

SYNTHESIS, CHARACTERIZATION, DNA CLEAVAGE AND BIOLOGICAL ACTIVITIES OF SCHIFF BASE DERIVED FROM P-PHENYLENEDIAMINE, BENZIL AND 3-AMINOCOUMARIN AND THEIR TRANSITION METAL COMPOUND

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Abstract: We prepared and characterized trinuclear Schiff base transition metal compounds. Compounds were synthesised from p-phenylenediamine, benzil and 3-aminocoumarin and Cu (II), Ni (II), Mn (II), Zn (II) and Cr (III) salts. The type of the compounds was [M3LC16]. The characterization and details of bonding of prepared trinuclear Schiff base compounds have been confirmed by physico chemical method and spectral studies such as infrared, ultraviolet-visible, cyclic voltametry, EPR, magnetic property and Thermogravimetric methods. Gel electrophoresis method was used to understand pUC18 DNA cleavage study. The results established that Schiff base complexes cleaved DNA in presence of H₂O₂. Additionally, the antibacterial activity was experienced by disc diffusion method. The antibacterial action of compounds was tested against bacteria such as Klebsiella pneumoniae, Escherichia coli, and Staphylococcus aureus.

Keywords: P-phenylenediamine, benzil, 3-amino coumarin, Ultraviolet-visible spectra, cyclic voltametry and DNA cleavage study.

1. INTRODUCTION

In the coordination compounds, carbonyl group and amino group are combined to give azomethine group. The ligand is reacted with metal chlorides to form coordination compounds. Schiff base complexes are present naturally and synthesized artificially. They are used as catalyst such as Jacobsen's catalyst. Schiff bases are played role in the growth of modern coordination chemistry and inorganic biochemistry. The Schiff base ligands have got good donor property and very significant in coordination Chemistry. Therefore, Chemist concentrated the coordination compounds containing Schiff bases. Schiff base complexes are legendary due to easy creation and simple complexation with d-block metals. Synthesised binuclear complexes play vital role in biological activity such as anticancer [1-2], antifungal [3], antitumour [4], antioxidant [5-6], antibacterial [7] agents. The DNA cleavage action of compounds with Calf-Thymus DNA was completed by Gel electrophoresis method(GEM). Cu(II) and Ni(II) compounds have got more efficient activity with the oxidant H₂O₂. The existence of nitrogen atoms set up hydrogen bonds with the DNA [8]. Antibacterial activity against microorganisms was tested by Disc diffusion method (DDM) [9]. The structural elucidation was finished by spectral studies for example IR, UV, CV, EPR, magnetic measurements and thermal analysis.

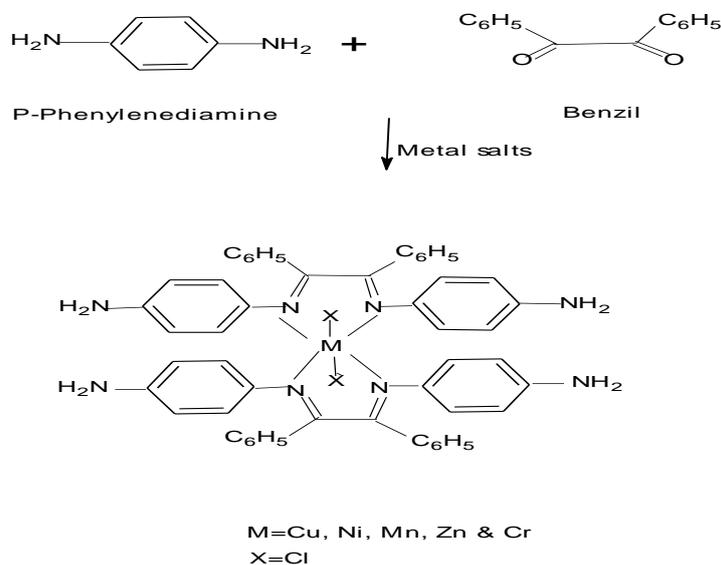
2. PREPARATION OF MONO AND TRI NUCLEAR COMPOUNDS SYNTHESIS OF MONO NUCLEAR SCHIFF BASE COMPLEX

