Studii şi Cercetări Ştiinţifice 2012, **13** (3), pp. 333 – 338
Chimie şi Inginerie Chimică, Biotehnologii, Industrie Alimentară

Scientific Study & Research
Chemistry & Chemical Engineering, Biotechnology, Food Industry *ISSN 1582-540X*

ORIGINAL RESEARCH PAPER

AMINO PHENYLARSENIATO ADDUCTS OF $SnPh_3Cl$ (R = Bu, Ph) : SYNTHESIS AND INFRARED STUDY

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Received: December, 21, 2011
Accepted: May, 25, 2012

Abstract: Six new phenylarseniato adducts and derivatives containing SnR_3 (R = Bu, Ph) residue have been synthesized and studied by infrared spectroscopy. The suggested structures are discrete, the anion behaving as a bi- or tri- dentate ligand. When the cation is involved through hydrogen bonds, supramolecular architectures are obtained.

Keywords: *coordinating phenylarseniat, discrete structure, hydrogen bonds, supramolecular architectures, tin centre*

INTRODUCTION

Many research teams have been focusing on synthesizing new organic tin (IV) molecules because of many applications (medicine, industry, agriculture …) found in some molecules of this family [1 - 6]. Our group has published several papers dealing with [7 - 12] and initiates here the study of the interactions between $Cy_2NH_2NH_2AsO_3H$ and $SnPh_3Cl$, $SnPh_3OH$ or $SnBu_3Cl$ which has yielded five new adducts and derivatives, infrared study of which has been carried out, then structures suggested on the basis of spectroscopic data.

EXPERIMENTAL

$Cy_2NH_2{\cdot}NH_2PhAsO_3H$ (**L**) has been obtained as a powder on mixing in water $NH_2PhAsO_3H_2$ with Cy_2NH and allowing the water to evaporate at 60 °C. When ethanolic solutions of (**L**) are mixed with ethanolic solutions of $SnPh_3OH$, $SnPh_3Cl$ or $SnBu_3Cl$ in specific ratios, precipitation occurs. The precipitate is stirred around two hours then filtered.
The elemental analyses have been performed by the Laboratory of Microanalyses-University of Montpellier II-France. Table 1 presents the elemental analysis of **A** – **F** compounds.

Table 1. *Elemental analyses of* ***A*** *–* ***F*** *compounds*

Compound	Chemical formula	Elemental analysis (%)					
		C		H		N	
		calc.	found	calc.	found	calc.	found
A	$NH_2PhAsO_3H{\cdot}SnPh_3{\cdot}H_2O$	49.69	49.36	4.41	5.13	2.41	2.57
B	$NH_2PhAsO_3H{\cdot}SnPh_2Cl{\cdot}3SnPh_3Cl{\cdot}3H_2O$	49.80	50.01	3.97	4.28	0.80	0.64
C	$NH_2PhAsO_3(SnBu_2Cl)SnBu_3$	40.37	40.10	6.59	6.45	1.81	1.70
D	$NH_2PhAsO_3(SnBu_3)_2{\cdot}3EtOH$	47.68	47.88	7.94	7.70	1.46	1.54
E	$Cy_2NH_2NH_2PhAsO_3{\cdot}NH_2PhAsO_3(SnBu_3EtOH)_2$	48.51	48.25	8.00	8.58	3.26	3.23
F	$(Cy_2NH_2)_2NH_2PhAsO_3{\cdot}2(SnBu_3Cl)$	52.70	52.59	8.78	7.88	3.41	2.80

The infrared spectra have been recorded at the University of Padova-Italy by a Perkin Elmer 580 spectrometer using CsI, the sample being as Nujol mulls.
Infrared data are given in cm^{-1}. IR abbreviations: (vs) very strong, (s) strong, (m) medium, (w) weak, (vw) very weak, (br) broad.
All the chemicals were purchased from Aldrich-Germany and used as such.

