
Chemical preparation of $\text{Ca}_{12}\text{Al}_{14}\text{O}_{33}$ by Self-Propagating Combustion Synthesis

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Abstract The binary compounds of the $\text{CaO-Al}_2\text{O}_3$ system do hold a significant place in a wide spectrum of applications of metallurgical slag, ceramic materials and cement technologies. In recent years new applications for calcium aluminates have emerged in optical and structural ceramics. Conventionally, $\text{Ca}_{12}\text{Al}_{14}\text{O}_{33}$ powders are produced by solid-state reactions between calcium oxide (CaO) or calcium carbonate (CaCO_3) and alumina (Al_2O_3) powders temperatures in excess of 1400°C . The chemically homogeneous powders of $\text{Ca}_{12}\text{Al}_{14}\text{O}_{33}$ phase of the $\text{CaO-Al}_2\text{O}_3$ binary system have been synthesized by a modified “Self-Propagating Combustion Synthesis (SPCS)” technique. A significant reduction in the synthesis temperature of this compound has been achieved as compared to the conventional techniques of synthesis. X-ray diffraction (XRD), scanning electron microscopy (SEM) and FT-IR-spectroscopy have been utilized for the structural characterization of the synthesized materials.

Keywords: SPCS technique, calcium aluminate, $\text{Ca}_{12}\text{Al}_{14}\text{O}_{33}$, FT - IR, XRD, SEM
