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Synthesis and characterization of some complexes of Co(II), Ni(II), Cu(II),Zn(II),Cd(II) and Hg(II) with Schiff–base(N-benzylidine furan -3-Carbohydrazide)

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ABSTRACT:
A new complexes of general formula $[M(R)_2]$ $(NO_3)_2]$ where M= Co(II), Ni(II), Cu(II), Zn(II), Cd(II) and Hg(II), are synthesized by the coordination of these metal salts with Schiff-base [N-benzylidine furan-3-carbohydrazides (RH)].The Schiff base is prepared by condensation of Furan -3-carbohydrazide and 2-hydroxy benzaldehyde (1 : 1 molar ratio). These complexes are characterized by their IR , UV/ Vis spectra and molar conductivity measurements. These results indicate that the ligands (RH) are coordinated with all metals as didentate via the most active sites , imine nitrogen (azomethane), phenolic oxygen in addition to carbonyl oxygen .

KEYWORDS: N-benzylidine furan -3-Carbohydrazide, Schiff base, complex.

1. INTRODUCTION

In addition to their importance as intermediates in organic synthesis, Schiff bases were also biologically active against many disorders such as leukemia, prostate and colon cancer(Anis et al., 2013),while their complexes were proved to be effective against many anaerobic bacteria (Cleiton et al., 2011) and epidermophyton floccosum (Raman et al., 2003). These Schiff bases showed different coordinating properties (Alzoubi, 2013) and the structures of the result complexes gave different geometries (Sahin, et al 2017) and (Shaheen, et al 2013).

It will more interest to investigate preparation routes to synthesis and characterization of some derivatives of Schiff bases and the steriogeometric complex show an octahedral..

2.Experimental:

IR Spectra were recorded on Unicam SP 2000 Spectrometer at a range (200-4000) cm^{-1} using KBr discs. Electronic spectra were recorded on a Shimadzu UV/Vis Spectrophotometer UV- 160 for 10 $^{-3}$M solution of the complexes in ethanol at ambient temperature, while DMF was the solvent used for molar conductivity measurements. Elemental analyses were carried out using Analytical function testing , Vario, EL, II CHNS analyzer.

2.1Synthesis of Schiff –bases:

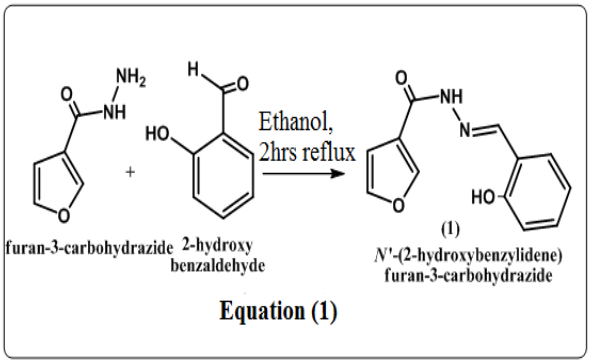
Furan -3-carbohydrazide and 2-hydroxy benzaldehyde (1 : 1 molar ratio)(from commercial suppliers) were dissolved in ethanol. The resulting reaction mixture was refluxed for two hours. The obtained solid precipitate was filtered, washed with distilled water dried, recrystallized from ethanol to give a 89% yield yellow crystals of m.p.148°C , the selected IR frequencies were :1580s, ν(C=N) and 1300 ν (O–H).(5,6,7)

2.2 Synthesis of complexes:

A mixture of 3mmol of the Schiff – base and 1mmol of the metal nitrate in 10ml ethanol was kept stirring at $50C^0$ for 30 minutes, the solvent was evaporated and the resulting precipitate was washed with distilled water and left to dryness, physical data and elementary analysis C.H.N.
are listed in Tables(1-2).(Xavie and N. Srividhya ,2014).

