Experimental Study on the Hydrothermal Synthesis of Bastnasite-(La)

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Abstract: Bastnasite is one of the most important minerals in rare earth deposits. Therefore, research on the hydrothermal synthesis of bastnasite is significantly important for revealing the hydrothermal mineralization of rare earth elements. In this paper, $La(NO_3)_3 \cdot 6H_2O$, NaF and $NaHCO_3$/ Na_2CO_3 were used to synthesize bastnasite by using hydrothermal method at various temperatures, pH values, fluoride ion concentrations, and sodium bicarbonate / sodium carbonate. Then the synthesized products have been analyzed by using XRD and SEM. The results show that the pure bastnasite-(La) phase can be formed in hydrothermal fluid with sodium bicarbonate/ sodium carbonate and low fluoride ion concentration, while the complex of bastnasite-(La) and fluocerite-(La) phases was formed in the fluid of high fluoride ion concentration. Due to the common appearance of bastnasite and the occasional present of fluocerite in the nature, it is believed that the bastnasite of REE deposites could be crystalized and precipitated in the fluid with low fluoride ion concentration.

Keywords: bastnasite; hydrothermal synthesis; forming condition