

SHORT COMMUNICATION

Me₄PhPO₃H·SnCl₄ AND (Me₄N)₂PhPO₃·SnBr₄: SYNTHESIS AND INFRARED STUDY

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Abstract: The title adducts have been obtained on allowing Me₄NPh₂PO₂ to react in specific ratios with SnX₄ (X = Cl, Br). The infrared data allow to suggest an infinite chain structure, the anion behaving as a bridging ligand, the environment around tin IV being octahedral. In Me₄NPhPO₃H·SnX₄ (X = Cl, Br) when the anion is involved through OH·····O or/and OH·····X hydrogen bonds a supramolecular architecture is obtained.

Keywords: *phenylphosphonate, hydrogenophenylphosphonate,
bridging oxyanion, octahedral environment,
supramolecular architecture*

INTRODUCTION

Halo- and organotin (IV) compounds are known for various applications (medicine, agriculture, wood preservatives)[1] and explain the focus of several research teams to obtain new molecules of this family for structural interest and further applications [2-10]. Our group has yet published several papers dealing with [11-16] and initiate here the study of the interactions between $\text{Me}_4\text{NPh}_2\text{PO}_2$ and SnX_4 ($\text{X} = \text{Cl}, \text{Br}$) which have yielded these two studied adducts, infrared study of which has been carried out then structures proposed on the basis on spectroscopic data.

EXPERIMENTAL

$\text{Me}_4\text{NPh}_2\text{PO}_2$ is obtained as a powder on neutralizing $\text{Ph}_2\text{PO}_2\text{H}$ with a water solution (20 %) of Me_4NOH and evaporating water at 60 °C. On allowing 0.2823 g of SnCl_4 in benzene to react with 0.3120 g of $\text{Me}_4\text{NPh}_2\text{PO}_2$ in ethanol a white precipitate is obtained stirred around two hours and filtered. When 0.4249 g of SnBr_4 in benzene is mixed with 0.2819 g of $\text{Me}_4\text{NPh}_2\text{PO}_2$ in ethanol a yellow precipitate is obtained. This precipitate is also stirred around two hours and filtered.

The analytical data reported below, % Calculated (% Found): C = 27.05 (27.05) H = 4.30 (4.42) N = 3.58(3.25) for (**A**) and C = 12.93 (13.05) H = 3.23(3.53) N = 3.77 (3.63) for (**B**) have allowed to suggest $\text{Me}_4\text{PhPO}_3\text{H}\cdot\text{SnCl}_4$ (**A**) and $(\text{Me}_4\text{N})_2\text{PhPO}_3\cdot\text{SnBr}_4$ (**B**) as formulae. 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 Perkin Eimer spectrometer using CsI windows, 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) shoulder (sh). All the chemicals were purchased from Aldrich-Germany- and used as such.

RESULTS AND DISCUSSION

Let us consider the infrared data of the two adducts:

(**A**): $\nu_{\text{as}}(\text{PO}_3)$: 1165m, 1135s, 1120sh; $\nu_{\text{s}}(\text{PO}_3)$: 1050sh, 1040s; $\nu_{\text{as}}(\text{SnCl}_4)$: 330vs, $\nu(\text{SnO})$: 250sh

(**B**): $\nu_{\text{as}}(\text{PO}_3)$: 1135m, 1115m; $\nu_{\text{s}}(\text{PO}_3)$: 1040w, 1035sh; $\nu_{\text{as}}(\text{SnBr}_4)$: 210vs, $\nu(\text{SnO})$: 310vw, 290vw

The sharpness of $\nu_{\text{as}}(\text{SnX}_4)$ (Eu) ($\text{X} = \text{Cl}, \text{Br}$) indicates a planar SnX_4 ($\text{X} = \text{Cl}, \text{Br}$) (D_{4h}) and allow to conclude to a *trans* coordinated SnX_4 consistent with an infinite chain or an oligomer as in Figure 1 and 2. When intermolecular interactions involving the OH group through $\text{O-H}\cdots\text{O}$ or $\text{O-H}\cdots\text{X}$ hydrogen bonds are considered and a supramolecular architecture is obtained.

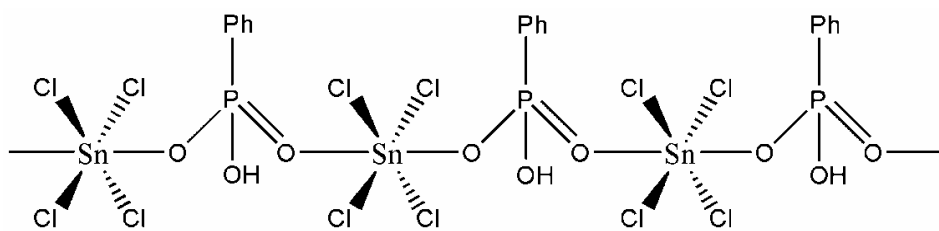


Figure 1. Suggested structure for compound (A)

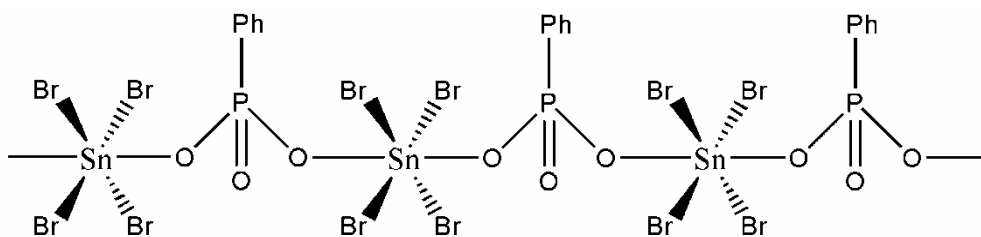


Figure 2. Suggested structure for compound (B)

CONCLUSION

The studied compounds have an infinite chain or a supramolecular architecture is obtained.

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