3. Result and Discussion:

The reaction of aromatic aldehydes with hydrazide derivatives gave aromatic Schiff-base (1), and the synthesis approach is shown in equation (1):



Equation (1)

While the coordination of this base with metals gave the complexes(2a-d), these complexes (Fig 1) gave molar conductivities at 140-170 cm^2 ohm^{-1} mol^{-1} in 10^{-3} M , which indicated the electrolyte property of these complexes () **(**Abdul razaq et al., 2010).The ligand IR spectra showed a strong bands for C=N group at about(1602-1617cm^{-1}).

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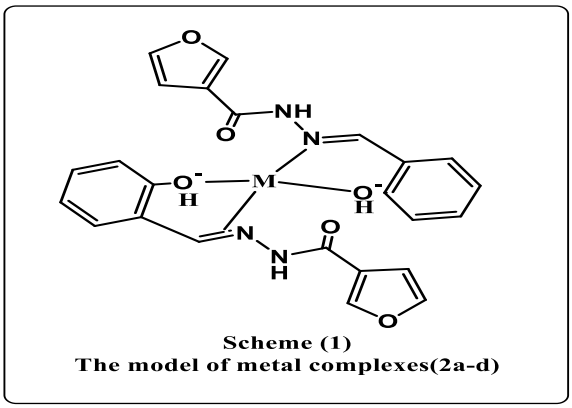

Scheme (1)
The model of metal complexes(2a-d)

Another strong bands at 1300 cm^{-1} attributed to phenolic OH group and this value was also shiftedtowards lower frequency (1260 – 1285 cm^{-1}) on coordination (Pelagatti and A. Bacchi (1999). The spectra of all complexes showed new bands around (510- 580 cm^{-1}) and (720 – 735 cm^{-1}) due to υ M-N and υ M-O (Abd El-Wahab et al., 2015) and (Chaubey and Pandeya, 2012). The electronic spectra complexes in ethanolic solution was 293nm and 490 nm due to the electronic transition π to π* in the phenolic ring and π to π* in C=N group respectively(10).However complexes of Zn, Cd, Hg are non-transition metals therefor not show bands in UV-Vis because not contain empty d-orbitals. On complexation a blue shifts wre 315 nm and 340 nm was observed due to the polarization in the C=N bond caused by the metal ligand electron interaction (Abdul razaq et al., 2010) and (Nasker et al. 2011) .

Table 1: Activity of enzymes in the serum of Table (1): Physical properties and spectra data of the complexes (1-6)

Complex no	Complex	m.p (°C)	IR spectra (cm^{-1})				conductivity ohm^{-1} cm^2 mol^{-1} DMF solvent	UV/ Vis (cm^{-1})
			υC=N	υO-H	υM-O	υM-N		
	Ligand	148	1580	1300	------	-------	----------	---------
1	$[Ni(R)_2](NO_3)_2$	230	1560	1260	720	510	160	293,390, 470
2	$[Cu(R)_2](NO_3)_2$	>350	1570	1280	735	550	170	454
3	$[Zn(R)_2](NO_3)_2$	320	1560	1275	730	580	150	---------
4	$[Co(R)_2](NO_3)_2$	285	1560	1265	725	520	170	297,398, 490
5	$[Hg(R)_2] (NO_3)_2$	340	1575	1270	720	540	150	---------
6	$[Cd (R)_2](NO_3)_2$	>350	1550	1285	715	535	160	---------

Table (2): Elemental analysis of complexe

Comp No.	CHN analysis						Comp No.	CHN analysis					
	Found			Calculated				Found			Calculated		
	C	H	N	C	H	N		C	H	N	C	H	N
1	44.01	3.01	13.78	44.85	3.11	13.08	**4**	44.00	3.99	13.87	44.79	3.11	13.06
2	44.01	3.55	13.10	44.51	3.09	12.98	**5**	37.73	3.58	12.00	36.73	2.55	10.71
3	44.11	3.78	12.9	44.37	3.08	12.9	**6**	44.03	3.57	12.66	41.37	2.87	12.06

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