

## **Synthesis and Characterization on the Effect of the Concentration of Sodium Silicate on the Morphological and Strength of Fly Ash-based Geopolymer Concrete**

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### **Structured Abstract**

**Background:** Portland cement concrete pavement, also known as PCC pavement, is one of the most popular uses of fly ash. The use of fly ash as a replacement for concrete in PCC road construction projects has substantial financial benefits. The Federal Highway Administration has come to accept fly ash as a filler in mines and for use in embankments.

**Methods:** All of the fly ash geopolymer concrete used in this investigation was made with an appropriate quantity of fly ash and alkaline activators  $\text{Na}_2\text{SiO}_3$  and  $\text{NaOH}$ . SEM and FTIR analyses were used to determine the morphological and chemical characteristics. The compressive strength test, meanwhile, was used to determine the mechanical strength. Different of concentration were used to differentiate the fly ash geopolymer concrete.

**Results:** Fly ash geopolymer concrete were subjected in different concentrations, undergo chemical and physical analysis. The compressive strength test showed that an increase in the concentration of  $\text{Na}_2\text{SiO}_3$  resulted in a decrease in compressive strength. The geopolymer samples' presence of specific bands was confirmed by FTIR analysis. The study established a thorough understanding of the mechanical properties, chemical composition, and microstructure of the geopolymer. It proved that the process of geopolymerization and the qualities of the final geopolymer were significantly influenced by the concentration of  $\text{Na}_2\text{SiO}_3$ .

**Conclusion:** Based on its physical and chemical characteristics, fly ash geopolymer concrete shows significant results. Therefore, it is crucial to apply various parameters to improve the strength of the geopolymer so will help the development of the use of geopolymer as a cement substitute in the future.

**Keywords:** Fly ash, geopolymer, sodium hydroxide, sodium silicate

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