RESULTS AND DISCUSSION

Let us consider the IR data of the studied compounds **A** - **F**:
(A): νOH = 3466 cm^{-1}(br); νNH_2 = 2400 cm^{-1}(m); $\nu asNH_2$ = 2380 cm^{-1}(w); ρNH_2 = 1182 cm^{-1}(w); ωNH_2 = 1091 cm^{-1}(w); δNH_2 = 824 cm^{-1}(m); νAsO_3 = 855 cm^{-1}(vs);

νAsC = 696 cm^{-1}(s); δAsO = 520 cm^{-1}(vw);
(B): υsOH = 3400 cm^{-1}(vs); νsNH_2 = 2395 cm^{-1}(s); ρNH_2 =1150 cm^{-1}(m); ωNH_2 = 1090 cm^{-1}(m); νsAsO = 880 cm^{-1}; νasAsC = 680 cm^{-1}(s); δAsO = 520 cm^{-1}(w);
(C): υsOH = 3400 cm^{-1}(s); νsNH_2 = 2400 cm^{-1}(vw); νasNH_2 = 2380 cm^{-1}(vw); ρNH_2 = 1148 cm^{-1}(m); ωNH_2 = 1085 cm^{-1}(trace); δNH_2 = 810 cm^{-1}(vs); νsAsO = 855 cm^{-1}(vs); νasAsO = 776 cm^{-1}(w); νasAsC = 692 cm^{-1}(w); δAsO = 514 cm^{-1}(w); ρAsO: 420 cm^{-1}(s)
(D): νsOH = 3300 cm^{-1}(s); νsNH_2 = 2426 cm^{-1}(s); νasNH_2 = 2359 cm^{-1}(m); ρNH_2 = 1156 cm^{-1}(m); ωNH_2 = 1092 cm^{-1}(w); νsAsO = 891 cm^{-1}(vs); νasAsO = 750 cm^{-1}(m); νasAsC = 652 cm^{-1}(m), νs$SnBu_3$ = 610 cm^{-1}(vw); δAsO = 517 cm^{-1}(trace);
(E): νsOH = 3400 cm^{-1}(s); νsNH_2 = 2450 cm^{-1}(s); νasNH_2 = 2380 cm^{-1}(m); ρNH_2 = 1150 cm^{-1}(m); ωNH_2 = 1090 cm^{-1}(m); νsAsO = 855 cm^{-1}(vs); νasAsO = 750 cm^{-1}(m); νasAsC = 692 cm^{-1}(s); νs$SnBu_3$ = 610 cm^{-1}(vw); δAsO = 514 cm^{-1}(vw);
(F): υsOH = 3450 cm^{-1}(s); νsNH_2 = 2450 cm^{-1}(m); νasNH_2 = 2380 cm^{-1}(m); ρNH_2 = 1150 cm^{-1}(m); ωNH_2 = 1080 cm^{-1}(m); νsAsO = 850 cm^{-1}(s), νasAsO = 750 cm^{-1}(s); νas AsC = 690 cm^{-1}(m); νs$SnBu_3$ = 610 cm^{-1} (vw).

In the compound $(Cy_2NH_2)(C_2O_4)_3(SnBu_3)_3 \cdot 2EtOH$ the ethanol molecules are coordinated to $SnBu_3$ residues [13]. It is why we consider the ethanol molecules in our compounds coordinated. The appearance of νs$SnBu_3$ as a very weak band is an indication of the presence of a *trans* coordinated $SnBu_3$ residue indicating monocoordination.
We can therefore suggest for the studied adducts the structures reported on following figures.

