

Comparison of geopolymer fly ash and ordinary Portland cement to the strength of concrete

Abstract

The aim of this study is to evaluate the effect of various fly ash: aggregate ratios by using fly ash (FA) based geopolymer compared to ordinary Portland cement (OPC) on the compressive strength of concrete. The different ratio of FA 50%:AGG 50%, FA 40%:AGG 60%, FA 30%:AGG 70% and FA 20%:AGG 80% for geopolymer concrete was used in this study. The same designs also have been used for OPC concrete as a control reference. The strength was measured by compressive strength, and other tests also have been conducted such as density, water absorption and porosity test. The results show that fly ash-based geopolymer with FA 30%:AGG 70% give highest compressive strength compared to OPC concrete at 1, 7, and 28 days of testing. The density of geopolymer concrete is comparable with OPC concrete. The water absorption and porosity of geopolymer concrete was lower than OPC concrete. The test data indicates that a better quality of fly ash-based geopolymer concrete can be produced with proper content of mix design of material.

Keywords

Compressive strength; Density; Geopolymer; Porosity; Water absorption