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Use of Waste Glass as Coarse Aggregate in Concrete: A Possibility towards Sustainable Building Construction

Authors : T. S. Serniabat, M. N. N. Khan, M. F. M. Zain

Abstract : As climate change and environmental pressures are now well established as major international issues, to which governments, businesses and consumers have to respond through more environmentally friendly and aware practices, products and policies; the need to develop alternative sustainable construction materials, reduce greenhouse gas emissions, save energy, look to renewable energy sources and recycled materials, and reduce waste are just some of the pressures impacting significantly on the construction industry. The utilization of waste materials (slag, fly ash, glass beads, plastic and so on) in concrete manufacturing is significant due to engineering, financial, environmental and ecological importance. Thus, utilization of waste materials in concrete production is very much helpful to reach the goal of the sustainable construction. Therefore, this study intends to use glass beads in concrete production. The paper reports on the performance of 9 different concrete mixes containing different ratios of glass crushed to 5 mm - 20 mm maximum size and glass marble of 20 mm size as coarse aggregate .Ordinary Portland cement type 1 and fine sand less than 0.5 mm were used to produce standard concrete cylinders. Compressive strength tests were carried out on concrete specimens at various ages. Test results indicated that the mix having the balanced ratio of glass beads and round marbles possess maximum compressive strength which is 3888.68 psi, as glass beads perform better in bond formation but have lower strength, on the other hand marbles are strong in themselves but not good in bonding. These mixes were prepared following a specific W/C and aggregate ratio; more strength can be expected to achieve from different W/C, aggregate ratios, adding admixtures like strength increasing agents, ASR inhibitor agents etc.

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