2.1 Preparation of mono nuclear Schiff base complex

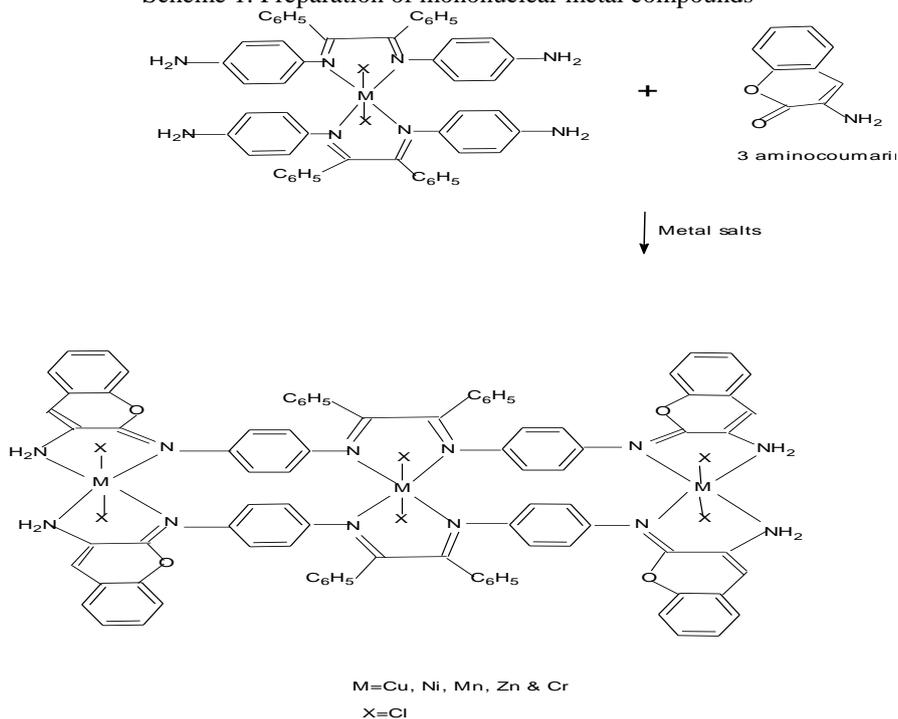
p-phenylenediamine and benzil were mixed gradually with consistent stirring. The solvent used was ethyl alcohol and heated in Rb flask for 3 hours. Then, copper chloride is added to the organic compounds and further refluxed for 1 hour. Precipitate was obtained after cooling. It was filtered, washed by using ethyl alcohol and further it was desiccated. Other Schiff base Ni(II), Mn(II), Zn(II) and Cr(III) mono nuclear compounds were also collected by similar method.

2.2 Preparation of trinuclear Schiff base metal complexes

The mononuclear Schiff base copper (II) complexes and 3-amino coumarin were refluxed for 3 hours. The solvent used was ethyl alcohol. Then, it was mixed with copper chloride and refluxed for 1 hour. The prepared trinuclear copper complex was filtered and dried. Other Schiff base Ni(II), Mn(II), Zn(II) and Cr(III) trinuclear compounds were collected by same method.



Scheme 1. Preparation of mononuclear metal compounds



Scheme 2. Preparation of trinuclear metal compounds

3. RESULTS AND DISCUSSIONS

Elemental analysis (C, H & N analysis)

The result of compounds was given in Table 1. The formula of compounds was ML, where M represented Cu(II), Ni(II), Mn(II), Zn(II) and Cr(III) ions, while L represented ligand. Theoretical values were in good agreement with experimental values.

Molar Conduction study

The Schiff base complexes were dissolved in DMF primarily. The values were given in Table 1. It was known that the result of molar conductance of [Cu3C88H64N12O4Cl6], [Ni3C88H64N12O4Cl6], [Mn3C88H64N12O4Cl6], [Zn3C88H64N12O4Cl6], and [Cr3C88H64N12O4Cl6] compounds were at 12.34–18.82 Ohm⁻¹ cm² mol⁻¹(Table 1).Therefore, it was confirmed that compounds were non ionic in nature and chloride ions were inside sphere.

Infrared spectra (IR)

The IR spectral study was tried for all Schiff base complexes. The type of binding of ligands and metal can be established by IR spectra. The band at 1592–1610 cm⁻¹ supported the formation of ν(C=N). There was no band received for ν(C=O) at 1700 cm⁻¹ and decided that formation of azomethine (C=N) group from carbonyl group (C=O) and amino (NH₂) groups. The band region in 1533–1588 cm⁻¹ attributed to the groups ν(C=N) and ν(C=C). The IR bands at 2900–3100 cm⁻¹ for trinuclear compounds supported to ν(C–H).

