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Effect of Recycled Grey Water on Bacterial Concrete

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Abstract : Concrete is the most widely used structural material. It is made using locally available materials. However, Concrete has low tensile strength and may crack in the early days with exothermic hydration. Bacillus subtilis bacteria that form endospores is the biological agent considered in this study for Biomineralization or MICP (Microbially Induced Calcite Precipitation) Technique and to address the increased Construction water demand, Recycled Grey Water which is obtained from STP of PES University, opted in place of Potable water. In this work, M30 grade conventional concrete is designed using OPC 53 grade cement, Manufactured Sand, Natural coarse aggregates, and Potable water. Conventional Concrete (CC), Bacterial Concrete with Potable water (BS), and Recycled Grey Water concrete (RGW) are the three different concrete specimens casted. Experimental studies such as the strength test and the surface hardness test are conducted on Conventional and Bacterial concrete samples after 7, 28, and 56 days of curing. Concrete cubes are subjected to a temperature of 50° C to investigate the effect of higher temperature. Cracked cube specimens are observed for Self-healing - as well as microstructure analysis with Scanning Electron Microscope (SEM), Energy Dispersive X-Ray Analysis (EDAX), and X-Ray Diffraction Analysis (XRD).Noticeable Calcium salt deposition is observed on the surface of BS and RGW cracked specimen. Surface hardness and EDAX test gave promising result on the advantage of using spore-forming bacteria in concrete. This is followed by the strength gain in Compression and Flexure. Results also indicate that Recycled Grey Water can be a substitute for Normal water in concrete.

Keywords : bacillus subtilis, bacterial concrete, recycled grey water, self-healing, surface hardness of concrete
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