

Correlation between $\text{Na}_2\text{SiO}_3/\text{NaOH}$ ratio and fly ash/alkaline activator ratio to the strength of geopolymer

Abstract

Geopolymer requires an alkaline activator to induce its pozzolanic property and to accelerate the geopolymerisation process. The geopolymerisation process occurs due to the mixing of fly ash, sodium silicate and sodium hydroxide as the alkaline activator, which produces aluminosilicate gel that acts as a binder. As such, the ratios of fly ash to alkaline activator and $\text{Na}_2\text{SiO}_3/\text{NaOH}$ play an important role in obtaining desirable compressive strength; the concentration of NaOH used in this study was 12 M. Different ratios of fly ash to alkaline activator (0.5, 1.0, 1.5, 2.0, 2.5 and 3.0) and $\text{Na}_2\text{SiO}_3/\text{NaOH}$ (0.5, 1.0, 1.5, 2.0, 2.5 and 3.0) were investigated in order to determine the maximum compressive strength. The alkaline activator was mixed with fly ash with different ratio as mentioned above and the samples were cured at 70°C for 24 hours and tested on the seventh day. The maximum compressive strength was obtained when the ratios of fly ash to alkaline activator and $\text{Na}_2\text{SiO}_3/\text{NaOH}$ were 2.0 and 2.5 with compressive strength 73.86 MPa.