

Effect of Glass Powder and GGBS on Strength of Fly Ash Based Geopolymer Concrete

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Abstract : In this study, the effect of glass powder (GP) and ground granulated blast furnace slag (GGBS) on the compressive strength of Fly ash based geopolymer concrete has been investigated. The mass ratio of fine aggregate (fA) to coarse aggregate (CA) was maintained constant. NaOH flakes dissolved in water was used as activating liquid and mixed with fly ash (FA) to produce geopolymer paste or cementing material. This paste was added to mixture of CA and fA to obtain geopolymer concrete. Cube samples were prepared from this concrete. The ranges of investigation parameters include GP/FA from 0% to 20%, and GGBS/ FA from 0% to 20% with constant amount of GP. All the samples were air cured inside laboratory under room temperature. Compressive strength of cube samples after 7 days and 28 days curing were determined. The test results are presented and discussed. Based on the results of limited tests a suitable composition of FA, GP and GGBS for constant quantity of CA and fA has been obtained to produce geopolymer concrete of M32. It is found that geopolymer concrete is 14% cheaper than concrete of same strength using OPC. The strength gain in the case of geo-polymer concrete is rather slow compared to that of Portland cement concrete. Tensile strength of this concrete was also determined by conducting flexure test on beam prepared using this concrete. During curing, up to 7days, greyish-white powder used to come out from all the surfaces of sample and it was found to be a mixture of Carbonates and Sulphides of Na, Mg and Fe. Detailed investigation is necessary to arrive at an optimum mixture composition for producing Geo-polymer concrete of required strength. Effect of greyish-white powder on the strength and durability of the concrete is to be studied.

Keywords : geopolymer, industrial waste, green material, cost effective material, eco-friendly material

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