

Comparison of Different Activators Impact on the Alkali-Activated Aluminium-Silicate Composites

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Abstract : Alkali-activated aluminium-silicate composites (AASC) can be used in the production of innovative materials with a wide range of properties and applications. AASC are associated with low CO₂ emissions; in the production process, it is possible to use industrial by-products and waste, thereby minimizing the use of a non-renewable natural resource. This study deals with the preparation of heat-resistant porous AASC based on chamotte for high-temperature applications up to 1200°C. Different fillers, aluminium scrap recycling waste as pores forming agent and alkali activation with 6M sodium hydroxide (NaOH) and potassium hydroxide (KOH) solution were used. Sodium hydroxide (NaOH) is widely used for the synthesis of AASC compared to potassium hydroxide (KOH), but comparison of using different activator for geopolymer synthesis is not well established. Changes in chemical composition of AASC during heating were identified and quantitatively analyzed by using DTA, dimension changes during the heating process were determined by using HTOM, pore microstructure was examined by SEM, and mineralogical composition of AASC was determined by XRD. Lightweight porous AASC activated with NaOH have been obtained with density in range from 600 to 880 kg/m³ and compressive strength from 0.8 to 2.7 MPa, but for AAM activated with KOH density was in range from 750 to 850 kg/m³ and compressive strength from 0.7 to 2.1 MPa.

Keywords : alkali activation, alkali activated materials, elevated temperature application, heat resistance

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