Strength performance Studies On Ambient Cured Geopolymer Concrete- A New GENERATION Eco-Efficient Construction Material

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ABSTRACT

Undisputedly, concrete is the most widely used construction material. Concrete is not just another material; it is surpassed only by water as the most used material on earth. So it has an enormous impact on the environment, on capital expenditure, on resource consumption, and on pollution.

An important ingredient of conventional concrete is ordinary Portland/pozzolana cement. The production of cement releases approximately an equal amount of carbon dioxide into the environment. Moreover, cement production consumes significant amount of natural resources, leading to depletion of the same in due course of time and it is highly energy intensive. Portland cement manufacture causes environmental impacts at all stages of the process causing global warming. Hence, there is an urgent need to find alternatives to portland cement in order to make the construction industry **eco-friendly and sustainable.**

Alternative for cement opted in our project was **GEOPOLYMER CONCRETE** which leads to **complete replacement** of cement.

Geopolymer concrete is a concrete where there is **complete replacement** of cement by fly ash and GGBS (Ground Granulated Blast Furnace Slag) and replacement of water by alkaline solution for its Geopolymerisation process.

Geopolymer or inorganic alumino-silicate polymers are synthesized by alkali activation of predominantly silicon and aluminium materials of geological origin or by-product materials such as Fly Ash, slag etc. Geopolymers are regarded as **NO CEMENT** composites with potential to use large quantities of fly ash.

One of the important steps of geopolymer synthesis is curing between 40^0C and 100 ^{0}C for 4 to 48 hours in dry or steam conditions. However, being able to be mixed with relatively low-alkali solution and cured in a reasonable time at **ambient temperature** is very important in terms of practical application.

In this dissertation work, Strength studies on **ambient cured geopolymer** concrete for various parameters like compression on cubes and cylinders, split tensile on cylinders, flexural strength on beams, shear strength on shear cubes and pull-out strength on cubes was conducted. Also, strength studies on cubes specimens for varying molarity and varying fluid/binder ratio was conducted.