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SYNTHESIS AND X-RAY STUDY OF RADIUM METAPLUMBATE

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The report presents experimental results on the synthesis and properties study of radium- and lead-based mixed oxide. Samples for examination were produced by high-temperature treatment of mixed $\text{RaCO}_3/\text{PbCO}_3$. A mixture of 2.0 mg of RaCO_3 and 5.0 mg of PbCO_3 was calcinated at 800°C for 8 hours in a stainless steel crucible. Resulted sample was studied by X-ray diffractometry. In the X-ray pattern 15 reflexes of 43 registered ones were the strongest and referred to the phase being an analog of BaPbO_3 with a cubic perovskite structure.

Taking into account potential contamination of radium plumbate with corrosion product coming from steel crucible, the experiment was repeated with the use of a platinum crucible. Sample of radium nitrate used in this run was preliminary purified by cation-exchange chromatography: the barium content being decreased to 100 μg and the total amount of impurities Ca, Fe, Ba, Al, B, Si were below 76 μg .

During the second experiment, 2.9 mg of RaCO_3 and 4.6 mg of PbCO_3 were calcinated at 800°C for 20 hours in the platinum crucible. The interpreted X-ray pattern showed the strongest reflexes to belong to metal platinum that came to the sample as an impurity. The other group of intensive reflexes corresponds to the phase of cubic RaPbO_3 . The X-ray pattern also demonstrated a group of 5 reflexes close in the location and relation of their intensity to $\text{BaPtO}_{2.38}$ phase reflexes. More probably, this group of reflexes corresponds to radium platinate RaPtO_{3-x} produced while radium reacts with the crucible material.

Based on supposition of RaPbO_3 formation, the interplanar space values were calculated as well as crystalline lattice parameter ($a=4.303 \text{ \AA}$) and crystallographic density ($\rho=10.0 \text{ g/cm}^3$).

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