Practical Organic chemistry, Vikas Pub. House India, 1979. P. 421.
39. Vogel, A.I., A text book of organic chemistry, 3rd ed., ELBS, London, 1968.
40. Vogel, A.I., A text book of Quantitative inorganic analysis, 3rd ed., ELBS, and Langman's Green and Co. Ltd., London, 1962.
41. W.A.Sistrunk, Food.Technol, 11 (1957) 336.
42. W.B.Giegar and J.E.Conn, J.Am.Chem.Soc, 67 (1945) 112.
43. Y.Kato, M.Sugrura and H.Yamada, Gifu.Yakka.Daigaku.Kiyo, 8 (1958) 37.
44. L.Mishra and V.K.Shingh, Indian.J.Chem, 32A (1993) 446.
45. R.S.Shrivastava, Inorg.Chem.Acta, 56(1981) 165.