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Strength Comparison of Ordinary Portland Cement And Rice Husk Ash

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ABSTRACT

Rise husk ash is one of the promising pozzolanic materials that can be blended with Portland cement for the production of durable concrete. Addition of rise husk ash to Portland cement not only improve the strength of concrete but also forms the calcium silicate hydrate gel around the cement particles which is highly dense and less porous. This may be increase the strength of concrete against cracking. Thus in the present investigation a realistic approach has been made using different techniques such as compressive strength, bond strength, split tensile strength etc. using different percentage of RHA and varying curing period

KEYWORD: Pozzolanic material, RHA (Rice Husk Ash).

I. INTRODUCTION

For civil engineering construction different type of Portland cement, slag cement, Portland pozolana etc is used. The basic material for above cement is produced using lime stone and clay in raw mix and second material is used as pozzolonic material. A "pozzolan" is defined as "a siliceous or siliceous and aluminous material, which in itself possesses little or no cementing property, but will in a finely divided form - and in the presence of moisture - chemically react with calcium hydroxide at ordinary temperatures to form compounds possessing cementitious properties." [1]

Supplementary cementitious materials are added to concrete as part of the total cementitious system. They may be used in addition to or as a partial replacement of Portland cement or blended cement in concrete, depending on the properties of the materials and the desired effect on concrete.
be available annually on a global basis for pozzolana production.

The use of waste material like RHA due to an assumption is that material can be replaced the existing material in order to reduce cost and improve mechanical properties of the composite structure.

There is an increasing importance to preserve the environment in the present era. RHA from the parboiling plants is posing a serious environmental thread to dispose them is a another issue. This material is actually a super pozzolan since it is rich in silica and has about 85% to 95% silica content. A good way of utilizing this material is to use it for making "high performance concrete".

II. RICE HUSK ASH

Rice milling generates a by product know as husk. This surrounds the paddy grain. During milling of paddy about 78 % of weight is received as rice, broken rice and bran .Rest 22 % of the weight of paddy is received as husk. This husk is used as fuel in the rice mills to generate steam for the parboiling process. This husk contains about 75 % organic volatile matter and the balance 25 % of the weight of this husk is converted into ash during the firing process, is known as rice husk ash (RHA). This RHA in turn contains around 85 % - 90 % amorphous silica. So for every 1000 kg of paddy milled , about 220 kg (22 %) of husk is produced , and when this husk is burnt in the boilers , about 55 kg (25 %) of RHA is generated.[3]

The physical effect followed by chemical effect involving the pozolanic reaction (in which the calcium hydroxide formed during hydration of cement in concrete react with silica present in the admixture to form calcium hydroxide silicate), fill up the empty spaces and cause densification (pore refinement) and strengthening of the microstructure, partially in high porous and least cracking- resistance interfacial zone which exist in vicinity of coarse aggregate particles.

Chemical analysis if Rice Husk Ash

Constitution	%Composition
Fe_2O_3	0.95
SiO_2	67.30
CaO	1.36
$Al2O_3$	4.90
MgO	1.81
L.O.I (Loss of Ignition)	17.78

Table1.Chemical Analysis of RHA

III. LABORATORY WORK DONE

3.1 MATERIAL USED

1. Standard sand
2. Cement

3. Rice husk Ash
4. Water.

3.2 Equipment used

1. Consistency apparatus
2. Measuring jar
3. Trowel
4. Cube Mould (7cm*7cm*7cm)
5. Vibrating Machine
6. Mixing tray
7. Weight balance

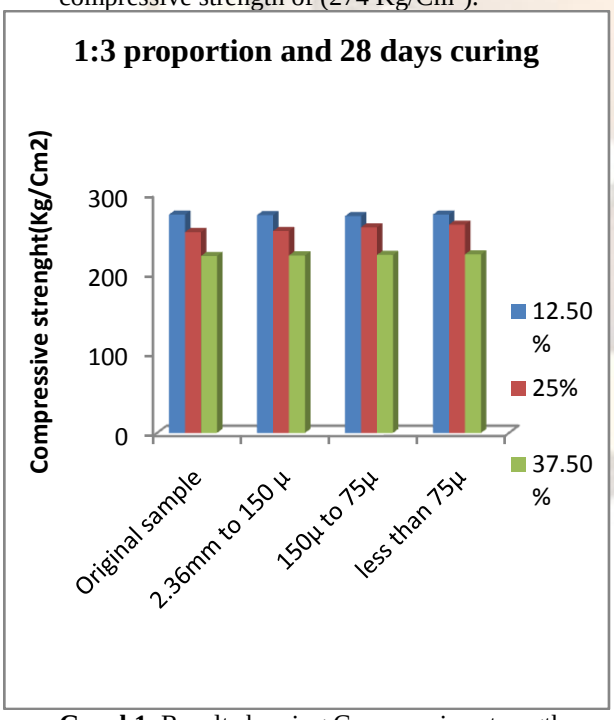
3.3 PROPORTION USED

Various testing is carried out by changing sieve size, proportion, curing period and percentage of RHA as given bellow

1. % of RHA used in one part of cement is (12.5%, 25%, and 37.5%)
2. Proportion of (cement : sand) (1:3, 1:4, 1:5)
3. One original sample is taken and then Sieve through (2.36mm to 150micron), (150microm to 75 micron), (less than 75micron).
4. Curing period (7 days and 28 days)

IV. RESULTS

Number of readings were taken with number of variation out of which following results with 1:3 (cement: sand) with 12.5% replacement of cement with RHA for 28 days of curing were proved as a most economical and having good compressive strength of (274 Kg/Cm^2).



Graph1. Result showing Compressive strength.

V. CONCLUSION

1. For all proportion i.e. 1:3,1:4,1:5 strength of RHA is nearly equal to half of the strength of the plane cement for 7dyas
2. For all proportion strength RHA is nearly equal for 28dyas
3. For all proportion strength of RHA 12.5 is 80% to 90%, for 25% is 70% to 80%, for 37.5% is 50% to 60% of plane cement.
4. RHA be the cost effective partial substitute for Portland cement.

VI. FUTURE SCOPE

Their should be work done on the microscopic structure of Rice Husk Ash so that chemical and physical properties can be known. Again work can be done on the workability of material. As the cost of the cement is increasing day by day so by using pozzolanic material like rice husk ash comparison of construction cost can be done.

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