

ABSTRACT

The objective of present study is to investigate the performance of alkali-activated fly ash based geopolymer mortar. For this purpose, two fold experimental program was conducted. Firstly, the influence of various parameters mix composition and process parameter on the compressive strength of the geopolymer mortar was examined. The mix composition parameters included Sodium hydroxide concentration and aggregate to binder ratio, while process parameter included curing temperature. The compressive strength tests were also accompanied with advanced analytical techniques such as X-ray diffractometry (XRD) and Scanning Electron Microscopy (SEM). Secondly, the performance of the geopolymer mortar against the carbonation was also evaluated. The influence of aggregate to binder ratio and curing temperature on the carbonation of the mortar was investigated. Carbonation is determined in terms of carbonation depth. Further, the carbonation tests were also supported by XRD and SEM testing. It was found the compressive strength test of the geopolymer mortar increase with increase in concentration of NaOH in range of 8M to 14M. Aggregate to binder ratio of 2:1 was found to be optimum for the attaining maximum compressive strength at 28 days. The higher strength attained can be attributed to mineral formed such as zeolite and sodalite, as evident form XRD tests. Further, mortar having higher porosity was found to be more vulnerable to carbonation. The carbonation of the mortar can be due to change in pore solution chemistry which is evident from XRD tests. Hence, an attempt has been made to delve deeper into the understanding of the performance of geopolymer mortar. However, the long term performance of the geopolymer mortar subjected to carbonation could not be performed due to limitation of time, which warrants the further investigation and is beyond the scope of the present study.

Keywords: Geopolymer; mortar; compressive strength; carbonation; micro-structure.