Synthesis and Antimicrobial Activity of Transition Metal complexes of substituted benzoinsemicarbazone

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by elemental and spectral analysis. The synthesized complexes were screened for antimicrobial activity at a concentration of 1000µgm/ml witch was serially diluted to determine their MIC values of P-Dimethylaminobezoinsemicarbazone.

Keywords- Antimicrobialactivity,Metalcomplexes,P-Dimethylaminobenzoin semicarbazone, O- hydroxybenzoin semicarbazone.

1 INTRODUCTION

Benzoinsemicarbazone are well known for their biological activity Coordination compounds containing ONS as donar atoms are reported to possess antimicrobial activity [1] . Metal Complexes of semicarbazone, thiosemicarbazone, of 1-Vinyl-pyrrole-2-carbaldehydes and reported that these compounds have their own importance in pharmaceutical and medicinal fields by milkhaleva[2] it was observed that antimicrobial activity of some drugs increased markedly. When they are applied in the from of metal complexes[3] . Quraishy and Ahmad[4] carried out synthesis & Characterization on of Ti (III), Mn (II) and Cu(II) complexes with semicarbazone and screened their antimicrobial activity. Chandra [5] reported synthesized and characterized of cu(II) complexes with semicarbazone and Thiosemicarbazones and also screened their biological activities against E.coli, S. aureus, microgranims. Co (II) , Ni (II) , Co(II), and Zn (II) complexes of O- vanillin semicarbazone have been synthesized and characterized by different physicochemical techniques by Hingorani [6] . Choudhary [7] carried out synthesis and charactarization of new series of mixed ligand complex of Co(II) and Cu(II) with thiosemicarbazone/ Semicarbazone and screened their antibacterial and antifungal activities in detailed. Investigation on variety of semicarbazones and Schiff bases and their transition metal complexes was carried out by several workers [8-9] Mohapatra [10] reported the complexes of divalent Mn(II), Co (II), Cu(II) with benzil semicarbazone . Mohanty [11] , reported the complexes of divalent metal with thiosemicabazone and thiosemicarbazone have attracted much attention due to their various biological activities. fiong. O.E [12] , reported the antibacterial activity of metal complexes of benzyl and benzointhiosemicarbazones. Krishan K[13] , carried out synthesis and characterization on of Co (II) Complexes with benzoin thiosemicarbazone. Sulekh Chandra [14] reported synthesis EPR and electronic spectral studies on Cr(III) and Mn(II) Complexes of some thiosemicarbazone and semicarbazone. In the Present work ,

novel transition metal complexes of substituted benzoin semicarbazone are reported.

2 Experimental

The benzoinsemicarbazone derivaritives were prepared by refluxing substituted benzoin with semicarbazide hydrochloride in presence of alkaline medium for 3-4 hours, reaction mixtures were kept overnight. The solid products formed were isolated and washed several times with water alcohol mixture the purity was checked by TLC paper. Their structural details were confirmed on the basis of and spectral analysis. In order to synthesize the complexes the equimolar mixture of each of the ligand (0.01 M) and metal salts was refluxed on a water bath for 6-8 hrs in presence of sodium acetate in ethanol/methanol. The reaction mixture was kept overneight. The products formed were isolated washed several times with cold water- ethanol mixture. The characterization of synthesized complexes was made with elemental analysis, IR and UV-VIS spectra.

Elemental Analysis of P-Dimethylaminobenzoinsemicarbazone Cu(II)Complexes :- C [found (58.58%)calculated 58.64%],H [found(5.82%)calculated 5.91%], N [found(10.65%)calculated 10.80%],cu[found(8.06%)calculated 8.17%] IR Spectrum :- IR spectrum[15] was recorded in KBr pellets and the important absorption can be correlated as(cm^{-1}) is shown in Table.Infrared spectra of p-Dimethylaminobenzoinsemicarbazone has main main absorption bands at 3463(O-H),3320(N-H),1689(C=O),1649(C=N)and1171(C-O)respectively.In the complexes (O- Hstretching) is found 3319cm^{-1} region, 1606 (c=o stretching in amide) 1171 (C-O stretching in cyclic form) indicating linkage through hydrogen oxygen 1649 (C=N) significantly decreases to 1545(C=N) showing linkage throw azido nitrogen.This has been confirmed by the absorption of (M-O) and (M-N) around 571 and470cm^{-1} region.

