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Influence of Curing Time on the Morphological and Strength of Fly Ash Geopolymer Concrete

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Structured Abstract

Background: Portland cement is commonly used in construction industries, also contribute to larger environmental pollution since its production contribute to releasing of a large amount of carbon dioxide (CO_2) to atmosphere. Thus, fly ash geopolymer concrete could be utilized to replace Portland cement as it has same binding properties. Moreover, the utilization of fly ash geopolymer concrete is economical, and eco-friendly.

Methods: In this study, all fly ash geopolymer concrete were produced using fixed amount of fly ash, alkaline activators which is KOH and $Na_2SiO_3.5H_2O$, and distilled water. The morphological and chemical properties were determined using SEM and FTIR analysis. Meanwhile, the mechanical strength was determined using compressive strength test. The fly ash geopolymer concrete were differentiate by different of curing period.

Results: Fly ash geopolymer concrete were subjected in different curing periods, undergo chemical and physical analysis. The results revealed that longer curing period led to more robust and stable structure, which was supported by SEM, FTIR and compressive strength test. Extend curing period improved the intermolecular bonding, undergone further hydration and reducing possibilities of porosity, deterioration, and cracks, which resulting in enhanced mechanical strength.

Conclusion: The fly ash geopolymer concrete exhibits significant results based on physical and chemical properties. Thus, it is vital to used broad parameters beside curing period, such as different type of alkaline activator, as it is beneficial to future development of geopolymer usage as cement replacement.

Keywords: Fly ash, geopolymer, curing period, potassium hydroxide

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