

# The investigation on properties of sodium sulfate-activated mortar incorporating steel slag with various replacement ratio and particle size

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## **ABSTRACT**

The alkali-activated materials are alternatives for replacing Portland cement to manufacture concrete products, which has benefits on reducing carbon dioxide (CO<sub>2</sub>) emission and supporting the development of green sustainable construction. The combined use of steel slag (SS) and alkali activator (AA) to make alkali-activated concrete not only reuse the industrial waste but also improve the activity of SS. There are many types of chemicals can be used as AA, such as sodium silicate, sodium hydroxide, sodium carbonate and sodium sulfate (SST). In this study, SST was chosen as the AA, and the performance of alkali-activated mortar incorporating SS from 0 to 12.5% of Portland cement by mass, activated by SST with the dosage varying from 0 to 3% of cement by mass, was investigated. In addition, two types of SS, of which the particle sizes are less than 75 μm and 150 μm, were used to manufacture alkali-activated SS mortar. Flow table test, compressive strength test and flexural strength test were conducted to evaluate the fresh and hardened properties of alkali-activated steel slag (AA-SS) mortar. Response surface methodology (RSM) was used in this study as an analysis method. As result, the addition of SS tends to decrease the strength of mortar, while the addition of SST could lead to the increase in the strength of mortar.

## **KEYWORDS**

Alkali-activated; Ate; Cementitious; F; Fineness; Sodium sul; Steel slag

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