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UTILIZING WASTE MATERIALS IN CONCRETE PRODUCTION AS A STEP TOWARD SUSTAINABLE CONSTRUCTION WHILE REDUCING THE DEPENDENCY ON NATURAL AGGREGATES”

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ABSTRACT

The environmental consequences of quarrying these aggregates are also becoming more evident, including habitat destruction, energy consumption and the release of carbon emission. Therefore, by incorporating industrial waste into concrete, we not only help conserve natural resources but also repurpose materials that would otherwise contribute to environmental degradation. Materials such as brick ballast 20 mm, glass fibre, rubber tire waste, slag, and silica fume are emerging as promising alternatives. These materials, when mixed in the right proportions, can enhance the strength and durability of concrete while promoting a circular economy. This experimental study investigates the potential of these substitutes to replace conventional aggregates and improve the overall sustainability of concrete in construction.

KEYWORDS: - Coarse aggregate, with brick ballast, glass fibre, rubber tyre waste and fine aggregate by slag and silica fume

INTRODUCTION

Although numerous attempts have been made to reuse red mud in various applications, most have not proven to be economically viable. This paper investigates the potential of using Red Using mud in concrete to partially replace Portland cement.

The combination of red filth and hydrated lime in concrete offers several advantages, especially in the context of sustainable construction practices. Here are some of the key benefits

Literature Review

T.N. Durai and S. Kandasamy (2023)- The study report utilised concrete with partial replacement of coarse aggregate by Polystyrene, namely M20 grade. Polystyrene with CA at various percentage of 5%, 10%, 15%, 20%, and 25% were tested in the trials. Traditional concrete was compared to the produced results. Coarse aggregates made from HDPE are utilised. Based on the findings, results indicate that polystyrene with CA enhance the performance of concrete [1].

Akshay Takleet.al (2022), replaced CA with crushed bricks. There are 38 different concrete samples, some of which include crushed jhama bricks and others which do not. Various tests have been performed and concrete was tested at 7 and 28 days after curing, respectively. Results revealed that 25% replacement of CA with crushed bricks give economic conditions. The results demonstrate that compared to conventional concrete, the aggregate used in jhama brick concrete achieved a lower strength [2]

Anjali P and Sajitha Beegom A (2022), replaced cement with steel slag and various tests have been performed to determine its applicability. Also chemical activators was mixed to accelerate the chemical reactions between the various ingredients in concrete. Further, results revealed that 4% of chemical was found suitable and optimum percentage dosage. Additionally, at 4% dosage of chemical, the properties and strength increases [3]

Methodology the test sample by adding three layers of concrete to the mould, each with a thickness that is about equal. Apply 35 tamping strokes with the tamping bar to each layer. It is important to apply tamping evenly over the whole beam mold's cross- section and in every layer. Make sure the supporting and loading rollers' bearing surfaces are clean, and remove any loose sand or additional material from the specimen surfaces wherein the rollers will be attached. To provide support and loading points for the samples, circular rollers made of steel with 38 mm cross-sections are going to be used. The rollers' width should exceed the test sample's width by at least 10 mm. All four rollers must have the ability to rotate in all directions. The inner rollers needed spaces and the outer rollers 3d spaces (the span). To keep everything in its proper place, the outer rollers should be evenly spaced apart from the inner rollers. Immediately upon being removed from water, while the samples are still wet, they

must undergo testing. The specimen to be tested must be placed in the middle of the machine, with its longitudinal axis perpendicular to the rollers.

RESULT

From the results, it observed that with addition of rubber crumbs, broken bricks, glass fiber, lime stone kiln, utilising 10% rubber crumbs, broken bricks, lime stone kiln, and steel slag, the material achieves its maximum compressive strength of 33.42 MPa. Compressive strengths decline with increasing amounts of rubber crumbs, shattered bricks, lime stone kiln, and steel slag.

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