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SHORT COMMUNICATION

$O_2CC_6H_4C_6H_4CO_2(SnPh_3)_2 \cdot 4H_2O$ AND $HO_2CC_6H_4C_6H_4CO_2SnBu_2Cl$: SYNTHESIS AND INFRARED STUDY

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Abstrat: When the diphenic acid $HO_2CC_6H_4C_6H_4CO_2H$ is allowed to react with $SnBu_2Cl_2$ or $SnPh_3OH$, $HO_2CC_6H_4C_6H_4CO_2$. $SnBu_2Cl$ (A) and $O_2CC_6H_4C_6H_4CO_2(SnPh_3)_2 \cdot 4H_2O$(B) were obtained and characterized by infrared spectroscopy. The structures are an infinite chain or an oligomer, the diphenic anion being a monodentate or a monochelating ligand. The environment around the tin centers is trigonal bipyramidal or octahedral.

Keywords: *infinite chain, infrared spectroscopy, monochelating ligand, monodentate, octahedral, oligomer, trigonal bipyramidal*

INTRODUCTION

In the dynamic of the seek of new organotin (IV) derivatives because of several applications found in this family [1], many research groups have been involved including ours [2-13]. We have initiated here the study of the interactions between diphenic acid $HO_2CC_6H_4C_6H_4CO_2H$ and SnBu2Cl2 or SnPh3OH with have yielded the two studied derivatives; their infrared study has been carried and structures suggested on the basis of infrared data.

MATERIALS AND METHODS

When $HO_2CC_6H_4C_6H_4CO_2H$ in EtOH is mixed with ethanolic solutions of $SnBu_2Cl_2$ or $SnPh_3OH$, in 1/2 ratio, white powders are obtained after a slow solvent evaporation. The analytical data reported below, allow to suggest the following formulae. % calculated (%found) $HO_2CC_6H_4C_6H_4CO_2.SnBu_2Cl$ (A)- C: 55.80 (56.10), H: 5.50 (4.59);
$O_2CC_6H_4C_6H_4CO_2(SnPh_3)_2.4H_2O$ (B) –C: 59.27 (59.40), H: 4.54 (3.79).
The elemental analyses were performed at the Microanalyses Centre – University of Bath- UK**.** The infrared spectra have been recorded at the University of Cheikh Anta Diop (Dakar-Sénégal) by means of a Bruker FT-IR spectrometer, the sample being as Nujol mulls, the windows being CsI. Infrared data are given in cm^{-1} IR abbreviations: (br) broad, (vs) very strong (s) strong, (m) medium. The chemicals were purchased from Aldrich and used as such.

RESULTS AND DISCUSSION

Let us consider the infrared data of:
(A): υasCOO$^-$ 1685(s), 1596(m), υsCOO$^-$ 1299(s), υasSnC$_2$ 667(s), νsSnBu$_2$ 610'vw);
(B): υasCOO$^-$ 1542(vs), υsCOO$^-$ 1296(s).
The apparition of νsSnBu$_2$ as a very weak band at 610 cm^{-1}on the infrared spectrum of (A) is an indication of the presence of linear $SnBu_2$ residues according to [14] and allowing to suggest the structure reported on Figure 1.
The structure is a dimer of dimer; the monomers being linked by O-H---O hydrogen bonds of acetic acid type leading to the first dimers; the two dimers than connect through chloro bridges to give a dimer of dimer with an octahedral environment around the tin centre (Figure 1). In the structure, the benzoate anion behaves as a monochelating ligand.
In the case of $O_2CC_6H_4C_6H_4CO_2(SnPh_3)_2{\cdot}4H_2O$ (B) derivative, an infinite chain is suggested in which the diphenic anion as a bidentate ligand. The $SnPh_3$ residues are transcoordinated with the oxygen atom of the diphenic and the oxygen atom of one water molecule. The tin coordinated water molecule interacts with another water molecule through O-H…..O hydrogen bonds. These dinuclear moieties can then interact through O-H…..O hydrogen bonds involving the free C=O groups of the carboxylates leading to a one dimensional supramolecular architecture (Figure 2).

