

Monomeric, dimeric and polymeric structure of the uranium trichloride hydrates.

Autorzy

A. Mech

Miroslaw Karbowski

Tadeusz Lis

Janusz Drożdżyński

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Streszczenie

Three different uranium trichloride hydrates of the formulas $\text{UCl}_3 \cdot 2\text{H}_2\text{O} \cdot 2\text{CH}_3\text{CN}$, $\text{UCl}_3 \cdot 6\text{H}_2\text{O}$ and $\text{UCl}_3 \cdot 7\text{H}_2\text{O}$ have been isolated from methylcyanide solutions of UCl_4 , with a 1–5% water content, by reduction with liquid zinc amalgam. The crystal and molecular structures of the hydrates have been determined by X-ray single crystal analysis. $\text{UCl}_3 \cdot 2\text{H}_2\text{O} \cdot 2\text{CH}_3\text{CN}$ crystallizes in the triclinic system (space group) forming infinite zigzag chains in the [0 1 0] direction. The coordination polyhedron of the uranium atom is a bicapped trigonal prism, formed by two oxygen atoms of the water molecules, four bridging chlorine atoms, one terminal chlorine atom and one nitrogen atom of the methylcyanide molecule. $\text{UCl}_3 \cdot 6\text{H}_2\text{O}$ crystallizes in the monoclinic system (space group $P2_1/n$), with a monomeric structure. The uranium ion is eight-coordinated by two chlorine atoms and six oxygen atoms of the water molecules, which form a distorted square antiprism. $\text{UCl}_3 \cdot 7\text{H}_2\text{O}$ crystallizes in the triclinic system in the space group . The characteristic feature of this structure are $[(\text{H}_2\text{O})_7\text{UCl}_2\text{U}(\text{H}_2\text{O})_7]^{4+}$ dimers. The coordination polyhedra, in the form of a tricapped trigonal prism, are linked through the complex network of the hydrogen bonds. $\text{UCl}_3 \cdot 6\text{H}_2\text{O}$ and $\text{UCl}_3 \cdot 7\text{H}_2\text{O}$ are isostructural with their lanthanide analogues.

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