

Experimental Study on Strength and Durability Properties of Bio-Self-Cured Fly Ash Based Concrete under Aggressive Environments

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Abstract : High performance concrete is not only characterized by its high strength, workability, and durability but also by its smartness in performance without human care since the first day. If the concrete can cure on its own without external curing without compromising its strength and durability, then it is said to be high performance self-curing concrete. In this paper, an attempt is made on the performance study of internally cured concrete using biomaterials, namely *Spinacea pleracea* and *Calatropis gigantea* as self-curing agents, and it is compared with the performance of concrete with existing self-cure chemical, namely polyethylene glycol. The present paper focuses on workability, strength, and durability study on M20, M30, and M40 grade concretes replacing 30% of fly ash for cement. The optimum dosage of *Spinacea pleracea*, *Calatropis gigantea*, and polyethylene glycol was taken as 0.6%, 0.24%, and 0.3% by weight of cement from the earlier research studies. From the slump tests performed, it was found that there is a minimum variation between conventional concrete and self-cured concrete. The strength activity index is determined by keeping compressive strength of conventionally cured concrete for 28 days as unity and observed that, for self-cured concrete, it is more than 1 after 28 days and more than 1.15 after 56 days because of secondary reaction of fly ash. The performance study of concretes in aggressive environment like acid attack, sea water attack, and chloride attack was made, and the results are positive and encouraging in bio-self-cured concretes which are ecofriendly, cost effective, and high performance materials.

Keywords : bio materials, *Calatropis gigantea*, self curing concrete, *Spinacea oleracea*

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