The intense band of ligand attained in the region ~3410 cm⁻¹ supported the amine group ν(N–H). The band at 3304–3320 cm⁻¹ meant condensation of the terminal nitrogen atom of the mononuclear compounds took part in bond formation with 3-amino coumarin and also the primary NH₂ of the 3-amino coumarin linked to the metal ion and the stable trinuclear Schiff base compounds were formed.

The far IR region at 600–620 cm⁻¹ associated to ν(M–N) group. The occurrence of bands of homo and hetero trinuclear complexes at 590–610 cm⁻¹ resulted from (M–N) group provided idea about the linkage of azomethine nitrogens. The bands between 352–362 cm⁻¹ attributed to ν(M–Cl) [10,11].The results were mentioned in the following table 2.

Table 1: Elemental analysis of the compounds

Complexes	% C		% H		% N		% of metal		Λ _M ⁻¹ (Ohm ⁻¹ cm ² mol ⁻¹)
	Calc.	Expt.	Calc.	Expt.	Calc.	Expt.	Calc.	Expt.	
[Cu3C88H64N12O4Cl6]	60.17	60.19	3.67	3.70	9.56	9.59	10.85	10.89	12.34
[Ni3C88H64N12O4Cl6]	60.68	60.71	3.70	3.67	9.64	9.68	10.10	10.06	18.82
[Mn3C88H64N12O4Cl6]	61.07	61.05	3.73	3.76	9.71	9.75	9.52	9.56	17.65
[Zn3C88H64N12O4Cl6]	59.99	59.95	3.66	3.64	9.53	9.56	11.12	11.16	15.76
[Cr3C88H64N12O4Cl6]	61.38	61.42	3.75	3.78	9.76	9.79	9.05	9.01	13.45

Table 2: IR spectra of the compounds

Complexes	(C=N) (cm ⁻¹)	NH ₂ (cm ⁻¹)	(M-N) (cm ⁻¹)	(M-Cl) (cm ⁻¹)
[Cu3C88H64N12O4Cl6]	1592	3315	590	352
[Ni3C88H64N12O4Cl6]	1608	3320	595	356
[Mn3C88H64N12O4Cl6]	1596	3304	604	360
[Zn3C88H64N12O4Cl6]	1610	3306	608	358
[Cr3C88H64N12O4Cl6]	1606	3312	610	362

Ultraviolet visible spectra (UV)

The electronic spectra are very useful in elucidating structure. The compounds were dissolved in DMF solvent. Ultraviolet visible spectra of each and every one complex were reported. The results are specified in Table 3. The UV-Visible bands at 278–296 nm assigned to the intra ligand charge transfer(LCT) transition (π→π*) due to transitions relating molecular orbital situated on the benzene ring of the ligand groups, 318 – 338 cm⁻¹ attributed

to (n→π*) transition due to azomethine groups and benzene ring of the ligand groups and 378-416 nm allocated to LMCT transition. The other type of bands at 550 –800 nm endorsed to d–d transitions relating to the metal orbitals.

The mononuclear cu(II) compound showed a peak at 565 nm and emerges as a result of the d-d transition ${}^2E_g \rightarrow {}^2T_{2g}$ (565 nm) of Copper(II) ion suggested that the Cu(II) ion appeared a distorted octahedral geometry. The UV result of the mononuclear Ni(II) compound disclosed two d-d transitions.

The noted transitions supported to ${}^3A_{2g} \rightarrow {}^3T_{2g}(F)$ (710 nm), ${}^3A_{2g} \rightarrow {}^3T_{1g}(F)$ (575 nm) representing a distorted octahedral arrangement in the region of the Ni(II) ion. The bands of Mn(II) compound at 520–710 nm attributed to the transitions ${}^6A_{1g} \rightarrow {}^4T_{1g}(4G)$, ${}^6A_{1g} \rightarrow {}^4E_g(4G)$, ${}^6A_{1g} \rightarrow {}^4E_g(4D)$, ${}^6A_{1g} \rightarrow {}^4T_{1g}(4P)$ confirmed the octahedral geometry. Homo trinuclear copper(II), nickel(II) and Manganese(II) compound had shown subsequent metal ion d-d transitions. On the other hand, some of the additional band appeared at 520–780 nm supported more metal ions present in the coordination sphere [12-14]. Hence, octahedral geometry was confirmed by UV-Vis spectra and magnetic measurement value also supported it. The UV results were mentioned in the following table 3.

