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STUDY ON SOLID/LIQUID RATIO AND MICROSTRUCTURE PROPERTIES OF ALKALI-ACTIVATED METAKAOLIN-BASED GEOPOLYMER CONTAINED IN LCD WASTE GLASS

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Abstract

There are considerable environmental and health and safety concerns regarding liquid crystal display (LCD) waste glass because of the waste electrical and electronic equipment (e-waste) that is deposited in landfills. In current study, the effect of variation in LCD waste glass on the deconvoluted fractions of silicon centers of metakaolin geopolymers has been comprehensively investigated to discover the underlying mechanisms governing the performance. Solid/liquid ratio affects the kinetics of the exchange of silicate units between species during geopolymerization. Flexural strength is related to the degree of geopolymerization and the number of soluble aluminosilicates in the geopolymer system. The solid/liquid ratio was increased from 0.8 to 1.0, the weight loss of 10% geopolymer in the 230-400 °C decreased from 16.97% to 14.94% at 60-day of curing. Nevertheless, the weight loss from 600–750 °C increased from 0.55% to 0.85%. When the solid/liquid ratio was increased from 0.6 to 1.0, the fractions of Q^4(3Al) (30.13%-35.07%) and Q^4(2Al) (30.40%–35.13%) increased, whereas the fractions of Q^4(4Al) (23.36%-22.57%) and Q^4(1Al) (10.15%-9.57%) decreased. Geopolymer with 10%-40% LCD waste glass and a solid/liquid ratio of 1.0 can partially replace metakaolin as geopolymer exhibit favourable mechanical characteristics.

Keywords: deconvoluted fractions, geopolymer, liquid crystal display waste glass

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