

**Title: ON THE DEVELOPMENT OF FLY ASH AND GGBS BASED GEO-
POLYMER CONCRETE**

Abstract: Geo-polymer concrete blocks, also known as “environmentally friendly” concrete blocks, are a carbon-free binding material that can be used as the ultimate concrete block replacement. Cement production accounts for 7% of global CO₂ emissions. This problem leads to conflicts with the environment. At this point, the manufacturing of geo polymer concrete will have resolved all of the issues discussed before. This research studied the mechanical behavior of industrial products such as fly ash and steel slag-based geo polymer concrete blocks (FAGPC-SGPC). Geo polymer concrete includes coarse aggregate, fine aggregate, alkaline liquid, fly ash, steel slag, and water. For Geo Polymer concrete blocks, the alkaline solution was made by mixing sodium silicate solution (Na₂SiO₃) and sodium hydroxide solution (NaOH) in different ratios. To make an alkaline liquid solution, sodium hydroxide solids were mixed with distilled water for about 5 minutes. The primary goal of the research was to evaluate the structural feasibility of geo polymer concrete blocks as an alternative to traditional Portland cement concrete blocks.

Keywords: Compressive strength, Fly ash, Steel slag, Geo-polymer, water absorption. Alkali Activator.

Objective of the work:

1. To develop a mixture proportioning process to manufacture fly ash and steel slag based Geo Polymer concrete without OPC.
2. To reduce the usage of Ordinary Portland Cement and to improve usage of waste material.
3. To study the compressive and water absorption of fly ash and GGBS based Geo-Polymer concrete.

**Key Researcher:
Md. Jahid Shahshuja
Research Officer, Building materials Division**

Research Team:

Md.Ashraful alam	Director General, HBRI	Advisor
Md Nafizur Rahman	Principle Research Officer, HBRI	Supervisor
Ahsan Habib	Senior Research Officer, HBRI	Co-supervisor
Md.Jahid Shahsuja	Research Officer, HBRI	Key Researcher
Kaniz Fatema	Senior Research Officer, HBRI	Member

Raw material Used for Geo-Polymer concrete.



Fly ash



Steel slag



Fine Sand



Alkali Activator

Figure: Preparation of Alkali Activator.



Figure -2: Preparation of Geo-polymer concrete block at Plant



Geopolymer concrete block



Oven curing at 90° C



Ambient curing



Compressive strength test by UTM

Conclusion: The Fly ash and GGBS Based Geo-polymer concrete is more environmentally friendly and the potential to replace OPC concrete in many applications such as precast units. Geo-polymer technology does not only contribute to the reduction of greenhouse gas emission but also reduced disposal cost of industrial waste.