Short Communication
Biochemical Behaviour of Newly Synthesized Mn (II) Chelate

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ABSTRACT

Synthesis of Schiff base metal complex of Mn(II). The complex was analyzed by differentphysico-chemical techniques like Elemental analysis, FTIR, UV/VIS, EPR, NMR and Magnetic Studies. The data show complex has octahedral geometry.Antimicrobial activity and anticancerous studies of Mn (II) chelate gave good result in the presence of metal ion in the ligand system

KEY WORDS: Synthesis, spectra, Antimicrobial, anticancerous.

Schiff bases and their complexes have been are being employed to many reactions in Synthetic Chemistry. Schiff bases containing heteroatoms as donor atoms are of considerable interest due to their potential applications in catalysis, Medicines and material science [1-5]. The Transition Metal complexes with Schiff base ligand display varying configurations, structural lability and sensitivity to Molecular environment. The central metal ion in the complex act as active site for catalyzing chemical reactions. The Schiff based are able to inhibit the growth of several animal tumors and some Metals have shown good tumor activity against animal tumors. The interest in preparation of New Manganese complex grained the tendency of Studying on the interaction of metal complexes with DNA For it application in Biotechnology and Medicine. In The paper in this Novel complex of Manganese with ligand, 2- furylglyoxal -2- aminophenol (FGAP) was synthesized and characterized by Physico- chemical studies. The Schiff base ligand and its complex was Further investigated for anticancer and antimicrobial Properties.

All the chemicals used were of analytical reagent grade and the solvent were dried and distilled before use according to a standard procedure C,H,N were analyzed on Carlo- Erbamicroangalyzer Model 1106. Metal content was estimated by standard Procedure. FTIR recorded onThermonicoletAvater 370. The electronic spectra were recorded in the region 200-1100 nm on a,Thermoelectron Nicolet evolution 300 UV-VIS spectrophotometer. EPR Spectra of complex in DMF recorded on variance E-112 X/Q band spectrophotometer at liquid nitrogen temperature and the standard used was tetracyanoethylene (TCNE) with a value of 2.0027. The conductance measurement carried out on a Model M-180 Flico digital conductivity meter Magnetic studies was done by a Guoy balance using $Hg[CO(SCN)_4)]$ as the calibrant. The ^1H. NMR spectra recorded in $CDCl_3$ at 300 MHz TMS as an internal reference. The antimicrobial activity of the compounds have been screened by using cup plate agar diffusion method. The anticancer activity evaluated against a panel of different cancer cell lines by using MTT(3-(4,5 dimethylthiazol-2-yl)-2,5 diphenyltetrazolium bromide) assay.

Synthesis of Mn(II) FGAP Chelate:

An ethanolic solution of ligand (FGAP) prepared by dissolving 0.86 g ($4x10^{-3}$M) of FGAP in 52mL ethanol was added to 30-40 mL ethanolic solution of $2x10^{-3}$M Manganese acetate (0.40g.

$Mn(OAC)_2.4H_2O$ in a round bottom flask. The resulting solution was refluxed over a water bath for about two and half hours on cooling separated coloured product was Filtered through suction washed with ethanol followed by ether and dried in Vacvvo over anhydrous $CaCl_2$.

The Manganese complex Mn $(C_{12}H_8O_3N_2)_2$ wascoloured non hygroscopic in Nature and stable at room temp. It was insoluble in common organic solvent but soluble in DMF and DMSO.

The Molar conductance value (Ω)4.78 ohm^{-1} cm^2 Mol^{-1} indicate its Non electrolytic Nature. $Mn[FGAP]_2$ yield 65% m.p. 165-170ºC Red colour and caldfo Mn $[C_{12}H_8O_3N_2]_2$(%): called C (56.36), H (3.13), N (10.95), Mn (10.76); Found C (55.92), H (3.82), N (10.88), Mn(10.74); IR (KBr Pallets cm^{-1})3050 υ(CH), 1680υ(>C=O), 1585 υ (> C= N) , 1252υ (C-O phenolic) ,567υ (M-O),468υ (M-N) Electronic spectra of the Schiff base and its complex were taken in methanol in the range of 50000-10000 cm^{-1}. The UV – visible spectrum of the Schiff base shows two strong bands at 42000 and 26500 cm^{-1} .due to benzene π-π*, imino π-π* Transitions.