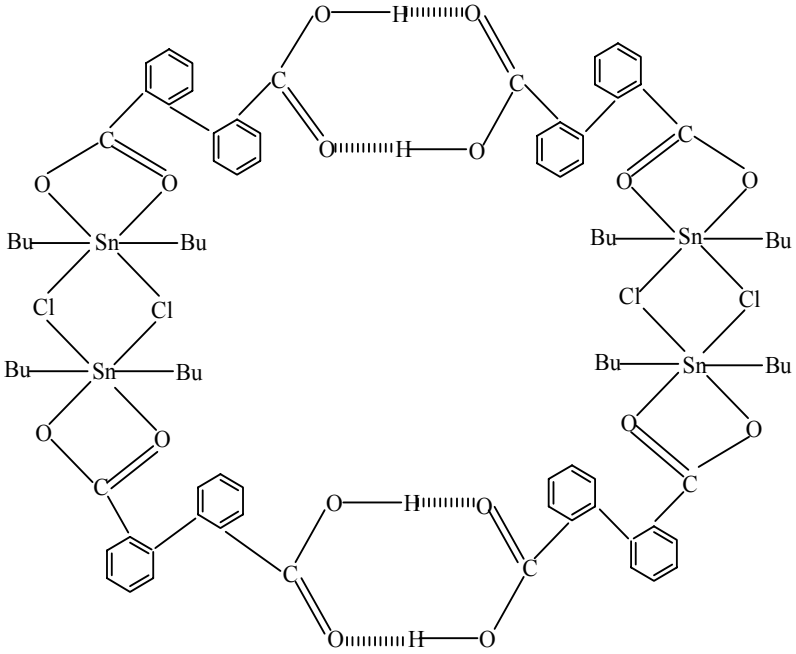

Figure 1.*Proposed structure for the compound* ***A***

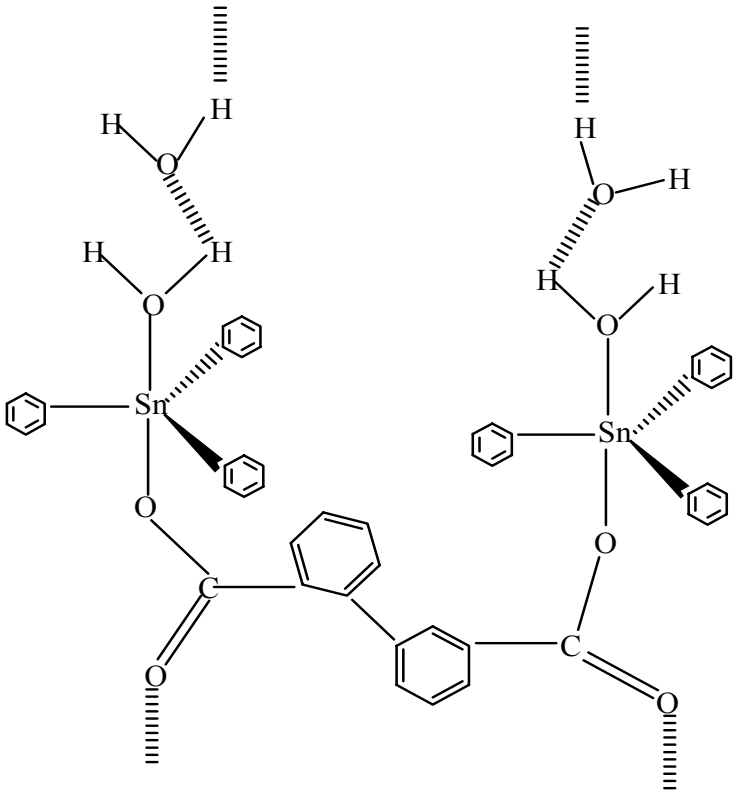

Figure 2.*Proposed structure for the compound* ***B***

CONCLUSION

The suggested structures for two derivatives are a dimer of dimer or a one dimensional supramolecular structure. Hydrogen bonds play a crucial role in the building of the structures.

