

Effect of aluminum ion contents on the thermal behavior of coal fly ash based geopolymer

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Geopolymer is a type of alkali-activated materials that can be synthesized by reaction of aluminosilicate raw materials with alkali activator. Physicochemical properties of geopolymer can vary with several factors including type of utilized ash, concentration of alkali activator, and curing condition, etc. Especially, contents of alumina and silica of the source materials have a major impact on the properties of geopolymer. In this study, distinct thermal behavior of geopolymers with different levels of aluminum ion contents was investigated by exposing them to various hot temperatures. As an alkali activator 14M-sodium hydroxide solution was used to make the coal fly ash based geopolymer. The geopolymer paste was cured at 75 °C for 24 hours after setting in 5cm cubic mold. The hardened geopolymer specimen after curing was exposed to temperatures of 300, 600, and 900 °C, respectively, by using a furnace. The burned geopolymer specimens were employed for the measurements of compressive strength and thermal conductivity according to aluminum ion contents. Microstructure examinations were also carried out by using XRD, FTIR, and SEM analyses.