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PARTIAL REPLACEMENT OF PERLITE POWDER WITH CEMENT IN CONCRETE

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Abstract - *For structural application of lightweight concrete, the density is more important than the strength. A low density for the same strength level reduces the self-weight, foundation size and construction cost. Structural lightweight aggregate concrete was designed with natural perlite aggregate that will provide an advantage of reducing dead weight of the structure also compared the strength of normal concrete with perlite concrete by partially replacing of perlite with sand as a percentage of 5%, 10%, and 15% in normal concrete mix. Perlite is an amorphous volcanic glass that has a relatively high water content, typically formed by the hydration of obsidian. It is an industrial mineral and a commercial product useful for its low density after processing. Small quantities of perlite are also used in foundries, cryogenic insulation, and in ceramics as a clay additive. It is also used by the explosives industry. Due to thermal and mechanical stability, non-toxicity, and high resistance against microbial attacks and organic solvents, perlite is widely used in biotechnological applications. Perlite was found to be an excellent support for immobilization of biocatalysts such as enzymes for bioremediation and sensing applications.*

***Key words*: Perlite powder, Compressive Strength, Split tensile strength.**

1. INTRODUCTION

Perlite is an amorphous volcanic glass that has a relatively high water content, typically formed by the hydration of obsidian. It occurs naturally and has the unusual property of greatly expanding when heated sufficiently. It is an industrial mineral and a commercial product useful for its low density after processing. Perlite softens when it reaches temperatures of 850– 900 °C (1,560–1,650 °F). Water trapped in the structure of the material vaporises and escapes, and this causes the expansion of the material to 7–16 times its original volume. The expanded material is a brilliant white, due to the reflectivity of the trapped bubbles. Unexpanded ("raw") perlite has a bulk density around 1100 kg/m^3 (1.1 g/cm^3), while typical expanded perlite has a bulk density of about 30–150 kg/m^3 (0.03–0.150 g/cm^3)Small quantities of perlite are also used in foundries, cryogenic insulation, and in ceramics as a clay additive. It is also used by the explosives industry. Due to thermal and mechanical stability, non-toxicity, and high resistance against microbial attacks and organic solvents, perlite is widely used in biotechnological applications. Perlite was found to be an excellent support for immobilization of biocatalysts such as enzymes for bioremediation and sensing applications. The investigation are to be carried out using serveral tests which include compressive test, split tensile test.

2. MATERIAL USED

2.1 Cement

The cement used in this study was OPC 53 grade from Ramco Cement Company which is widely used in the construction industries. The chemical properties of cement are shown in Table. Which is given by the supplier. The physical properties of cement was determined by testing the cement as per IS 12269:1987 (reaffirmed 2004).

2.2 Perlite powder

Perlite is an amorphous volcanic glass that has a relatively high water content, typically formed by the hydration of obsidian. It occurs naturally and has the unusual property of greatly expanding when heated sufficiently. It is an industrial mineral and a commercial product useful for its low density after processing .Perlite softens when it reaches temperatures of 850–900 °C (1,560–1,650 °F). Water trapped in the structure of the material vaporises and escapes, and this causes the expansion of the material to 7–16 times its original volume. The expanded material is a brilliant white, due to the reflectivity of the trapped bubbles.

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