The Mn (II) complex shows three bands at 17300, 22900 and 29970 cm^{-1}. These spectral bands are assigned as the $^6A_{1g} \rightarrow {}^4T_{ig}$ $^6A_{1g} \rightarrow {}^4T2g$ and charge transfer (CT) respectively towards octahedral structure around Mn (II) ion. The Magnatic moment of Mn(II) complex is 5.05 BM suggesting octahedral geometry.

The EPR spectrum of Schiff base Mn(II) metal complex at 77K in DMSO exhibits six hyperfine lines. The lines are poorly resolved which may be due to the poor glass formation. The spectrum gives a value of 1.98 with an A Value of 0.00093 cm.

^1H NMR spectra of free Schiff base he signals were appeared in the range of 8.18- 8.20 ppm due to (HC= N) proton however in the spectra of Schiff metal complex the signal was observed in up-field regions of8.28 – 8.30 ppm supporting the coordination of iminontrogen atom to Mn(II) ion [6-7] while the free ligand NMR spectra has a characteristic NMR signal for carboxyl group proton in the 10.17-10.88 ppm range the disappearance of this signal in the ^1H NMR spectra of Mn(II) complex indicating the involvement of carboxylate ion oxygen in chelation through deprotonation.

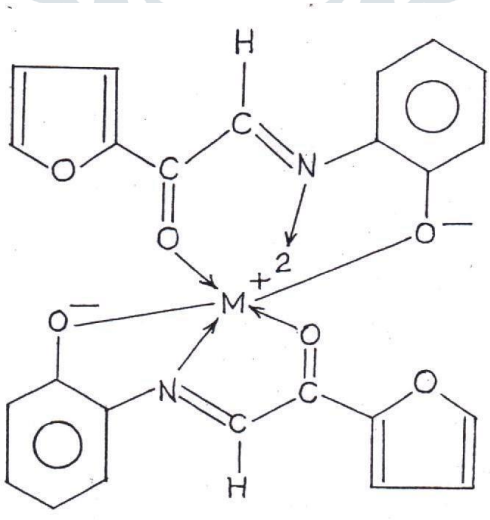

Fig- Structure of Mn(II) Chelate

The result of the invitro antimicrobial activity of the ligand and Mn(II) complex against bacteria staphylococcusaureus and Escherichia coli [8-9] determined by the paper disc plate method are presented in Table 1 in which the activity of a known antibiotic vizciprofloxacin in included for comparison. From the result it is clear that the inhibition by the Metal chelate was higher than that

of free ligand. Such enhanced activity of metal chelate in due to the lipophilic nature of the metal ion in the complex. The increase in activity with concentration is due the effect of Mn(II) ion on the Normal metabolic function of the cell the action of compound may involve the formation of hydrogen bonds with the active centre of cell constituents, resulting in the interference with the Normal function of the cell.

Table -1
Antimicrobial activity of the compound

Test Compound	Inhibition Zone, mm			
	E. Coli		S. aureus	
	500	1000	500	1000
Ciprofloxin	30	35	28	31
FGAP (L)	10	12	12	15
Mn (II) FGAP Complex	15	18	16	17

Preliminaryscreaming of the synthesized Mn(II) chelate was carried out for cytotoxic activity against a panel of selected human cancer cell lines such as BT474 (Brest) and HOP-62 (Lung) by using MTT assay. The result of this cytotoxicity testing, expressed as IC_{50} value is summarized in table 2 Doxorubicin was used as a positive control.

Table-2 Half Minimum Inhibitory conc. of Mn (II) Chelate
(IC_{50})[a] value expressed in μm

Compound	**BT474[b]**	**HOP-62[C]**
Mn(II), FGAP Complexes	4.42	2.09
Doxorubicin	1.73	1.12

(a) 50% inhibitory concentration value are an average of these individual experiments (b) Breast cancer (c) Lung Cancer

Mn(II) metal chelate was found to be effective in all the cell lines examined [10-11]

CONCLUSION

In the present novel Schiff base Mn(II) Metal chelate was prepared and characterized by physico-chemical methods. The metal ion Mn (II) was complexed with Nitrogen of imine group and presence of octahedral geometry around metal ion. The metal complex has higher antimicrobial activity than the ligand. The synthesized Metal chelate also showed the anticancer activity against a panel of selected human cancer cell lines.

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