

Lightweight fly ash-based geopolymer concrete

Abstract

The experiments of this study were performed to study the synthesis process for lightweight aggregate geopolymer concrete (LWAGC) using normal sand as a fine aggregate and expanded clay as lightweight aggregate. The LWAGC was synthesized by the alkali activation of a fly ash (FA) as the source material by mixture of liquid alkaline activator. The resultant LWAGC possessed a compressive strength of 18.86 MPa at age of 28 days with oven-dry density of 1438.7 kg/m³. The microstructure images showed that the high alkalinity chemical reaction of the geopolymerization process does not react with the used aggregate, and the smooth surface of the aggregate declined the interaction between the geopolymer matrix and aggregate. The significant result of the current study was the proven of the reliability of the ACI 211.2-98 standard used for designing and mix proportioning of OPC lightweight aggregate structural concrete in the production of LWAGC.