



## **SYNTHETIC AND ANTIMICROBIAL STUDY OF CU(II) COMPLEXES OF SUBSTITUTED BENZOINHYDRAZONES**

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### **Abstract**

Benzoin hydrazone and its metal complexes were synthesized from substituted benzoinhydrazone. They were characterized by elemental analysis and spectral analysis. The synthesized complexes were screened for antimicrobial activity. At a concentration of 1000µgm/ml. Which was serially diluted to determine their MIC value .

**Keywords :-** Antimicrobial activity, 2-HBH-Cu(II), FURO-Cu(II)

### **Introduction:-**

The complex formation of benzoinhydrazone with copper(II) and nickel(II) , were synthesized by scherbakov<sup>1</sup> .Prasad<sup>2</sup> , studied by the synthesis of Novel(II) complexes with now ligand derived from hydrazone of isoniazid and their magnetic-spectral, electrochemical, thermal and antimicrobial investigation. Benzoinhydrazone are well known for their biological activity coordination compounds containing ONS as donor atoms are reported to antimicrobial activity<sup>3</sup>. Synthesis, spectral and biological studies of Co(II), Ni(II), Zn(II), Cu(II) and Cd(II) complex with benzyl salicyladehyde acyldihydrazone were carried out by singh<sup>4</sup>. The simultaneous spectroscopic determination of palladium and osmium with salicyladehyde hydrazone was carried out by Ray<sup>5</sup>. The synthesis and structural characterization of three new co-ordination complexes of Co(II), Mn(II) and Cu(II) with N,N,O- donor hydrazine ligands were carried out by shit<sup>6</sup> .The coordination chemistry of hydrazones is an intensive area of study and numerous transition metal complexes of these ligands have been investigated<sup>7</sup>. Synthesis and characterization of some



copper(II) complexes with N,S,O-donor thiohydrazones were carried out by Dey<sup>8</sup>.

### Experimental:-

The melting point of all synthesized compounds was recorded using hot paraffin bath. The carbon and hydrogen analysis were carried out of carlo-Ebra 1106 elemental analyser. Nitrogen estimation was carried out colman-N-analyzer-29. IR spectra were recorded on perkin Elmer spectra were recorded on Bruker Ac 300F spectrometer with TMS as internal standard using CDCl<sub>3</sub> and DMSO-d<sub>6</sub> as solvent. The purity of compounds was checked on silica Gel-G pellets by TLC with layer thickness of 0.3mm. All chemicals used were of AR grade. The 4-DMABH was prepared by refluxing substituted benzoine with hydrazine hydrate in presence of alkaline medium for 3-4 hours this reaction mixture was kept overnight. This 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 elemental and spectral analysis. Synthesis of complexes the equimolar mixture of each of the ligand(0.01M) and metal salts(0.01M) were refluxed on a water bath for 6,8 hours in presence of sodium acetate in ethanol . The reaction mixtures was kept overnight. The product formed were isolated washed several times with cold water ethanol mixture. The characterization of synthesized complex was made with elemental analysis and IR.

### Result and discussion:-

#### IR spectral data of ligand and its complexes as shown in table-1

Ligands and and its Complexes	$\nu$ (O-H)	$\nu$ (C=N)	$\nu$ (C-O)	$\nu$ (M-O)	$\nu$ (M-N)
4-DMABH	3423	1597	1388	-	-
[Cu(L) <sub>2</sub> ] 2H <sub>2</sub> O	3399	1585	1385	514	584
4-4 <sup>1</sup> DMBH	3388	1634	1362	-	-
[Cu(L) <sub>2</sub> ] 2H <sub>2</sub> O	3327	1618	1373	520	585
2-HBH	3412	1607	1417	-	-
[Cu(L) <sub>2</sub> ] 2H <sub>2</sub> O	3381	1586	1420	511	593
FURO	3420	1620	1419	-	-
[Cu(L) <sub>2</sub> ] 2H <sub>2</sub> O	3334	1601	1395	510	591



IR spectra of ligand 4-DMABH shows band at  $3423\text{cm}^{-1}$  ( $\nu(\text{O-H})$ ). In 4-DMABH-Cu(II) complexes which decreases to  $3399\text{cm}^{-1}$  indicating through hydrogen oxygen. However  $1597(\text{C}=\text{N})$  significantly decreases to  $1585\text{cm}^{-1}$  showing linkage through imino nitrogen. Similarly 4,4'-DMBH, 2-HBH and FUROH-Cu(II) were carried out as mentioned above.

On the basis of elemental analysis the complexes were assigned to the composition as shown in table-2

Complexes	Colour	Molecular wt	Decomposition temp. °C	Elemental analysis Found/(calculated)%			
				C	H	N	M
[Cu(L) <sub>2</sub> ]2H <sub>2</sub> O	Brown	635.54	272	62.99 (64.05)	5.20 (6.71)	14.01 (14.02)	9.68 (10.59)
[Cu(L) <sub>2</sub> ]2H <sub>2</sub> O	Red	687.54	277	59.30 (60.42)	4.71 (5.66)	8.81 (8.81)	8.86 (9.99)
[Cu(L) <sub>2</sub> ]2H <sub>2</sub> O	Grey	597.54	279	60.72 (61.59)	3.83 (4.76)	10.26 (10.26)	10.78 (11.64)
[Cu(L) <sub>2</sub> ]2H <sub>2</sub> O	Dark Brown	509.54	290	59.51 (60.3)	3.61 (4.52)	6.11 (7.04)	14.04 (15.97)

#### Antimicrobial activity:-

The compounds were assayed for their antimicrobial activities<sup>9</sup>. Against for test organisms *E.coli*, *S.aureus*, *P.aeruginosa* and *B.subtilis*, at a concentration of **1000µg/ml by agar well technique**<sup>10</sup>. Further their MIC value against these organisms were determined by serial dilution method using DMF as a solvent, the results obtained are given in the following table.

MIC values in **µg/ml** of compounds

Complexes	<i>E.coli</i>	<i>S.aureus</i>	<i>P. aeruginosa</i>	<i>B.Subtilis</i>
[Cu(L) <sub>2</sub> ] 2H <sub>2</sub> O	125	63	63	125
[Cu(L) <sub>2</sub> ] 2H <sub>2</sub> O	125	63	63	63
[Cu(L) <sub>2</sub> ] 2H <sub>2</sub> O	125	63	125	125
[Cu(L) <sub>2</sub> ] 2H <sub>2</sub> O	125	125	63	63



On the basis of MIC values, 4-4<sup>1</sup>-DMBH-Cu(II) is found to be most effective antimicrobial agent followed by 4-DMABH-Cu(II) and FURO-Cu(II). The enhance antimicrobial activity in case of the compounds. 4-4<sup>1</sup>-DMABH-Cu(II) may be attributed to the presence of methoxy group.

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