

Durability of fly ash based geopolymer concrete

Dr.R.Prasanna Kumar*, J Mukesh*,

Dept of Civil Engg, Malla Reddy Engineering College (A), Maisammaguda, Hyderabad, PIN-500100.

ABSTRACT

The use of supplementary cementitious materials as partial replacements of the cement in concrete will play a significant role in the environmental control of greenhouse effects. Currently, the most widely used supplementary cementitious material, all over the world, is Flyash, a waste product of thermal power plants. The development of Geopolymer concrete (GPC), a one hundred percent replacement of Portland cement by flyash.

Geopolymer concrete results from the reaction of a source material that is rich in silica and alumina with alkaline liquid aided by heat. Flyash, considered to be waste material which is rich in silica and alumina and it can be used as source material for manufacture of Geopolymer concrete. These binders have been reported to achieve high early strength and better durability (in terms of acid resistance) as compared to Ordinary Portland cement.

In this project work an attempt has been made to assess the acid resistance of flyash based Geopolymer concrete specimens. The concrete cubes of 150mmx150mmx150mm are cast and then cured in the oven for a period of 24hrs at 60 degrees, Then left for air curing for a period of 28 days. Then specimens are immersed in solutions of 3% H₂SO₄, 3% HCL, 3% HNO₃ up to a period of 28 days and evaluation of its durability characteristics in terms of changes in weight and compressive strength at regular intervals is found. The different parameters considered in the study are, the molarity of alkaline activator and proportions of Flyash and GGBS in the Binder. The results confirmed that geopolymer concrete when subjected to different acidic environment reported a very low %weight loss. With regard to compressive strength with increase in alkaline to flyash ratio the compressive strength of the geopolymer concrete is increased from 14 to 21N/mm² and when 50% of flyash is replaced with GGBS a high compressive strength was achieved which is nearly four times compressive strength that was obtained from normal unreplaced flyash basedgeopolymer concrete specimens.

This project work is carried out in the concrete testing laboratory located inside the Kakatiya Institute of Technology and Science college campus. This Laboratory is a part of

the Department of Civil Engineering and is meant for carrying experiments for the undergraduate students.