Table No.1

Frequency (cm^{-1})	**Correlation**
3319	Intermolecular –OH stretching
2908.9	Ar–H stretching
2817.1	$–CH_3$ stretching
1545.7	>C=N stretching
1606.7	$–CONH_2$
1171.9	–C–O stretching in cyclic form
517	M-O
470	M-N

Elemental Analysis of -Hydroxybenzoinsemicarbazone Cu(II) complexes: C[found(54.18%)calcuted 54.28],N[found(4.68%)calcuted 4.79%],N[found(11.09%)calculated],Cu[found(8.36%)calcu ted 8.45%]

IR Spectrum :- IR spectrum was recorded in KBr pellets and is reproduced on Plate No. PMDIR-15, is shown in

Table No.2

Frequency (cm^{-1})	**Correlation**
3317.7	Intermolecular –OH stretching
3059.7	Ar–H stretching
1526	>C=N stretching
1607	$–CONH_2$
1115	–C–O stretching in cyclic form
569	M-O
462	M-N

The similar procedure was adopted in the synthesis of other complexes detailes are given below. P-DMABSC-Mn(II),p-DMABSC-Cr(III),O-HBSC-(Mn),O-HBSC-Cr(III),pp'-DMBSC-Mn(II),pp'-DMBSC-Cr(III).

Electronic spectra and Magnetic Moment: The electronic spectrum of Cr(III) complexes exhibits three bands at 13476,19590 and 22620cm^{-1} which may be assigned to $^4A_{2g}$---$^4T_{2g}$(F),4A2g---4T1g(F) and2g—4T1g(P),transition,respectively for an octahedral stereochemistry.(16).The electronic spectrum of Mn(II) complexes exhibits three bands are observed at 13870,19002 and 21840cm-1 belongs to 6A1g-4T1g,6A1g—4T2g and 6A1g—4Eg transition respectively,suggested octahedral geometry(17).The electronic spectrum of Cu(II) complex exhibits three bands at 13533,19200 and 22094cm-1 which may be assigned to 2B1g—2A1g,2B1g—2B2g and 2B1g—2Eg suggesting,distorted octahedral geometry.(18) The magnetic moment of 3.97 to 4.18 B.M for Cr(III) complex is consistent with octahedral geometry around metal centre. The magnetic moment of Mn(II) shows 4.51 to 5.93 B.M would suggested octahedral geometry around metal ion. In of Cu(II) complexes,show magnetic moment of 1.78 to 2.16 B.M Suggesting a distorted octahedral geometry.(19)

3 Antimicrobial activity of complexes

The compounds were assayed for their antimicrobial activites[20] against four test organisms E.coli, S.aureus, Ps.aeruginosa, B.subtils at a concentration of 1000µgm/ml by agar well technique[21]. Further their MIC valuer against these organisms were determined by serial dilution method[20] using DMF as a solvent. The results obtained are given in Table.

MIC values in µ gm/ml of Compounds.

Ligands andits Complex	*E.coli*	*S.aureus*	*Ps. aeruginosa*	*B- Subtilus*
P- DMABS	1000	500	500	500
P-DMABS Cu (II)	250	250	250	250
P-DMABS Mn(II)	250	125	125	250
P-DMABS Cr (III)	250	125	250	125
O-HBSC	500	500	500	1000
O-HBSC Cu (II)	250	250	250	125
O-HBSC Mn (II)	250	250	250	125
O-HBSC Cr (III)	125	250	250	250
PP'-DMBSC-Cu (II)	250	125	250	250
PP'-DMBSC-Mn (II)	250	125	250	250
PP'-DMBSC-Cr (III)	125	250	125	61

Result and Discussion

The complex P P'- dimethylaminobenzoinsemicarbazone Cu(II) and o-hydroxybenzoinsemicarbazone-Cr(II)is found to be effective against maxium number of organisms followed by P-dimethylaminobenzoinsemicarbazone-Mn(II).and P P' dimethoxybenzoinsemicarbazone-Cr(III).They Showed antimicrobial activity against E.coli, S. aureus, P-aeruginosa, B.subtilis (lowest MIC value) The enhanced antimicrobial activity in case ofthe compound PP'-Dimethoxylaminobenzoin semicazone-Cr(III) may be attributed to the presence of two methoxy groups.

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