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SHORT COMMUNICATION

SUBBORIC ACID ADDUCTS $R_4NOH{\cdot}2B_2(OH)_4$ (R= Me, Et): SYNTHESIS AND INFRARED CHARACTERIZATION

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Abstract: On allowing Me_4NOH as a methanolic solution or Et_4NOH as an ethanolic solution to react with BO_3H_3 in ethanol, $R_4NOH{\cdot}2B_2(OH)_4$ (R = Me, Et) are obtained and characterized by infrared. The subboric acid $B_2(OH)_4$ has been obtained *in situ*. An infinite chain structure has been suggested on the basis of infrared data. When OH···O hydrogen bonds are considered, supramolecular architectures are obtained.

Keywords: *OH^-, subboric acid, tetrahedral boron*

INTRODUCTION

Boric acid is known to react with OH^- as Lewis acid to give $[B(OH)_4]^-$ complex-anion [1, 2]. Subboric acid $B_2(OH)_4$ is known to be obtained by acidic hydrolysis of $B_2(NMe_2)_4$ [3]. A solid-state NMR study of boric acid doped in poly(vinyl alcohol) and a study on the effect of MgF_2-H_3BO_3 flux on the properties of $(Ce,Tb)MgAl_{11}O_{19}$ phosphor have been reported [4, 5].
On allowing Me_4NOH in methanolic media or Et_4NOH in ethanolic media to react with boric acid in ethanol, subboric acid adducts were obtained. The obtained adducts were studied by infrared analysis and then the structures were suggested on the basis of infrared data.

MATERIALS AND METHODS

When Me_4NOH in methanol is mixed with BO_3H_3 in ethanol or when Et_4NOH and BO_3H_3 are mixed in ethanol, powders are obtained by slow solvent evaporation.
Elemental analyses [% calculated (% found)] (Table 1), have allowed to suggest $Me_4NOH{\cdot}2B_2(OH)_4$ and $Et_4NOH{\cdot}2B_2(OH)_4$ as formulae.

Table 1. *Results of the elemental analyses*

Compound	Elemental analysis (%)					
	C		H		N	
	calc.	found	calc.	found	calc.	found
A	17.10	17.76	6.88	7.83	4.82	5.18
B	28.78	29.42	8.04	8.83	4.13	4.49

The elemental analyses were performed at the "Service Central d'Analyses" – C.N.R.S. – Vernaison – France. The infrared spectra were performed at the University of Padova – Italy-by means of a PerkinElmer spectrometer type the sample being as Nujol mull using CsI optical windows.
Infrared abbreviations: (vs) very strong, (s) strong, (m) medium, (w) weak, (vw) very weak. The chemicals were purchased from Aldrich on Merck companies and used as such.

RESULTS AND DISCUSSION

Let us consider the infrared data (cm^{-1}):
[**A**]: ν(OH): 3300s; $\nu_{as}B(OH)_3$: 1300s; $\nu_sB(OH)_3$: 1150s; ν(B-B): 1010m; δ_{as}(BOH): 840m, 770s, 700s; δ_s(BOH): 525s, 475vs, 390s
[**B**]: ν(OH): 3300s; $\nu_{as}B(OH)_3$: 1490s, 1418s, 1307s; $\nu_sB(OH)_3$: 1120s; ν(B-B): 1010m; δ_{as}(BOH): 808sh, 771s, 739s, 706s; δ_s(BOH): 659sh, 461s
The structure suggested for the subboric adducts while considering the complex-anion $[OH{\cdot}2B_2(OH)_4]^-$ is an infinite chain with four coordinated boron (Figure 1) with the

presence of B-B bonds. While considering OH····O hydrogen bonds, a supramolecular architecture is obtained.

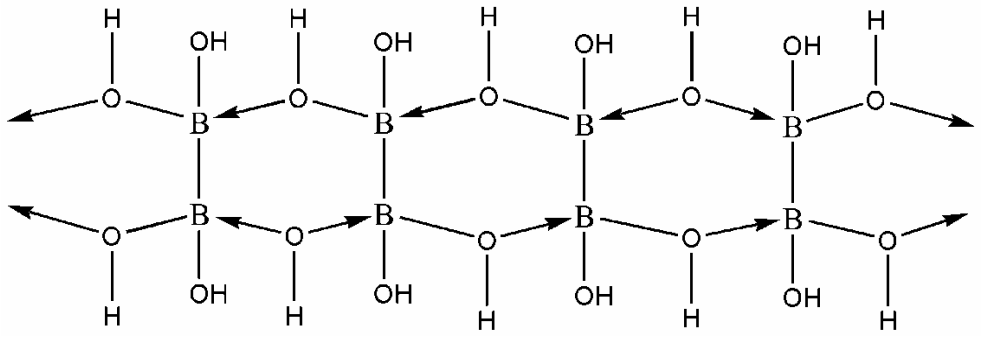

Figure 1

CONCLUSION

The subboric acid adducts studied here have an infinite chain structure, the environment around the boron being tetrahedral. When OH···O hydrogen bonds are considered, a supramolecular architecture is obtained.

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