

## **Effect of Concentration of Sodium Hydroxide on Properties of Fly Ash-Based Geopolymer**

Nur Aimuni Hisham<sup>a</sup>, Sharil Fadli Mohamad Zamri<sup>ab\*</sup>

### **Structured Abstract**

**Background:** The use of Portland cement is very common in building and construction industry. However, it causes environmental problem due to the release of CO<sub>2</sub> gas to the atmosphere. Therefore, fly ash was chosen as an alternative material to replace Portland cement due to lower carbon content and the similarity of their binding properties.

**Methods:** In this study, the fly ash-based geopolymer was produced by mixing fly ash, sodium hydroxide and sodium silicate. The functional group presence in the sample was characterized using FT-IR analysis. The strength of the concrete sample was determined using compressive test. The surface and microstructural of the concrete sample was analysed using SEM analysis.

**Results:** Fly ash geopolymer concrete was tested through chemical, morphological, and mechanical test. The results show that higher the concentration of sodium hydroxide produced more stable structure of concrete. This statement was supported by FT-IR, SEM, and compressive strength. FT-IR test shows formation of bonding indicating that there is reaction occurs in fly ash. The increases in the graph trendline proved that the concentration of sodium hydroxide influence the strength of geopolymer concrete.

**Conclusion:** In conclusion, the concentration of sodium hydroxide was found to influence the stability of the geopolymer concrete and from the results, it can be concluded that higher concentration of sodium hydroxide can create a stable concrete sample.

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

---

\*Correspondence: [sharil7240@uitm.edu.my](mailto:sharil7240@uitm.edu.my)

<sup>a</sup>School of Chemistry & Environment, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia

<sup>b</sup>Synthesis and Application of Conducting Polymers, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia