



Studies on mechanical and microstructural properties of hematite modified concrete

D. Ramachandran¹, R. P. George^{*2}, Vinita Vishwakarma², Sudha U.¹, Arul Maximus Rabel¹

¹Centre for Nanoscience and Nanotechnology, Sathyabama University, Chennai-600119, India

²Corrosion Science and Technology Group, IGCAR, Kalpakkam-603102, India

Abstract: High density or heavy weight concrete is manufactured by using heavy weight aggregates such as hematite, magnetite, goethite, limonite etc. Concrete containing hematite is an excellent radiation shielding material which is widely used in nuclear industries, particle accelerators and reactors. Two different types of M35 grade concrete were prepared the fly ash modified concrete (FAC) and a combination of fly ash (FA) and hematite modified concrete (HC). The cement was partially replaced with 20% of FA for FAC whereas the cement and fine aggregates were partially replaced with 20% of FA and 10% of hematite respectively for HC. The mechanical properties such as compressive, split tensile and flexural strength were compared in both types of modified concrete after curing period of 7, 28 and 56 days. The results showed that concrete containing hematite and fly ash exhibits higher strength than the fly ash modified concrete. Further durability studies such as porosity measurement and Rapid Chloride Permeability Test (RCPT) were carried out. Microstructural properties such as X-ray diffraction (XRD) and Field Scanning Electron Microscopy (FESEM) studies were also studied and discussed in detail in paper. Further, epifluorescence microscopic studies quantified the presence of microbial attachment on FAC and HC.

Keywords: Heavy weight concrete; Hematite; Fly ash.

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