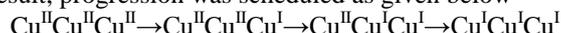
Table 3: The UV spectra of the compounds

Compounds	π-π* (nm)	n-π* (nm)	L-M CT (nm)	d-d (nm)
[Cu3C88H64N12O4Cl6]	278	326	410	522,685
[Ni3C88H64N12O4Cl6]	280	329	416	558,602&690
[Mn3C88H64N12O4Cl6]	290	318	390	576,634&688
[Zn3C88H64N12O4Cl6]	294	332	378	
[Cr3C88H64N12O4Cl6]	296	338	375	

Cyclic voltametric studies

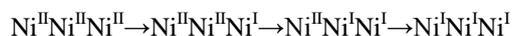
The redox properties of Schiff base compounds were performed by cyclic voltametry. Electrochemistry of trinuclear metal complexes was determined by this method at 0.1 Vs⁻¹ and the solvent used was DMF. The results were given in Tables 4 and 5. Three-electrodes were utilised. Cathodic (E_{pc}) and anodic potential (E_{pa}) were determined.

Trinuclear [Cu₃(L³)Cl₆] complex presented three quasi reversible reduction waves. Controlled potential electrolysis(CPE) was analysed at 100 mVs⁻¹ and data showed that every couple connected to one electron transfer(OET) process. As a result, progression was scheduled as given below

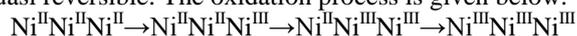


The first and second reduction potentials are allocated to reduction of Cu(II) in the terminal compartments. The third reduction waves were attributed to the reduction of Cu(II) in central compartment. The [Cu₃(L³)Cl₆] complex showed a three quasi reversible oxidation waves attributed as a copper(III)/copper(II) pair. The ΔE_p results supported that the every one pair be quasi reversible. The E_{1/2} results stated that every pair corresponded to one electron transfer(OET) process.

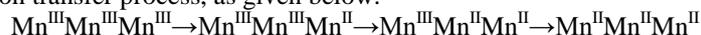
The compound [Ni₃(L³)Cl₆] showed three quasi waves. The first reduction potential of the complex acquired E¹_{pc} = -1.84 V, the second reduction potential of the complex acquired E²_{pc} = -1.63 V and third reduction potential of the compound acquired E³_{pc} = -1.17 V. The ΔE_p results suggested occurrence of a quasi reversible couple. The E_{1/2} results indicated that every pair corresponded to one electron transfer (OET) process. Controlled potential electrolysis was furthermore analysed and experiment divulged that every pair associate to one-electron transfer process, as mentioned below:



The Ni(II) complex received at positive potential area emerged one electron transfer (OET) waves. The oxidation process was also quasi reversible. The oxidation process is given below:



The [Mn₃(L³)Cl₆] complex showed three reduction waves. The first reduction potential of the complex acquired E¹_{pc} = -1.70 V, the second reduction potential of the complex acquired E²_{pc} = -1.15 V and third reduction potential of the complex acquire E³_{pc} = -0.57V. The ΔE_p results suggested the occurrence of a quasi reversible couple. The E_{1/2} results indicated that every pair corresponded to one electron transfer(OET) process. Controlled potential electrolysis(CPE) was furthermore analysed and the experiment concluded that every pair correlated to one-electron transfer process, as given below:



The Process happened on the metal centre of the Mn(II) compound was confirmed from oxidation peak at the positive potential side. This peak described a one-electron oxidation of Mn(II)/Mn(III) [15-17].

Table 4: Electrochemical result of homo and hetero trinuclear compounds (reduction)

Compounds	E _{pc} (V)	E _{pa} (V)	E _{1/2} (V)
[Cu ₃ (L ³)Cl ₆]	-1.66	-1.47	-1.57
	-1.21	-1.05	-1.13
	-0.35	-0.25	-0.30
[Ni ₃ (L ³)Cl ₆]	-1.84	-1.77	-1.81
	-1.63	-1.47	-1.55
	-1.17	-0.94	-1.05
[Mn ₃ (L ³)Cl ₆]	-1.70	-1.41	-1.55
	-1.15	-0.96	-1.05
	-0.57	-0.37	-0.47

Table 5: Electrochemical data of homo and hetero trinuclear compounds (oxidation)

