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## Synthesis and study of Lithium Triuranate $\text{Li}_2\text{U}_3\text{O}_{10} \cdot 6\text{H}_2\text{O}$

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In this work, a method of synthesis of lithium triuranate hexahydrate  $\text{Li}_2\text{U}_3\text{O}_{10} \cdot 6\text{H}_2\text{O}$  is described. The chemical and functional composition of this compound has been investigated; its crystallographic characteristics have been determined; the state of  $\text{H}_2\text{O}$  and its role in the formation of the structure have been studied.

Synthesis of the investigated compound is a reaction of shoeipita  $\text{UO}_3 \cdot 2.25\text{H}_2\text{O}$  with aqueous solution of lithium nitrate under hydrothermal conditions at 200°C. The synthesized lithium triuranate hexahydrate is an easily reproducible individual crystalline compound. The X-ray diffraction picture contains a series of reflections from planes with indices which, in combination with an intense reflection peak at  $2\theta = 12.04^\circ$ , indicate a typical layered structure of the triuranate.

For evaluation of its functional composition of  $\text{Li}_2\text{U}_3\text{O}_{10} \cdot 6\text{H}_2\text{O}$ , we have performed the IR spectroscopic research. The spectrum contains two groups of vibrations associated with  $\text{H}_2\text{O}$  and uranyl group. The vibrations of  $\text{H}_2\text{O}$  are very characteristic. The band of  $\delta(\text{H}_2\text{O})$  vibrations at  $1620 \text{ cm}^{-1}$  is not split. Due to the participation of  $\text{H}_2\text{O}$  molecules in the formation of the branched system of H-bonds, the bands of vibrations vs and vas are represented in the spectra by a broad and intense band with faint maxima at  $3511$  and  $3414 \text{ cm}^{-1}$ . On the whole, all  $\text{H}_2\text{O}$  molecules in the IR spectrum of  $\text{Li}_2\text{U}_3\text{O}_{10} \cdot 6\text{H}_2\text{O}$  retain their vibrational identity. The vibrations of the uranyl group are represented in the spectrum by the only band vas at  $917 \text{ cm}^{-1}$ , which is typical for the seven-fold coordination of uranium(VI) in its uranium-oxygen polyhedron. The absence of the band allows us to consider the uranyl group as having a linear and the equal-shoulder configuration.

To specify the state of  $\text{H}_2\text{O}$  in  $\text{Li}_2\text{U}_3\text{O}_{10} \cdot 6\text{H}_2\text{O}$  and to estimate its position in the structure, we have performed thermographic study. According to the first effect in the DTA curve at  $162^\circ\text{C}$ , the elimination of four  $\text{H}_2\text{O}$  molecules per  $\text{Li}_2\text{U}_3\text{O}_{10} \cdot 6\text{H}_2\text{O}$  formula unit proceeds in a single stage. The elimination of the two additional  $\text{H}_2\text{O}$  molecules also proceeds in a single stage, but at a higher temperature  $393^\circ\text{C}$ . The dehydration process is completed at  $393^\circ\text{C}$  by the total destruction of the crystal structure and the transition into the amorphous state. The crystallization of  $\text{Li}_2\text{U}_3\text{O}_{10}$  over wide time and temperature ranges occurs above  $393^\circ\text{C}$ .

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