Thermodynamic Investigation of Crystalline Thorium Selenite Monohydrate

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The synthesis and identification of new compound – crystal monohydrate of the Th(IV) selenite with the composition $Th(SeO_3)_2 \cdot H_2O$ have been made. The method of precipitation of thorium from solution provides reliable and displayable preparation of monohydrate of selenite of thorium with the crystal structure with 100% output of thorium. The identification of the compound was proved by the methods of X-Ray phase analysis, derivatography, tensiometry and IR-spectroscopy. The synthesized monohydrate of thorium selenite is the only oxygen-containing compound of thorium and selenium of strictly stoichiometric composition [1,2] and consequently, can be used as a certain chemical agent in preparation chemistry and thorium technology.

Thermodynamics of $Th(Se0_3)_2 \cdot H_2O_{(cr)}$ dehydration was investigated with the help of static method with glass membrane zero-manometer. The determined value of dehydration enthalpy has made it possible to go over to calculation of $Th(SeO_3)_2 \cdot H_2O_{(cr)}$ standard formation enthalpy. This calculation was performed according to the technique described in work [3]. On the basis of the value of dehydration enthalpy and calculated standard enthalpy of anhydrous thorium selenite formation $\Delta_f H^0$ ($Th(SeO_3)_{2\,(cr)}$; 298 *K*), the value $\Delta_f H^0$ ($Th(SeO_3)_2 \cdot H_2O_{(cr)}$; 298 *K*) was obtained.

[1] *The Actinide Elements.* Edited by G.T. Seaborg and J.J. Katz. – New York (1954).
[2] V.P. Nesterenko, *Synthesis of the Thorium Selenite. Invention Certificate* N^0 *582647* (1977).
[3] N.A. Svidunovitch et al, *Interaction of Components in Alloys*. – Metallurgia, Moscow (1989).