Compounds	E _{pc} (V)	E _{pa} (V)	E _{1/2} (V)
[Cu ₃ (L ³)Cl ₆]	0.34	0.46	0.40
	0.65	0.75	0.70
	0.95	0.95	0.95
[Ni ₃ (L ³)Cl ₆]	0.38	0.44	0.41
	0.67	0.77	0.63
	0.95	1.04	0.72
[Mn ₃ (L ³)Cl ₆]	0.27	0.45	0.36
	0.68	0.72	0.70

	0.86	0.92	0.89
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Electron Spin Resonance spectra (ESR)

The ESR spectra of the compounds $[Cu_3(L^3)Cl_6]$ and $[Mn_3(L^3)Cl_6]$ were analysed at room temperature and LNT and band was clear for compounds at “g” values around 2. The compounds were anisotropic and the values of two compounds were $g_{iso} = 2.0066$ and 2.0051 .

The result of the $[Cu_3(L^3)Cl_6]$ compound revealed a broad signal and there is no hyperfine splitting. The compound has got g_{iso} at 2.0066. It was suitable with a distorted octahedral geometry. The dipolar interactions were responsible for the broadening of this signal, signifying unpaired electron resided usually in the dx^2-y^2 orbital and exchange interaction in trinuclear compound. The resonance line at upper magnetic field denoted an improved broadness than the monomer precursors and it stated the occurrence of Cu(II) ion was observed to be in excess. This aspect may be allocated to the compound possessing trinuclear model.

In the same way, a single unresolved signal is obtained for the trinuclear $[Mn_3(L^3)Cl_6]$ complex suggested that there was an exchange interaction between metal ions. In this case, the g_{iso} value is 2.0051 and it concluded that there was an octahedral environment. Therefore, the EPR spectrum supported the binding of the four nitrogen of ligand with the metal ion in an octahedral background [18,19].



Fig 1: ESR spectra of $[Cu_3(L^3)Cl_6]$ complex

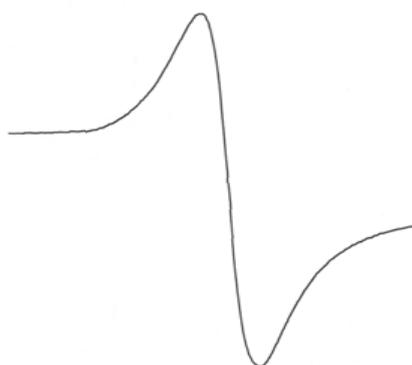


Fig 2: ESR spectra of $[Mn_3(L^3)Cl_6]$ complex

Magnetic properties

The paramagnetic nature of Cu(II) compound associating with the +2 oxidation state was confirmed by magnetic susceptibility calculations. The Bohr magneton values of trinuclear Cu(II) compound was 1.62 B.M where as 1.71 B.M for mononuclear Cu(II) compound . It is renowned that the Bohr magneton values of trinuclear Cu(II) compound is lesser than the mononuclear Cu(II) complex. This was due to strong antiferromagnetic coupling.

Similarly, the Bohr magneton value of trinuclear Nickel(II) compound acquire 2.72 B.M representing an octahedral geometry corresponding to two unpaired electrons. The value for trinuclear Nickel(II) compound was lesser, when compared to actual spin only Bohr magneton value for mononuclear nickel(II) compound. This implied that one more metal ion nearby in coordination sphere. At the room temperature Bohr magneton value of trinuclear Mn(II) compound was 5.71 B.M. signifying an octahedral geometry associated to five unpaired electrons. The Bohr magneton value for trinuclear Mn(II) complex was lower than spin only magnetic moment for mononuclear manganese complex implied that one more metal ion appeared in coordination sphere [20,21].

Thermal analysis

The decomposition of the compounds was examined in this work and given typical pathways depending on the nature of ligand groups. Thermogravimetric (TG) analysis for the compounds was conducted at 0-900°C.

The compound $[\text{Cu}_3(\text{L}^4)\text{Cl}_6]$ having the molecular formula $[\text{Cu}_3\text{C}_88\text{H}_64\text{N}_{12}\text{O}_4\text{Cl}_6]$ decomposed between 165-650°C and happened in three successive step. The first step happened at 165-355°C with an estimated loss of mass 12.10% (calculated loss of mass = 13.14), which was because of loss of six Cl groups. The second step arose at 355-465°C with an estimated loss of mass 34.80% (calculated loss of mass = 33.22%), which was logically counted for the loss of aromatic groups. The third step arose at 465-650°C with an estimated loss of mass 33.05% (calculated loss of mass = 34.12%), which was reasonably counted for the loss of coumarin groups. The estimated total loss of mass was 80.04% (calculated total loss of mass = 79.20%).

