

A Study of the Replacement of Natural Coarse Aggregate by Spherically-Shaped and Crushed Waste Cathode Ray Tube Glass in Concrete

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Abstract : The aim of this study is to conduct an experimental investigation on the influence of complete replacement of natural coarse aggregate with spherically-shape and crushed waste cathode ray tube (CRT) glass to the aspect of workability, density, and compressive strength of the concrete. After characterizing the glass, a group of concrete mixes was prepared to contain a 40% spherical CRT glass and 60% crushed CRT glass as a complete (100%) replacement of natural coarse aggregates. From a total of 16 types of concrete mixes, the optimum proportion was selected based on its best performance. The test results showed that the use of spherical and crushed glass that possesses a smooth surface, rounded, irregular and elongated shape, and low water absorption affects the workability of concrete. Due to a higher specific gravity of crushed glass, concrete mixes containing CRT glass had a higher density compared to ordinary concrete. Despite the spherical and crushed CRT glass being stronger than gravel, the results revealed a reduction in compressive strength of the concrete. However, using a lower water to binder (w/b) ratio and a higher superplasticizer (SP) dosage, it is found to enhance the compressive strength of 60.97 MPa at 28 days that is lower by 13% than the control specimen. These findings indicate that waste CRT glass in the form of spherical and crushed could be used as an alternative of coarse aggregate that may pave the way for the disposal of hazardous e-waste.

Keywords : cathode ray tube, glass, coarse aggregate, compressive strength

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