

## Mechanical Properties and Chloride Diffusion of Ceramic Waste Aggregate Mortar Containing Ground Granulated Blast-Furnace Slag

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**Abstract :** Ceramic waste aggregates (CWAs) were made from electric porcelain insulator wastes supplied from an electric power company, which were crushed and ground to fine aggregate sizes. In this study, to develop the CWA mortar as an eco-efficient, ground granulated blast-furnace slag (GGBS) as a supplementary cementitious material (SCM) was incorporated. The water-to-binder ratio (W/B) of the CWA mortars was varied at 0.4, 0.5, and 0.6. The cement of the CWA mortar was replaced by GGBS at 20 and 40% by volume (at about 18 and 37% by weight). Mechanical properties of compressive and splitting tensile strengths, and elastic modulus were evaluated at the age of 7, 28, and 91 days. Moreover, the chloride ingress test was carried out on the CWA mortars in a 5.0% NaCl solution for 48 weeks. The chloride diffusion was assessed by using an electron probe microanalysis (EPMA). To consider the relation of the apparent chloride diffusion coefficient and the pore size, the pore size distribution test was also performed using a mercury intrusion porosimetry at the same time with the EPMA. The compressive strength of the CWA mortars with the GGBS was higher than that without the GGBS at the age of 28 and 91 days. The resistance to the chloride ingress of the CWA mortar was effective in proportion to the GGBS replacement level.

**Keywords :** ceramic waste aggregate, chloride diffusion, GGBS, pore size distribution

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