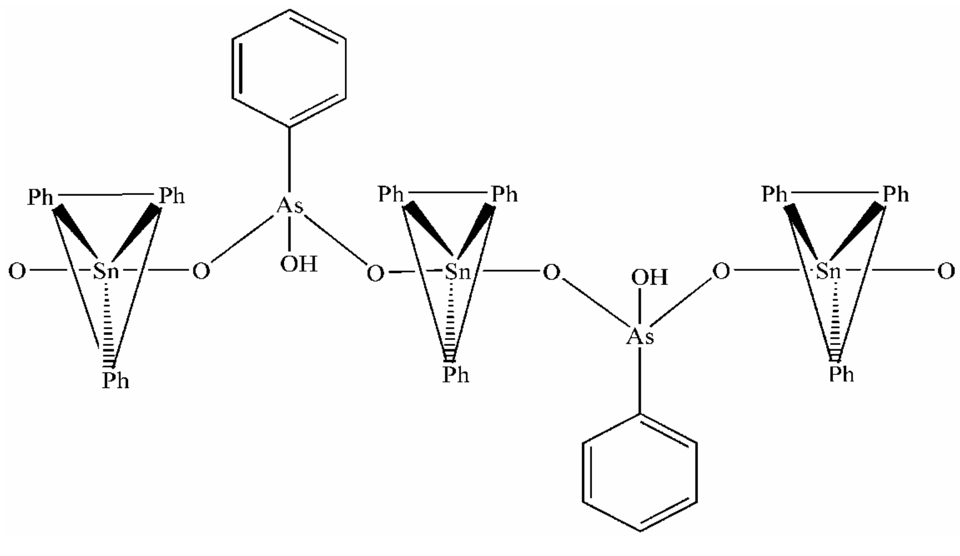

Figure 1. *Proposed structure for the compound* ***A***

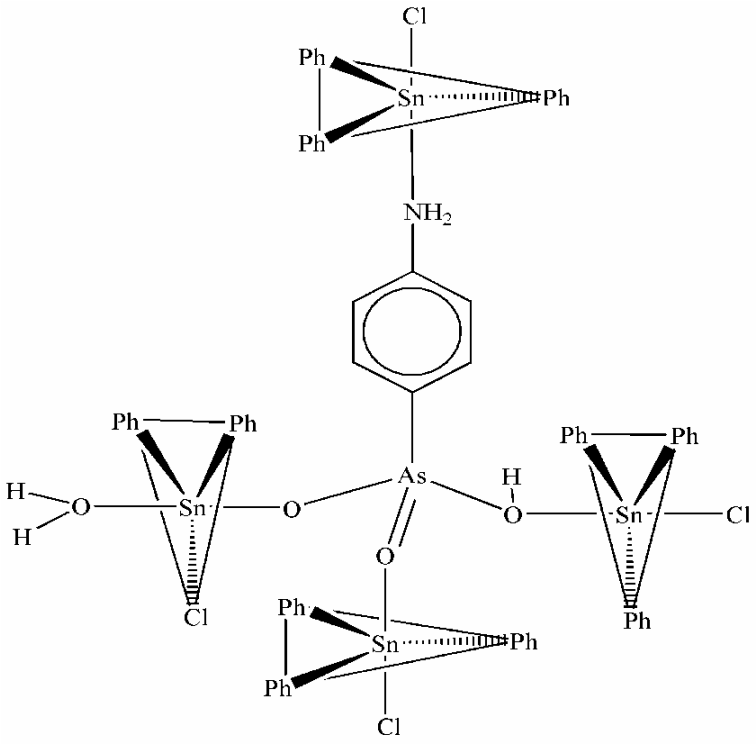

Figure 2. *Proposed structure for the compound* ***B***

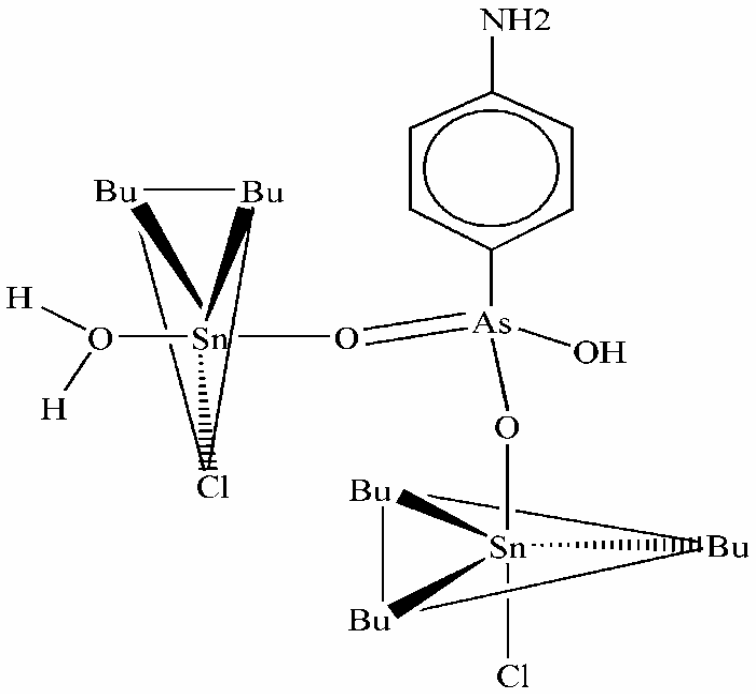

Figure 3. *Proposed structure for the compound* ***C***

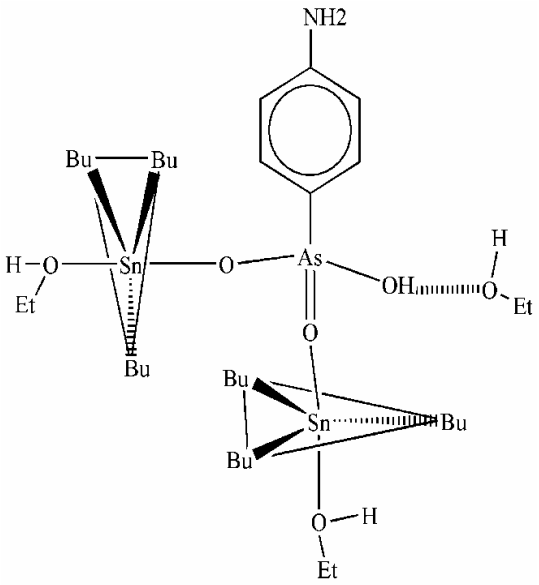

Figure 4. *Proposed structure for the compound* ***D***

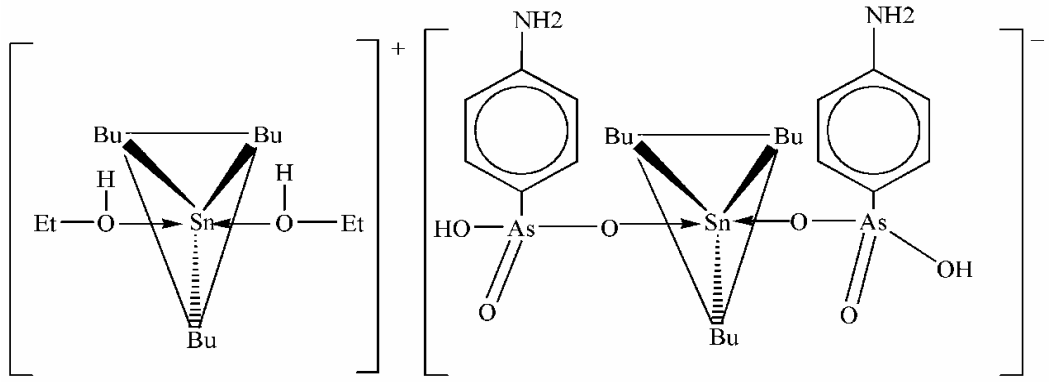

Figure 5. *Proposed structure for the compound* ***E***

