

NOTE

Structural Feature of Adducts of Tin(II) Chloride with Thiosemicarbazones Derived from 2-Pyridinecarboxaldehyde and *p*-Anisaldehyde

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Equimolar reactions of tin(II) chloride with thiosemicarbazones and 4-phenylthiosemicarbazones in anhydrous tetrahydrofuran under nitrogen atmosphere resulting in the isolation of a new series of tin(II) adducts formation of the type $\text{SnCl}_2 \cdot \text{L}$ (where L = thiosemicarbazones or 4-phenylthiosemicarbazones of 2-pyridinecarboxaldehyde and *p*-anisaldehyde). The IR and ^1H NMR spectral studies indicate coordination of tin to the azomethine nitrogen and sulphur of the ligand moiety.

Semicarbazones and thiosemicarbazones are amongst the most important nitrogen-oxygen/sulphur donor ligands.¹ Our interest in the chelated tin compounds²⁻⁴ led us to study the nature of bonding and structural properties of tin(II) adducts. During the course of the present investigation an attempt has been made to synthesize tin(II) adducts with the aforesaid ligands. The ligands were prepared by a method similar to that reported in an earlier publication.³ Then adducts were prepared by mixing the equimolar amounts of anhydrous tin(II) chloride and the ligand in dry tetrahydrofuran under oxygen-free nitrogen as described by Gsell and Zeldin.⁵ The resulting new derivatives were coloured solids. The molar conductance of 10^{-3} M solutions of the adducts in DMF lies in the range of 6–12 $\text{ohm}^{-1} \text{cm}^2 \text{mol}^{-1}$ indicating their non-electrolytic behaviour and the molecular weight determinations indicate their monomeric nature. The details of spectroscopic measurements are similar to those reported earlier.^{3,4}

The IR spectra of ligands show two sharp bands in the regions 3440 and 3360 cm^{-1} due to $\nu_{\text{asym}}(\text{NH}_2)$ and $\nu_{\text{sym}}(\text{NH}_2)$ mode of vibration respectively which remain unchanged in the spectra of the adducts. The strong ligand band around 1620 cm^{-1} assignable to $\nu(\text{C}=\text{N})$ is shifted to higher wave number in the spectra of the adducts. This indicates coordination of the ligand through the nitrogen atom of the azomethine group. The $\nu(\text{C}=\text{S})$ of the thiosemicarbazones appearing as a medium intensity band at 1070–1040 cm^{-1} is shifted to lower wavenumber in the adducts indicating coordination through thione sulphur.

The mode of bonding discussed above is further supported by the ^1H -NMR spectral studies. The proton signals at *ca.* δ 10.20 ppm in the ligand due to NH

remain unchanged showing the non-involvement of this group in coordination. The signals at δ 2.25 and δ 8.15 in the PMR spectra of the adducts have been assigned to methyl and methine protons respectively. These signals appear downfield as compared to the corresponding signals (δ 2.10 and δ 8.00) of the ligands, indicating coordination of ligands to the Sn(II) via azomethine nitrogen.

TABLE-1
CHARACTERISATION DATA OF SnCl_2 ADDUCTS WITH THIOSEMICARBAZONES

Ligands	Compounds	m.p. (°C)	Found (Calcd.) %			
			Sn	N	S	Cl
2-pyridinecarboxaldehyde-thiosemicarbazone	$\text{SnCl}_2\text{C}_7\text{H}_8\text{SN}_4$	184	32.10 (32.06)	15.42 (15.23)	8.24 (8.66)	20.01 (19.15)
2-pyridinecarboxaldehyde-4-phenylthiosemicarbazone	$\text{SnCl}_2\text{C}_{13}\text{H}_{12}\text{SN}_4$	174	26.41 (26.59)	12.26 (12.63)	7.01 (7.18)	15.26 (15.88)
<i>p</i> -anisaldehyde-thiosemicarbazone	$\text{SnCl}_2\text{C}_9\text{H}_{11}\text{SN}_3\text{O}$	139	30.12 (29.74)	10.14 (10.60)	8.28 (8.03)	18.14 (17.76)
<i>p</i> -anisaldehyde-4-phenylthiosemicarbazone	$\text{SnCl}_2\text{C}_{15}\text{H}_{15}\text{SN}_3\text{O}$	152	25.14 (24.98)	9.12 (8.90)	6.29 (6.75)	14.26 (14.92)

REFERENCES

1. A. Saxena, *Polyhedron*, **3**, 681 (1984).
2. M.S. Raizada, *Synth. React. Inorg. Met.-Org. Chem.*, **17**, 625 (1987).
3. M.S. Raizada and M.N. Srivastava, *Synth. React. Inorg. Met.-Org. Chem.*, **22**, 393 (1992).
4. M.S. Raizada, *Synth. React. Inorg. Met.-Org. Chem.*, **26**, 1563 (1996).
5. R. Gsell and M. Zeldin, *J. Inorg. Nucl. Chem.*, **37**, 1133 (1975).

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