The $[\text{Ni}_3(\text{L}^4)\text{Cl}_6]$ compound with the molecular formula $[\text{Ni}_3\text{C}_88\text{H}_64\text{N}_{12}\text{O}_4\text{Cl}_6]$ decomposed between 135-450°C. In keeping with the TG curves, the decomposition took place more than one step. The first step happened at 135-345°C with an estimated loss of mass 47.38% (calculated loss of mass = 46.48) which was because of loss of six Cl groups and aromatic groups. The second step arose at 345-450°C with an estimated loss of mass 33.33% (calculated loss of mass = 32.61%), which was logically counted for the loss of coumarin groups. The estimated total loss of mass is 80.71% (calculated total loss of mass = 79.69%).

The $[\text{Mn}_3(\text{L}^4)\text{Cl}_6]$ compound with the molecular formula $[\text{Mn}_3\text{C}_88\text{H}_64\text{N}_{12}\text{O}_4\text{Cl}_6]$ decomposed between 155-680°C. The estimated total loss of mass was 81.24% (calculated total loss of mass = 82.74%) at 155-680°C may be supported that expel of six Cl, aromatic and coumarin.

The $[\text{Zn}_3(\text{L}^4)\text{Cl}_6]$ compound with the molecular formula $[\text{Zn}_3\text{C}_88\text{H}_64\text{N}_{12}\text{O}_4\text{Cl}_6]$ decomposed between 145-485°C. The first step happened at 145-365°C with an estimated loss of mass 12.07% (calculated loss of mass = 13.16) which was because of loss of six Cl groups. The second step arose at 365-485°C with an estimated loss of mass 34.78% (calculated loss of mass = 33.99%), which was logically counted for loss of aromatic groups.

The $[\text{Cr}_3(\text{L}^4)\text{Cl}_6]$ compound with the molecular formula $[\text{Cr}_3\text{C}_88\text{H}_64\text{N}_{12}\text{O}_4\text{Cl}_6]$ decomposed between 175-525°C. The first step happened at 175-385°C with an estimated loss of mass 12.35% (calculated loss of mass = 13.58) which was because of loss of six Cl groups. The second step arose at 385-525°C with an estimated loss of mass 35.59% (calculated loss of mass = 36.99%), which was logically counted for loss of aromatic groups [22,23].

Deoxyribonucleic acid (DNA) cleavage study

This study was examined by Gel electrophoresis method. The separation of calf thymus was initiated by Schiff base metal complex in presence of oxidant hydrogen peroxide.

When electrophoresis was conducted, migration of super coil form will be fast, it was known as Form-I. Form II meant super coil form was converted to open circular form if one strand was cleaved. Form III meant a linear form was migrated between forms-I and II, if both strand was cleaved. No cleavage of DNA occurred for ligand even if lengthy exposure time (lane 1). Manganese complex (lane 5) with H_2O_2 at high concentration confirmed cleavage action. The efficiency of copper and nickel complexes with H_2O_2 (lane 2&3) was more. Cu and Ni compounds despoiled the DNA entirely. Zn and Cr compounds (lane 4&6) exhibited action. [24,25].

Table 6: Thermo analytical data of the homo and hetero trinuclear complexes

Compounds	TG range (°C)	Estimated (Calculated) (%)		Assignment	Metallic residue
		Loss of mass	Total loss of mass		
$[\text{Cu}_3(\text{L}^3)\text{Cl}_6]$	165-355	12.10 (13.41)	80.04 (79.20)	Loss of six Cl groups, aromatic groups and coumarin groups.	Decomposition is in progress
	355-465	34.89 (33.22)			
	465-650	33.05 (34.12)			

[Ni ₃ (L ³)Cl ₆]	135-345	47.38 (46.48)	80.71 (79.69)	Loss of six Cl groups, aromatic groups and coumarin groups.	Decomposition is in progress
	345-450	33.33 (32.61)			
[Mn ₃ (L ³)Cl ₆]	155-680	81.24 (82.74)	81.24 (82.74)	Loss of six Cl groups, aromatic groups and coumarin groups.	Decomposition is in progress
[Zn ₃ (L ³)Cl ₆]	145-365	12.07 (13.16)	-	Loss of six Cl and aromatic ring	Decomposition is in progress
	365-485	34.78 (33.99) -			
[Cr ₃ (L ³)Cl ₆]	175-385	12.35 (13.58)	-	Loss of six Cl and aromatic ring	Decomposition is in progress
	385-525	35.59 (36.99)			

