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Experimental Study on Light Weight Concrete by Ceramic Waste

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Abstract: This paper investigate the prospect of utilization of the ceramic wastes (CW) such as coarse and fine aggregate in lightweight aggregate concrete (LAC) that is consequence of coarse aggregate material (CAM) substitute with CW and consequence of biscuit substitute fine aggregate material (FAM) on properties of LAC. The composition of ordinary Portland cement (PC): FAM: CAM are 1: 2.21: 3.03 and substituted CAM with CW and FAM with biscuit at the levels of 0, 25, 50, 75 and 100 wt.%. All conditions of LAC was subjected to tested water absorption, thermal conductivity and unit weight at the age of 28 day. The compressive strength at 7, 14, 28 and 56 days was also conducted. The results show that when proportion of CW is increased then density and compressive strength decreased but the water adsorption and thermal conductivity increased. After 28 days, the sample with 100% CW compressive strength and bulk density has reduced from 55.4 to 11.4 MPa and 2394 to 1362 kg/m3. On the other hand 50 wt. % gave the compressive strength and density of 38.1 MPa and 1803 kg/m3 respectively. 50% mix was collected for study with biscuit replaced FAM on mechanical properties. The compressive strength improved when levels of biscuit increased for 50 wt. % were as decreased with excess 50 wt. %. The bulk density and thermal conductivity dropped from 1803 to 1584 kg/m3 and 0.689 to 0.592 W/m°K. The optimum configuration that meet the ASTM C330: standard range for structural lightweight aggregate concrete has t contain 50 wt. % of CW and 100 wt. % of biscuit.
Keywords: lightweight aggregate concrete (LAC), ceramic wastes (CW). Coarse aggregate material (CAM)

I. Introduction

Lightweight concrete (LWC) outlined as a sort of concrete that contains of AN increasing agent that will increase the degree of the mixture that is lighter than the standard concrete.. USA, uk, Sweden, etc has been wide exploitation LWC. The LWC has denseness and thermal conduction. Reduction of load, quicker building rates in construction and lower transport and handling prices square measure blessings of LWC. Light-weight mixture concrete may be shaped employing a vary of light-weight aggregates from natural materials, thermal treatment of natural raw materials, by-products from industrial. Volcanic rock, clay, slate, shale, fly ash, feather palm shell ash, biscuit ceramics, bottom ash etc. were used be light-weight mixture in concrete [1]-[6]. the specified engineering properties of LWC can have a sway on the most effective style of light-weight mixture to use. it's a touch structural, however high thermal insulation properties, square measure required a light-weight, weak mixture may be used. The LAC have AN air dry density not exceptional 2000 kg/m3, however may be as low as four hundred kg/m3 reckoning on the materials used and therefore the compressive strength will vary between one and sixty five MPa [7]. The LAC was usually being designed in accordance with ACI 213R-04 [8].

The environmental problems square measure important and anxious in industrial sector. The small, medium and huge industrials turn out pollution akin to water, air, solid, risky and noise. In ceramic industries, they're the one in all industries that generates solid wastes from method akin to biscuit, deteriorated operating mould etc. The biscuit is defected final product akin to ceramic ware, or unglazed ceramic ware, typically known as terracotta, or, most typically, A negotiator stage in a very glazed final product. The operating moulds square measure drop before expiration or deterioration. From the ministry of business (Thailand) found that the number of deteriorated operating mould is quite 38,000 tons/year [9]. Generally, the management of operating mould waste will utilized in varied manufacture business akin to cement business, the mineral is additional into a clinker concerning 3-5 wt.% of cement weight and created the ceiling that it's utilized in little quantities. Additionally, the ceramic production has broken ceramic wastes concerning five-hitter of ceramic product. Each most operating mould and biscuit square measure drop or land crammed that square measure inappropriate strategies.

It increasing the chance of chemical element compound gas and Causes the worldwide warming. From the property of CW and biscuit that have a lower density than traditional coarse and fine mixture. it's presumably replacement of CAM and FAM This analysis study the optimum quantitative relation of light-