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NOTE

Tin(IV) Complexes of Bidentate Schiff Bases Having NS Donor Systems

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Nine new tin(IV) complexes of bidentate thiosemicarbazate Schiff bases have been synthesised. The mode of bonding of the ligands is *via* azomethine nitrogen and thiolo sulphur atom as revealed by IR and PMR data. These complexes were screened for antibacterial activity.

The number and diversity of SN chelating agents used to prepare new coordination and organometallic compounds has increased rapidly during the past few years and has created considerable interest in their coordination chemistry due to pronounced biological activity[1, 2] of several Sn(IV) complexes of a variety of Schiff bases[3, 4]. In our earlier publications[5, 6] several Sn(IV) complexes of a variety of Schiff bases have been reported. We presently describe the synthesis and characterisation of Sn(IV) derivatives of thiosemicarbazones and 4-phenyl-thiosemicarbazones, derived from 2-pyridinecarboxaldehyde and *p*-anisaldehyde.

The calculated amount of the sodium salt of the schiff bases in dry methanol (25 mL) was added dropwise to the weighed amount of organotin chloride in the same solvent with constant stirring. After 2 h a clear solution along with the precipiate of sodium chloride was obtained. Further, to ensure completion of the reaction, the contents are refluxed for 5–6 h and sodium chloride was filtered off. The filtrate was dried under reduced pressure and the resulting solid product was washed repeatedly with methanol and air-dried.

All these complexes are soluble in most organic solvents. The molecular weight and conductance measurements show them to be monomeric and non-electrolytic in nature. The infrared and proton magnetic resonance spectra show the bonding between azomethine nitrogen and thiolo sulphur of Schiff base to the central tin atom[6, 7] (Table-1).

On the basis of spectral studies a trigonal bipyramid and octahedral structure with the central tin atom being in a penta-and hexa-coordinate environment has been suggested in the presented complexes[5, 6].

The products were screened for antibacterial activity by cup plate method using chloroform as solvent at a concentration of 10 mcg/d against *S. aureus* and *E. coli*. All compounds show mild activity against both the bacteria.

TABLE-1
ANALYTICAL DATA, KEY IR FREQUENCIES (cm^{-1}) AND SELECTED ^1H NMR SPECTRAL DATA OF TIN(IV) COMPLEXES

Sl. No.	Compounds	m.p. (°C)	Elemental Analysis (%), Found (calcd.)					IR Frequencies (cm^{-1})		Proton Signal		$\delta Sn(C_4H_9)$
			C	H	N	S	Sn	ν(C=N)	ν(C—S)(enolic)	δ SH	δ—CH (azomethine)	
1.	$C_{25}H_{22}SN_4Sn$ $Ph_3Sn(PTSC)$	212	56.48 (56.69)	4.01 (4.18)	10.32 (10.65)	5.98 (6.05)	22.20 (22.41)	1630	1430	—	9.10	0.6–1.7
2.	$C_{26}H_{24}S_2N_8Sn$ $Ph_2Sn(PTSC)_2$	180	48.86 (49.40)	3.62 (3.83)	17.60 (17.84)	9.88 (10.14)	18.45 (18.77)	1630	1450	—	9.25	0.7–1.75
3.	$C_{19}H_{34}SN_4Sn$ $Bu_3Sn(PTSC)$	87	47.68 (48.59)	6.64 (7.29)	11.70 (12.00)	6.41 (6.82)	25.10 (25.27)	1635	1330	—	9.20	0.58–2.0
4.	$C_{31}H_{26}SN_4Sn$ $Ph_3Sn(PPTSC)$	238	60.52 (61.47)	4.10 (4.32)	8.96 (9.31)	5.12 (5.29)	18.86 (19.59)	1630	1430	—	9.22	0.6–1.7
5.	$C_{38}H_{32}S_2N_8Sn$ $Ph_2Sn(PPTSC)$	205	57.60 (58.19)	3.88 (4.11)	14.12 (14.38)	8.52 (8.17)	16.24 (15.13)	1630	1450	—	9.25	0.5–2.0
6.	$C_{25}H_{38}SN_4Sn$ $Bu_3Sn(PPTSC)$	198	55.46 (55.02)	7.32 (7.01)	10.12 (10.33)	6.21 (5.87)	21.92 (21.74)	1635	1332	—	9.10	0.7–1.75
7.	$C_{27}H_{25}OSN_3Sn$ $Ph_3Sn(PATSC)$	240–242	57.98 (58.05)	4.64 (4.51)	7.12 (7.57)	5.42 (5.74)	20.98 (21.25)	1630	1432	—	9.20	0.6–1.7
8.	$C_{30}H_{30}O_2S_2N_6Sn$ $Ph_2Sn(PATSC)_2$	260	53.06 (52.22)	4.46 (4.38)	12.12 (12.26)	8.86 (9.29)	17.55 (17.20)	1630	1450	—	9.10	0.5–1.75
9.	$C_{21}H_{37}OSN_3Sn$ $Bu_3Sn(PATSC)$	160	50.42 (50.58)	8.12 (7.48)	8.12 (8.48)	6.82 (6.43)	23.28 (23.80)	1635	1330	—	9.10	0.58–2.0

PTSC = 2-pyridinecarboxaldehyde thiosemicarbazone
PPTSC = 2-pyridinecarboxaldehyde-4-phenylthiosemicarbazone
PATSC = *p*-anisaldehyde thiosemicarbazone

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