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Effect of Alccofine powder on the properties of Pond fly ash based Geopolymer mortar under different conditions

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Abstract

As the most widely used synthetic material on the planet, concrete poses a serious societal concern regarding its significant environmental footprint. There is a global urgency to develop innovative strategies to develop greener concrete with improved strength and durability. In recent years, scientists are interested to have OPC free concrete to reduce CO₂ emission. One of the major breakthroughs is the preparation of geopolymer cement. In this paper geopolymer cement was made by activating Pond fly ash (a waste of thermal power plant) with 14 M NaOH and sodium silicate solutions. Natural Ennor sand was used to make the mortar. Alccofine powder was added during geopolymerization process, which increased the compressive strength in a similar way as silica fume. Curing was done at different temperatures in an oven and in microwave oven. Curing in microwave oven gave high compressive strength in shorter period. Powder X-ray diffraction, heat evolution profile, TG studies, compressive strength measurements and SEM studies were made to characterize the geopolymer. Durability test in sulphuric acid was conducted and it was observed that the geopolymer mortars were much more durable as compared to the control. The results have been discussed.

Keywords: Geopolymer cement; Aluminosilicates; Strength; Sodium silicate; Alccofine; Microwave oven.

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