World Academy of Science, Engineering and Technology
International Journal of Civil and Architectural Engineering
Vol:9, No:05, 2015

An Investigation on Fresh and Hardened Properties of Concrete While Using Polyethylene Terephthalate (PET) as Aggregate

Authors : Md. Jahidul Islam, A. K. M. Rakinul Islam, M. Salamah Meherier

Abstract : This study investigates the suitability of using plastic, such as polyethylene terephthalate (PET), as a partial replacement of natural coarse and fine aggregates (for example, brick chips and natural sand) to produce lightweight concrete for load bearing structural members. The plastic coarse aggregate (PCA) and plastic fine aggregate (PFA) were produced from melted polyethylene terephthalate (PET) bottles. Tests were conducted using three different water–cement (w/c) ratios, such as 0.42, 0.48, and 0.57, where PCA and PFA were used as 50% replacement of coarse and fine aggregate respectively. Fresh and hardened properties of concrete have been compared for natural aggregate concrete (NAC), PCA concrete (PCC) and PFA concrete (PFC). The compressive strength of concrete at 28 days varied with the water–cement ratio for both the PCC and PFC. Between PCC and PFC, PFA concrete showed the highest compressive strength (23.7 MPa) at 0.42 w/c ratio and also the lowest compressive strength (13.7 MPa) at 0.57 w/c ratio. Significant reduction in concrete density was mostly observed for PCC samples, ranging between 1977–1924 kg/m^3. With the increase in water–cement ratio PCC achieved higher workability compare to both NAC and PFC. It was found that both the PCA and PFA contained concrete achieved the required compressive strength to be used for structural purpose as partial replacement of the natural aggregate; but to obtain the desired lower density as lightweight concrete the PCA is most suited.

Keywords : polyethylene terephthalate, plastic aggregate, concrete, fresh and hardened properties
Conference Title : ICCSCE 2015 : International Conference on Civil, Structural and Construction Engineering
Conference Location : Rome, Italy
Conference Dates : May 05-06, 2015