

## Effect of Iron Ore Tailings on the Properties of Fly-ash Cement Concrete

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**Abstract :** The strength of concrete varies with the types of material used; the material used within concrete can also result in different strength due to improper selection of the component. Each material brings a different aspect to the concrete. This work studied the effect of using Iron ore Tailings (IOTs) as partial replacement for sand on some properties of concrete using Fly ash Cement as the binder. The sieve analysis and some other basic properties of the materials used in producing concrete samples were first determined. Two brands of Fly ash Cement were studied. For each brand of Fly ash Cement, five different types of concrete samples denoted as HCT0, HCT10, HCT20, HCT30 and HCT40, for the first brand and PCT0, PCT10, PCT20, PCT30 and PCT40, for the second brand were produced. The percentage of Tailings as partial replacement for sand in the sample was varied from 0% to 40% at 10% interval. For each concrete sample, the average of three cubes, three cylinders and three prism specimen results was used for the determination of the compressive strength, splitting tensile strength and the flexural strength respectively. Water/cement ratio of 0.54 with fly-ash cement content of 463 Kg/m<sup>3</sup> was used in preparing the fresh concrete. The slump values for the HCT brand concrete ranges from 152mm - 75mm while that of PCT brand ranges from 149mm to 70mm. The concrete sample PCT30 recorded the highest 28 days compressive strength of 28.12 N/mm<sup>2</sup>, the highest splitting tensile strength of 2.99 N/mm<sup>2</sup> as well as the highest flexural strength of 4.99 N/mm<sup>2</sup>. The texture of the iron-ore tailings is rough and angular and was therefore able to improve the strength of the fly ash cement concrete. Also, due to the fineness of the IOTs more void in the concrete can be filled, but this reaches the optimum at 30% replacement level, hence the drop in strength at 40% replacement

**Keywords :** concrete strength, fine aggregate, fly ash cement, iron ore tailings

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