

## **Preparation and characterization of geopolymer composite containing fly ash (FA) and rice husk ash (RHA)**

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### **Abstract**

The construction material currently in use is Ordinary Portland Cement (OPC). Due to the drawbacks of OPCs, such as being an energy-intensive process and emitting large amounts of greenhouse gases, research into the use of geopolymers are currently underway. Raw materials containing mainly silica and alumina are used in the production of geopolymer, which is used as an environmentally friendly construction material. The objective of this study is to prepare and characterize geopolymer composites which are made by alkali activated Fly Ash (FA) and Rice Husk Ash (RHA). A sample series was manually prepared by mixing cement, FA, RHA, pre-washed and sifted sand, water, NaOH and Ca(OH)<sub>2</sub>. Non alkali activated, control sample was prepared using the optimal ash content of 50%. FA and RHA were initially characterized using FTIR, XRF and XRD analysis, and results confirmed that the presence of higher amounts of Al and Si helped to create a strong geopolymer. The compressive strength of each sample was measured after a curing period of 7 days. The results show that when ash content increases, the compressive strength decreases, while water absorption increases. Accordingly, it was concluded that a sample containing 50% of ash had an optimum compressive strength as well as an optimum water absorption value. Further, alkali activated samples exhibited optimal properties compared to non-alkali activated samples. In this limited scope of study, it can be concluded that cement bricks with added fly ash and rice husk ash can be used as environmentally friendly, cost-effective, value-added alternative construction materials.

**Keywords:** *Compressive strength, Fly ash, Geopolymer, Rice husk ash, Water absorption*