When cations and OH groups are involved in hydrogen bonds, supramolecular architectures are obtained.

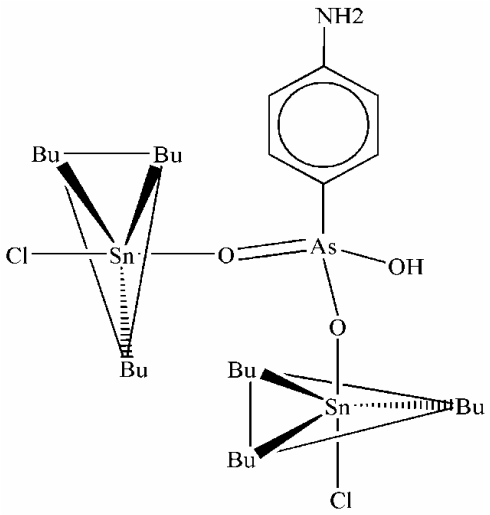

Figure 6. *Proposed structure for the compound* ***F***

CONCLUSIONS

The studied compounds have discrete and infinite chain structure the anion behaving as a bi- or tri- dentate ligand. When the cation or the groups are involved in hydrogen bonding, supramolecular architectures are obtained.

ACKNOWLEDGEMENTS

We thank Professor M. Vidali (University of Padova-Italy) for equipment support.

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