

Investigating Geopolymerization Process of Aluminosilicates and its Impact on the Compressive Strength of the Produced Geopolymers

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Abstract : This paper investigates multiple factors that impact the formation of geopolymers and their compressive strength to be utilized in construction as an environmentally-friendly material. Bentonite and Kaolinite were thermally calcinated at 750 °C to obtain Metabentonite and Metakaolinite with higher reactivity. Both source materials were activated using a solution of sodium hydroxide (NaOH). Thereafter, samples were cured at different temperatures. The samples were analyzed chemically using a host of spectroscopic techniques. The bulk density and compressive strength of the produced Geopolymer pastes were studied. Findings indicate that the ratio of NaOH solution to source material affects the compressive strength, being optimal at 0.54. Moreover, controlled heat curing was proven effective to improve compressive strength. The existence of characteristic Fourier Transform Infrared Spectroscopy (FTIR) peaks at approximately 1020 cm⁻¹ and 460 cm⁻¹ which corresponds to the asymmetric stretching vibration of Si-O-T and bending vibration of Si-O-Si, hence, confirming the formation of the target geopolymer.

Keywords : calcination of metakaolinite, compressive strength, FTIR analysis, geopolymer, green cement

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