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Experimental Study On Rice Husk Ash & Ceramic Tiles As a Partial Replacement Of Cement &Coarse Aggregate In concrete

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Abstract: The main aim of this research is to study the utilization of waste ceramic tiles as a partial replacement of coarse aggregate(20mm) and 10% fly ash as a replaced of cement in concrete. For all the materials physical properties shall be carried out and mechanical properties such as compressive strength & split tensile strength of concrete were examined and compared with normal concrete. M25 grade of concrete was designed to prepare the conventional mix. The cubes and cylinders are determined the age of 7 & 28 days. Cubes for compressive strength as size 15X15X15 cm and cylinder for split tensile strength as size15X30 cm were casted by adopting weight batching and hand mixing. The mix were designated with various percentage of waste ceramic tiles such as 0%,5%,10%,15%,20%,25%30%to evaluate various properties. The results which come out from the research work are shows that the strength developed in concrete is increased, it can be equated to higher strength concrete and it can be easily used as construction material in construction work.

Keywords: Ceramic Tiles (CT), Fly Ash (FA), Compressive strength, Split tensile strength__

INTRODUCTION

The amount of ceramic tile waste on earth is enough for use as a coarse aggregate in concrete. Ceramic tile is produced from natural materials sintered at high temperatures. There are no harmful chemicals in tile. Waste tiles cause only the hazard of pollution. So due to such reasons waste tiles are stored in factory fields because of their economic value. Nevertheless, every year approximately 250,000 tons of tiles are washed out, while 100 million tiles are used for repairs. Ceramic waste can be transformed into useful Coarse aggregate. It has been calculated that about 30% of the daily production in the ceramic industry left as a waste. This waste is not recycled in any form at present.

MATERIALS

1. **Ordinary Portland Cement (OPC) :** OPC is a special blended cement useful in general construction work and is especially suitable for applications in environmental conditions. 53 grade cement is used and it is used as a binding material.

2. Coarse aggregate :

The size of the aggregate is more than 4.75mm is called as a coarse aggregate. For this project, we are using 20mm size aggregate. It is used as a concrete material to increase the strength.

3. Potable water:

Water is the key ingredient, which is mixed with cement, forms a paste that binds the aggregate together. The water causes the hardening of concrete through a process called hydration.

4.Fine Aggregate:

Fine Aggregate is essential ingredient in concrete that consists of natural sand or crushed stone. The quality and fine aggregate density strongly influence the harden properties of the concrete**.**

5. Ceramic Tiles:

A tile is a manufactured piece of hard-wearing material such as ceramic stone or even glass. Tiles are generally used for covering roofs,floors,walls,or other objects such as tabletops**.**

6. Rice Husk Ash:

Rice husk ash was burnt for approximately 72hours in air in an uncontrolled burning process.The temperature was in the range of 400 to 600 degree C. The ash collected was sieved through BS standard sieve size 75 micron and its color was grey.

TESTS ON MATERIALS USED:

1.Impact test on concrete:

Aggregate Impact Value test determines the aggregate Impact Value (AIV) of aggregates which provides a relative measure of the resistance of an aggregate to sudden shock or impact. Resistance of the aggregates to impact is termed as toughness. Impact Value should not be less than 45% for aggregates used for concrete other than wearing surface and 30% for concrete used in wearing surface.

2.Crushing test on aggregates:

The aggregate crushing value provides a relative measure of resistance to crushing under a gradually applied compressive load. To achieve a high quality of pavement, aggregate possessing low aggregate crushing value should be preferred. The aggregate crushing value for cement concrete pavement shall not exceed 30%. The aggregate crushing value for wearing surfaces shall not exceed 45%.

3.Fineness test on cement:

The fineness of cement has an important bearing on the rate of hydration and hence on the rate of gain of strength and also on the rate of evolution of heat. Finer cement offers a greater surface area for hydration and hence faster the development of strength. According to the IS recommendations, the standard value of fineness of cement should have a fineness that is less than 10%, or the fineness of cement should not be higher than 10%.

4.Specific Gravity:

Specific gravity separates bad particles which are lighter than other particles, from good aggregates. Using specific gravity in cement mix design, we calculate the solid volume of aggregates in concrete mix. Gavel, water and cement are used for this test. The specific gravity of coarse aggregate of 10mm is 2.7.

CUBE DESIGN :

ADVANTAGES

a. Reduce cost of concrete.

b. About 30% production which go waste is reduced.

c. RHA makes a role to increase resistance to chemical.

d. Improves compressive strength , flexural and split tensile strength..

CONCLUSION

After completion of total project work, from the above investigations and from the test results some variations observed in compressive strength of different concrete mixes having different percentages of replacing ceramic tiles in place of coarse aggregate as mentioned below.1The concrete is cast by partially replacing coarse aggregate with ceramic tiles in various proportions such as 10%, 20%,30%, 40% and 50%.2)The compressive strength and split tensile strength reveals high strength of replacement of ceramic tiles as a coarseaggregate.3)At the age of 28 days curing, the compressive strength of 10% replacement is 3.81% higher; at 20% replacement is 6.62%higher than the conventional concrete.4)At the age of 28 days curing, the split tensile strength of replacement is 9.39%higher than the conventional concrete.5)Thus ceramic tiles can be utilized manufacture of concrete at in the replacement of 20%

REFERENCES :

1. **Properties of concrete by A.M.Neville Longman , Pubilishers**
2. **Concrete technology by R.S.Varshney , Oxford , and IBH**
3. **Concrete technology by A.M. Neville , J.J.Brooks , pearson**
4. **Better ceramic through chemistry by CJ Brinker**