Lane 1 2 3 4 5 6

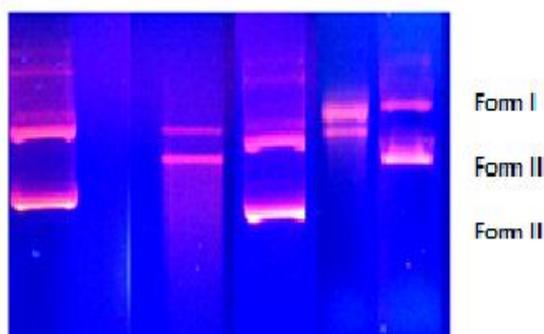


Fig 3: Gel electrophoretic results of interaction of compounds with DNA.

Lane 1, pUC18DNA alone,
 Lane 2, pUC18DNA +Cu compound + Hydrogen peroxide,
 Lane 3, pUC18DNA +Ni compound + Hydrogen peroxide,
 Lane 4, pUC18DNA +Zn compound + Hydrogen peroxide,
 Lane 5, pUC18DNA +Mn compound + Hydrogen peroxide and
 Lane 6, pUC18DNA +Cr compound+ Hydrogen peroxide.

In vitro Antimicrobial studies

Antibacterial activity of the complex was indicated in table 4. The compounds were experienced with bacteria and Initially, Petri dishes were sterilised by means of autoclave and disc diffusion method was conducted inside air purifier. The stock solution was prepared by mixing Schiff base complexes and DMF solvent. The agar was taken as medium in Petri dishes and the swab was used to make lawn for microbes. The dried plates were kept uninterrupted for five minutes. The pH range was fixed from 7.1 to 7.5. The Petri dishes containing metal complexes and microbe were incubated for one day at 36°C. The standard used was streptomycin in this method. The metal complexes inhibited bacterial growth. The range of the zone depended on efficiency of metal complex, diffusion of metal compound in agar medium and molecular configuration of the compound. The Schiff base complexes have got more efficiency compared with standard streptomycin and the complexes retarded the growth of bacterium. The area where bacterium was not grown in wafer is called as zone of inhibition. The efficiency and diffusion of complex were the factors influencing size of zone. The results of the compounds were mentioned in table 7. The activity of Cu(II),Ni(II) and Mn (II) compounds were more. The action of Zn(II) and Cr(III) compounds were moderate[26,27].

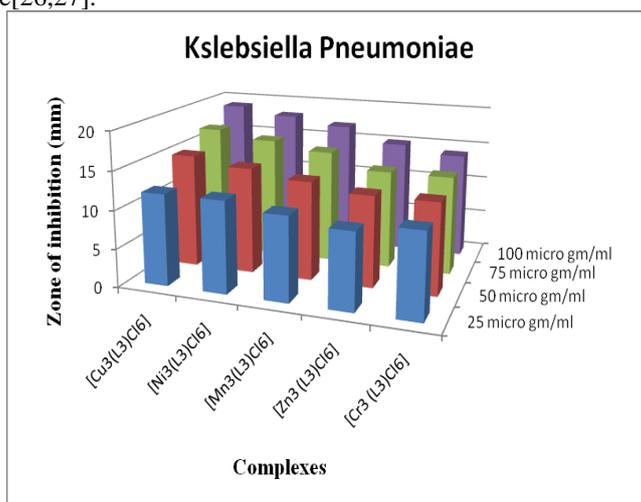


Fig 4: Variation between the antimicrobial activities of the trinuclear compounds against *Klebsiella pneumoniae*

