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Influence of water, alkali activators, and curing regime on the workability and compressive strength of the alkali activated mortar

Eslam Gomaa
Graduate student
Missouri University of Science and Technology
Rolla, Missouri, USA
egomaa@mst.edu
Graduate Research Assistant with a focus on developing sustainable cementitious material for different applications using fly ash.

Simon Sargon
Graduate student
Missouri University of Science and Technology
Rolla, Missouri, USA
ssk36@mst.edu
Graduate Research Assistant with a focus on investigating advanced curing regimes for better performance of zero cement concrete

Cedric Kashosi
Graduate student
Missouri University of Science and Technology
Rolla, Missouri, USA
cckgbc@mst.edu
Graduate Research Assistant with a focus on developing a more practical and user-friendly zero cement concrete

Ahmed Gheni
Post Doctorate Fellow
Missouri University of Science and Technology
Rolla, Missouri, USA
Gheni.a@mst.edu
A postdoctoral research fellow with an interest in developing new Eco-friendly alternatives for the conventional construction materials

Mohamed ElGawady
Benavides Professor
Missouri University of Science and Technology
Rolla, Missouri, USA
elgawadym@mst.edu
Professor and Benavides Faculty Scholar. Associate Editor, American Society of Civil Engineering Journal of Bridge Engineering

Contact: elgawadym@mst.edu

1 Abstract

The effect of the water to fly ash (W/FA), alkali activators to fly ash (Alk/FA), and curing regimes on the workability and compressive strength of the alkali-activated mortar (AAM) was studied. Three high calcium fly ashes (FAs) having different chemical compositions were used. Sodium hydroxide (SH) and sodium silicate (SS) were used as the alkali activators. The two alkali activators were mixed together at ratio of 1.0. Two curing regimes, elevated heat curing in an electric oven at 70 °C for 24 hr and ambient curing at 23 ± 2 °C, were applied. The water to fly ash (W/FA) ratios were 0.350, 0.375, and 0.400. However, the alkali activators to fly ash (Alk/FA) ratios were 0.250, 0.275 and 0.300. The results revealed that the workability and the compressive strength of the oven cured specimens were decreased with increasing the calcium content of FA in the mixture. However, the compressive strength of the specimens that cured under the ambient temperature increased with increasing the calcium content. The workability increased with increasing the W/FA and decreasing the Alk/FA. The compressive strength based on both curing regimes decreased with increasing the W/FA. The optimum Alk/FA was 0.275 with W/FA of 0.400.

Keywords: class C fly ash; alkali activated mortar; workability; compressive strength; sustainable materials.

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