

SHORT COMMUNICATION

**Bu₄NSO₄SnPh₃·Ph₃PO:
SYNTHESIS AND SPECTROSCOPIC STUDIES**

Serge Renamy¹, Libasse Diop^{1*}, Bernard Mahieu²

¹*Université Cheikh Anta Diop, Faculté des Sciences et Techniques,
Département de Chimie, Laboratoire de Chimie Minérale et Analytique
(LACHIMIA), Dakar, Sénégal*

²*Université Catholique de Louvain, Laboratoire de Chimie Inorganique et
Nucléaire, 1348 Louvain-La-Neuve, Belgique*

*Corresponding author: dlibasse@gmail.com

Received: January 12, 2011

Accepted: January 29, 2011

Abstract: On allowing Bu₄NSO₄SnPh₃ to react with Ph₃PO, the adduct Bu₄NSO₄SnPh₃·Ph₃PO is obtained. The IR and Mössbauer data allow to conclude to the cleavage of the Bu₄NSO₄SnPh₃ chain and the coordination of Ph₃PO to the tin (IV) centre leading to discrete ionic structure containing a trans bipyramidal trigonal SnC₃O₂ arrangement with SO₄²⁻ and Ph₃PO being in an apical positions.

Keywords: *coordinating Ph₃PO sulphate, IR, Mössbauer,
trans coordinated SnPh₃ residue*

INTRODUCTION

In the dynamic of seeking new organotin IV compounds, due to several applications found within this family [1] and our interest for oxyanions coordinating behaviour, many groups, including our, have yet reported several papers [2 – 5]. In this paper we report the study of the interactions between $\text{Bu}_4\text{NSO}_4\text{SnPh}_3$ – derivative that we have already studied [6], and Ph_3PO which have yielded the studied derivative. Infrared and Mössbauer studies have been carried out and a structure was suggested on the basis of the spectroscopic data.

EXPERIMENTAL

$\text{Bu}_4\text{NSO}_4\text{SnPh}_3$ has been obtained as already reported [6]. On allowing $\text{Bu}_4\text{NSO}_4\text{SnPh}_3$ to react with Ph_3P both as ethanolic solutions $\text{Bu}_4\text{NSO}_4\text{SnPh}_3 \cdot \text{Ph}_3\text{PO}$ is obtained as a powder from a slow solvent evaporation. Its analytical data - % calculated (% found) - are: C = 64.60 (64.46); H = 6.88 (6.77); N = 1.41(1.43).

The elemental analyses were performed by the CNRS “Service Central d’Analyses” Vernaison, France or the Laboratory of Microanalyses, University of Padova, Italy. All the chemicals were from Aldrich or Merck Companies and used without any further purification. The IR spectra were recorded by a Perkin Elmer 580 ($4000 - 200 \text{ cm}^{-1}$) the sample being as Nujol mulls, using CsI windows. The Mössbauer spectrum has been obtained as described previously [7]. Infrared data are given in cm^{-1} [abbreviations: (vs) very strong, (s) strong, (m) medium, (sh) shoulder]. Mössbauer parameters are given in $\text{mm} \cdot \text{s}^{-1}$ (abbreviations: Q.S. = quadrupole splitting, I.S. = isomer shift, Γ = full width at half-height).

RESULTS AND DISCUSSION

Let us consider the IR and Mössbauer data of $\text{Bu}_4\text{NSO}_4\text{SnPh}_3 \cdot \text{Ph}_3\text{PO}$: $\nu_1 = 1001 \text{ vs}$, $\nu_3 = 1192 \text{ vs}$, 1122 vs , $\nu_4 = 611 \text{ m}$, 584 s , $\nu_2 = 485 \text{ m}$, $\nu_{\text{asSnC}_3} = 270 \text{ vs}$, $\nu_{\text{SnC}_3} = 213 \text{ sh}$, $\nu_{\text{SnO}} = 201 \text{ sh}$, $\delta_{\text{asSnC}_3} = 252 \text{ m}$, 244 m .

The splitting of the stretching bands of the sulfate into three components, the appearance of ν_2 as a band and the infrared activity of ν_1 indicate C_3v symmetry according to Group Theory [8]. The value of the quadrupole splitting (Q.S. = $2.66 \text{ mm} \cdot \text{s}^{-1}$) is an indication of a trans dissymmetrically coordinated SnPh_3 residue according to Platt *et al.* [9, 10] and allows to suggest the discrete ionic structure with a monocoordinating sulfate on the tin (IV) centre (Figure 1). The tin centre is pentacoordinated.

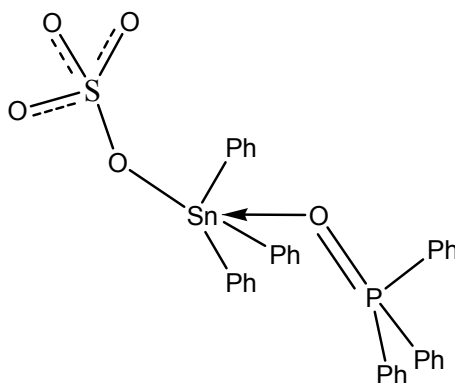


Figure 1. Structure of Bu₄NSO₄SnPh₃·Ph₃PO

CONCLUSION

Bu₄NSO₄SnPh₃·Ph₃PO has an ionic discrete structure, the tin (IV) centre having a dissymmetrical trigonal bipyramidal environment, the sulphate ion and Ph₃PO occupying apical positions.

REFERENCES

1. Evans, C. J., Karpel, S.: Organotin Compounds in Modern Technology, *J. Organomet. Chem. Library*, **1985**, 16;
2. Ma, C., Li, J., Zhang, R., Wang, D.: *Inorg. Chim. Acta*, **2006**, 359, 2407;
3. Chandrasekhar, V., Thilagar, P., Sonapati, T.: *Euro. J. Inorg. Chem.* **2007**, (7), 1004;
4. Reinoso, S., Dickman, M.H., Reicke, M., Kotz, U.: *Inorg. Chem.*, **2006**, 45, 9014;
5. Diop, C.A.K., Diop, L., Toscano, R.A.: *Main Group Met. Chem.*, **2002**, 25, (5), 327;
6. Diop, C.A.K., Okio, K.Y.A., Diop, L., Mahieu, B.: *Main Group Chem.*, **2000**, 23, 9;
7. Willem, R., Bouhdid, A., Mahieu, B., Ghys, L., Biesemans, M., Tiekink, E.R.T., De Vos, D., Gielen, M.: *J. Organomet. Chem.*, **1997**, 531, 151;
8. Nakamoto, K.: *Infrared and Raman Spectra of Inorganic and Coordination Compounds*, John Wiley and Sons, **1997**, 5th Edition;
9. Bancroft, G.M., Platt, R.H.: Mössbauer Spectra in Inorganic Compounds : Structure and Bonding in: *Advanced Inorganic Chemistry and Radio Chemistry* (Editors: Emeleus, H.J., Sharpe, A.G.) Academic Press, New York, **1972**, 15, 110;
10. Parish, R.V., Platt, R.H.: *Inorg. Chim. Acta*, **1970**, 4, 65.

