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Chemical resistance of alkali-activated mortar with nano silica and polypropylene fiber

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Abstract

In this study, the mechanical and long-term performance of alkali-activated mortar (AAM) were investigated. In the fresh phase, the flow table and fresh density were evaluated. The compressive and flexural strengths were investigated at 28 and 56days. In addition, the water absorption, sorptivity, and chemical resistance (sulfuric acid, magnesium sulfate, and sodium chloride) of AAM were investigated after 56days of exposure Nano silica with and without polypropylene fiber was added to the AAM mixtures and cured at ambient temperature (23±2°C). Sodium silicates (Na2SiO3) and sodium hydroxide (NaOH) were used as alkaline-activated solution with a ratio of 1.5 to 2.5. The results show that the workability, water absorption, and sorptivity were better, with a ratio of 2.5 (the ratio of sodium silicates to sodium hydroxide). Nevertheless, the simultaneous use of fiber and nano-silica was adversely influenced. On the other hand, better hardened performanc was achieved with the ratio of 1.5. Moreover, the together use of fiber and nano-silica were reduced the flexural and compressive strengths when exposed to sulfuric acid, magnesium sulfate, and sodium chloride. In contrast, an increment of compressive strength was recorded for sodium chloride exposure.