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SHORT COMMUNICATION

SYNTHESIS AND INFRARED STUDY OF SOME NEW IODATO ADDUCTS AND DERIVATIVES

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Abstract: Three iodato adducts and one derivative have been synthesized and studied by infrared data. The suggested structures are discrete, the iodate behaving as a mono- or bidentate ligand, or an infinite chain with bridging iodate, the environment around the tin centre being trigonal bipyramidal, tetrahedral or octahedral.

Keywords: *coordinating iodate, discrete and infinite chain structures, trigonal bipyramidal, tetrahedral, octahedral environments*

INTRODUCTION

The organotin (IV) molecules are known for their applications as wood preservatives, antifouling paints, drugs etc [1]. That is the reason why several groups including our [2-15] have been focusing their search in the synthesis of new compounds of this family. We have initiated in this work the study of the interactions between Et_4NIO_3 and $SnPh_3Cl$, $SnPh_3Br$, $SnMe_2Cl_2$ or $SnCl_4$ which have given four new adducts and derivatives infrared study of which has been carried out then structures suggested on the basis of spectroscopic data.

MATERIALS AND METHODS

Et_4NIO_3 has been obtained as a powder on neutralizing IO_3H with a 20% water solution of Et_4NOH and allowing water to evaporate at 60°C.
Compound A: the mixture of 0.7167 g of $SnPh_3Cl$ in acetone and 0.5670 g of Et_4NIO_3 in acetone gives after slow evaporation colourless crystals.
Compound B: The mixture of 0.8652 g of $SnMe_2Cl_2$ in the ethanol and 1.2010 g of Et_4NIO_3 in ethanol gives a white precipitate.
Compound C: The mixture of 0.7070 g of $SnCl_4$ in benzene and 1.2010 g of Et_4NIO_3 in benzene gives a white precipitate.
The analytical data reported below, have allowed to suggest the following formulae (Table 1).

Table 1. *Suggested formulae of synthesized compounds and the elemental analyses*

Compound	Chemical formula	Elemental analysis (%)					
		C		H		N	
		calc.	found	calc.	found	calc.	found
A	$SnPh_3IO_3 \cdot SnPh_3Cl$	47.49	48.08	3.32	4.19	-	-
B	$SnMe_2(IO_3)_2 \cdot 2/5EtOH$	6.50	6.37	1.64	1.62	-	-
C	$SnCl_4(Et_4NIO_3)_{1.5}$	20.46	20.78	4.34	4.51	2.70	2.59

The elemental analyses were performed by the laboratory of Microanalyses – University of Padova – Italy. The infrared spectra have been recorded at the University of Padova - Italy - by means of a Bruker FTIR spectrometer using CsI windows, the sample being as Nujol mulls. Infrared data are given in cm^{-1} (abbreviations: (vs) very strong, (s) strong, (m) medium, (w) weak, (vw) very weak). All the chemicals were purchased from Aldrich – Germany - and used as such.

RESULTS AND DISCUSSION

Let us consider the infrared data (in cm^{-1}) of the studied compounds:
(A): ν_s IO_3 = 785 (vs); ν_{as} IO_3 = 730 (vs), 700 (vs); δ IO_3 = 350 (m); ν_{as} $SnCl_3$ = 270 (s); ν SnCl = 235 (m); ν SnO = 215 (m);

(B): ν_s IO_3 = 800 (s); ν_{as} IO_3 = 745 (vs), 700 (vs); ν_{as} SnC_2 = 590 (w); ν SnO = 230 (w);
(C): ν_s IO_3 + ν_{as} IO_3 = 790 (br); ν_{as} $SnCl_4$ = 294 (vs).

From all these data we can reasonably suggest for compound **A** an infinite chain of $SnPh_3IO_3$ to which $SnPh_3Cl$ coordinates through the free oxygen atom (Figure 1).

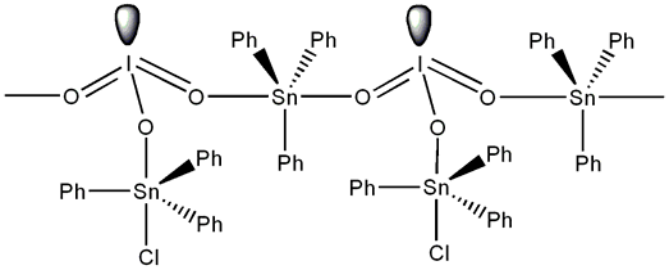

Figure 1. *Suggested structure for compound **A***

The absence of ν_s $SnMe_2$ in the spectrum of the derivative **B** is an indication of a linear $SnMe_2$ residue allowing to deduce an octahedral environment. The suggested structure is an infinite chain with bridging iodates (Figure 2).

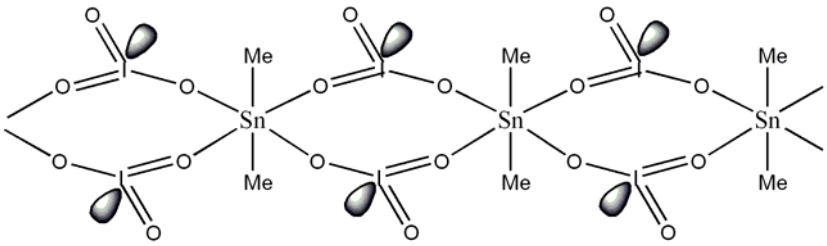

Figure 2. *Suggested structure for compound **B***

$\nu_{as}SnCl_4$ appears as a sharp and strong band (Eu type according to Group Theory) allowing to conclude to D_{4h} symmetry for $SnCl_4$. The suggested structure is discrete with one bridging and two monocoordinating iodates (Figure 3).

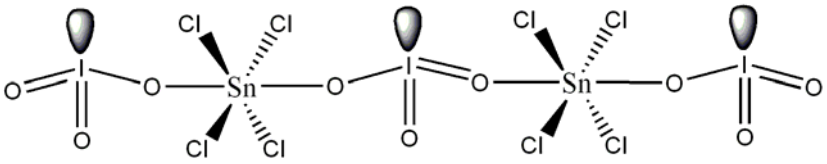

Figure 3. *Suggested structure for compound **C***

CONCLUSIONS

The studied iodato adducts have discrete or chain structures the environment around tin centre being octahedral, trigonal bipyramidal, the iodate behaving as a monocoordinating or a bridging ligand.

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