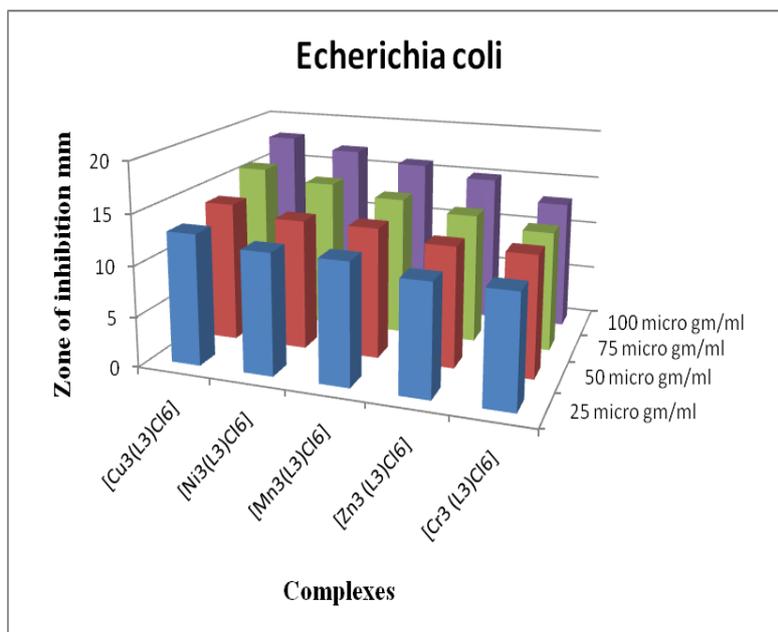


Fig 5: Variation between the antimicrobial activities of the trinuclear compounds against *Escherichia coli*
Table 7: Antibacterial activity of the compounds

Compounds	K.pneumonia (mm)				E.coli (mm)				S.aureus(mm)			
	Concn. (µg/ml)											
	25	50	75	100	25	50	75	100	25	50	75	100
[Cu3C88H64N12O4Cl6]	12	15	17	19	13	14	16	18	13	15	18	19
[Ni3C88H64N12O4Cl6]	12	14	16	18	12	13	15	17	13	13	17	18
[Mn3C88H64N12O4Cl6]	11	13	15	17	12	13	14	16	12	13	15	17
[Zn3C88H64N12O4Cl6]	10	12	13	15	11	12	13	15	12	12	13	15
[Cr3C88H64N12O4Cl6]	11	12	13	14	11	12	12	13	11	11	12	13

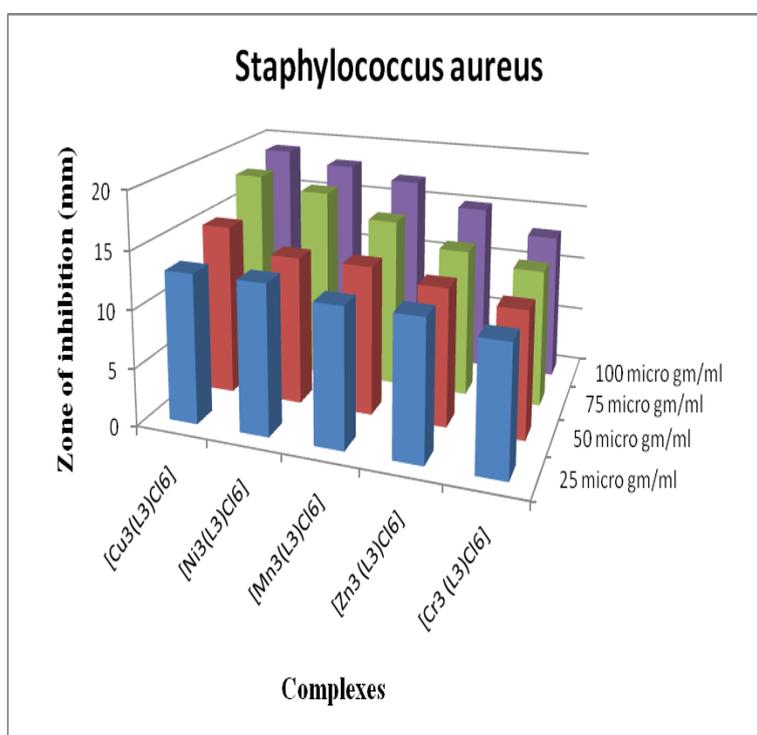


Fig 6: Variation between the antimicrobial activities of the trinuclear compounds against *Staphylococcus aureus*

4. CONCLUSION

In the current work, ligand and their Cu(II), Ni(II), Mn(II), Zn(II) and Cr(III) compounds were prepared from p-phenylenediamine, benzil and 3-amino coumarin. The highlights of present investigations are a) from the elemental and various instrumental analysis, the configuration can be concluded and compounds have got distorted octahedral structure. b) The molar conductivity value made known that prepared complexes were non ionic in nature. c) Synthesised copper and nickel Schiff base complexes exhibited more efficiency towards DNA cleavage activity by the way of oxidative path. d) In the last part, the antibacterial activity of compounds was evaluated against microbes. Cu(II)& Ni(II) Schiff base compounds had extra efficiency compared with other Schiff base complexes.

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