

Synthesis and Characterization of CaZrTi₂O₇ from Tartrate Precursor Employing Microwave Heating Technique

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Abstract : Zirconolite (CaZrTi₂O₇) is one of the three major phases in the synthetic ceramic 'SYNROC' which is used for immobilization of high-level nuclear waste and also acts as photocatalytic and photophysical properties. In the present work the nanocrystalline CaZrTi₂O₇ was synthesized from Calcium Zirconyl Titanate tartrate precursor (CZTT) employing two different heating techniques such as Conventional heating (Muffle furnace) and Microwave heating (Microwave Oven). Thermal decomposition of the CZTT precursors in air yielded nanocrystalline CaZrTi₂O₇ powder as the end product. The products obtained by annealing the CZTT precursor using both heating method were characterized using simultaneous TG-DTA, FTIR, XRD, SEM, TEM, NTA and thermogravimetric study. The physical characteristics such as crystallinity, morphology and particle size of the product obtained by heating the CZTT precursor at the different temperatures in a Muffle furnace and Microwave oven were found to be significantly different. The microwave heating technique considerably lowered the synthesis temperature of CaZrTi₂O₇. The influence of microwave heating was more pronounced as compared to Muffle furnace heating. The details of the synthesis of CaZrTi₂O₇ from CZTT precursor are discussed.

Keywords : CZTT, CaZrTi₂O₇, microwave, SYNROC, zirconolite

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