

SYNTHESIS AND X-RAY ANALYSIS OF NEW TELLURITES OF DYSPROSIUM AND HOLMIUM

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Compounds based on oxides of rare earth metals due to the peculiarities of the electronic structure of lanthanides possess unique combination of electrical, magnetic, thermal, optical and other properties and can be widely used in modern microelectronics and many fields of new technology for the creation of multifunctional systems. Especially poorly studied complex oxygen compounds, in particular, double tellurites of s-f elements are of particular theoretical and practical interest for inorganic materials science as promising substances having valuable physical and chemical properties. The aim of this work is the synthesis and study of radiographic characteristics of new tellurites of dysprosium and holmium of the $Me^fCaTeO_{4.5}$ (Me^f - Dy, Ho) composition.

For the synthesis oxides of dysprosium (holmium) (III), tellurium (IV) and calcium carbonate ("chem. pure" grade) were taken in a stoichiometric ratio as starting components. We used the following thermal treatment: annealing for 15 h at a temperature of 400°C, 20 h at 800°C, then for 23 h at 1200°C with periodic grinding of the mixture in the mortar; the final annealing for 10 h at 400°C with the aim of obtaining stable compounds at low temperatures.

The formation of the equilibrium composition of the compounds was controlled by the method of X-ray phase analysis on the DRON-2.0 device using CuK_{α} – radiation. The indexing of the diffraction patterns of powder of the compounds under study was performed by the method of homology.

The accuracy of indexing is controlled by the satisfactory coincidence of experimental and calculated values of $10^4/d^2$, and a consistency of values of x-ray and micrometrical densities of the compounds investigated. It is established that double tellurite of dysprosium $DyCaTeO_{4.5}$ and holmium $HoCaTeO_{4.5}$ crystallize in the tetragonal crystal system.

Thus, new double tellurites of dysprosium and holmium were synthesized by the solid-state method. Radiographic types of their crystal structure and unit cell parameters were determined. Radiographic data studies show that the tellurite synthesized crystallizes in the structural type of distorted perovskite P_m3_m . This compound can possess unique electrical and physical properties. Radiographic features of new tellurite can be the source of information for basic reference books and produce an interest for chemical informatics.