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REFERENCES

1. Evans, J.C., Karpel, S.: Organotin Compounds in Modern Technology, *Journal of Organometallic Chemistry Library*, **1985**, **16**, Elsevier, Amsterdam;
2. Traoré, B., Diop, L., Sidibé, M.: Aminophenylarseniato adducts and derivatives of SnR_2Cl_2 (R = Ph, Bu): Synthesis and infrared study, *Scientific Study & Research - Chemistry & Chemical Engineering, Biotechnology, Food Industry*, **2012**, **13**(4), 405 – 408;
3. Ndoye, D., Diop, L.: $2[(enH)_2O_2C\text{-}SO_3].SnPhCl_3$ and$Cy_2NH_2O_2C\text{-}SO_3H.SnPhCl_3.H_2O$: Synthesis and infrared study, *Scientific Study & Research - Chemistry & Chemical Engineering, Biotechnology, Food Industry*, **2012**, **13** (4), 409 – 412
4. Allouch, H., Diop, L.: $Me_4PhPO_3H.SnCl_4$ and $(Me_4N)_2PhPO_3.SnBr_4$: Synthesis and infrared study, *Scientific Study & Research - Chemistry & Chemical Engineering, Biotechnology, Food Industry*, **2013**, **14** (1), 055 – 058;
5. Gueye, N., Diop, L., Diop, L.: New R_2NH_2OH (R = Cy, Bu) adducts of MX_2, MX_3 orMX_5: Synthesis and infrared study, *Scientific Study & Research - Chemistry & Chemical Engineering, Biotechnology, Food Industry*,**2012**, **13** (4), 399–403.
6. Diop, T., Diop, L., Vander Lee, A.: Poly[dibutylammonium [nonamethylbis(μ3-sulfato-κ3 O: O': O'')tristannate(IV)]], *Acta Crystallographica*, **2012**, **E68**, m1380–m1381.
7. Sow, Y., Diop, L., Kociock-Köhn, G., Molloy, K.C.: X-ray crystal structure of $(nPr_2NH_2)_2C_2O_4.SnCl_4$, *Main Group Metal Chemistry*, **2010**, **33**, 4-5 , 205;
8. Diop, L., Mahieu, B., Mahon, M.F., Molloy, K.C., Okio, K.Y.A.: Bis(triphenyltin) oxalate, *Applied Organometallic Chemistry*, **2003**,**1 7**, 881-882;
9. Diop, T., Diop, L., Diop, C.A.K., Molloy, K.C., Kociock-Köhn, G.: Dicyclohexylammonium trimethylbis(hydrogen phenylphosphonato)stannate(IV), *Acta Crystallographica*, **2011**, **E67**, m1872-m1873;
10. Diop, T., Diop, L., Molloy, K. C., Kociock-Köhn, G., Fall, D.: Synthesis, characterization and crystal structure of $[(CH_3)_2CH]_2NH_2(PhPO_3H)_2SnPh_3$, *Main Group Metal Chemistry*, **2012**, **35,** 3-4, 99;
11. Pouye, S.F., Cisse, I., Diop, L.: Synthesis and infrared study of some new molybdato and hydrogenomolybdato adducts, derivatives and complexes of cadmium and antimony (V), *Scientific Study & Research - Chemistry & Chemical Engineering, Biotechnology, Food Industry*, **2009**, **10**(4), 313-316;
12. Pouye, S.F., Cisse, I., Diop, L., Fall, D., Ciss, M.: Synthesis and infrared study of some hydrogenomolybdato and molybdato adducts of SbF_3, $HgPh_2$ and MX2 (M = Cd, Hg; X = Cl, Br), *Scientific Study & Research - Chemistry & Chemical Engineering, Biotechnology, Food Industry*, **2011**, **13**(1), 043-048;
13. Gueye, N., Diop, L., Molloy, K.C., Kociok-Köhn, G.: Dibenzylazanium (oxalato-κ^2O,O')triphenylstannate(IV), *Acta Crystallographica*, **2012**, **E68**, m854-m855.