Solventothermal Synthesis and Structure of the Polymeric Thioarsenates(III) (Et$_4$N)$_2$As$_6$S$_{10}$ and (Et$_4$N)$_2$As$_8$S$_{13}$

Viola Vater, William S. Sheldrick*

Lehrstuhl für Analytische Chemie der Ruhr-Universität Bochum, D-44780 Bochum

Z. Naturforsch. 53 b, 1259–1264 (1998); received July 7, 1998

Arsenic, Sulphur, Thioarsenates(III), Solventothermal Synthesis, Chain Structures

Reaction of (Et$_4$N)Cl with As$_2$S$_3$ and Na$_2$S in acetonitrile at 110°C affords the polymeric thioarsenate(III) (Et$_4$N)$_2$As$_6$S$_{10}$ in which the cyclic [As$_3$S$_6$]$^3-$ and chainlike [As$_3$S$_7$]$^5-$ trinuclear molecular building units are linked together through common sulphur atoms into infinite double chains. In contrast, reaction of the same starting materials at higher temperatures (180°C) in water leads to formation of a markedly denser phase (Et$_4$N)$_2$As$_8$S$_{13}$, whose thioarsenate(III) $^{1/1}_{\infty}$[As$_8$S$_{13}$]$^{2-}$ anions exhibit a higher condensation grade. These likewise double chains are composed of cyclic [As$_3$S$_6$]$^3-$ and dinuclear [As$_2$S$_5$]$^3-$ units with shared $\psi$-AsS$_3$ tetrahedra corners. Analogous treatment of (Et$_4$N)Cl with As$_2$Se$_3$ and Na$_2$Se in acetonitrile (T=110°C) yields (Et$_4$N)[SeAsSe$_7$].

* Reprint requests to Prof. Dr. W. S. Sheldrick; e-mail shel@anachem.ruhr-uni-bochum.de