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TO STUDY THE CHARACTERISTIC OF DRY LEAN CONCRETE WITH PARTIAL REPLACEMENT OF CEMENT IN DRY WITH LIME AND RICE HUSK ASH

Sanjay Singh[1], Dr. Rajeev Chandak[2]
[1]M.E.scholar (Structural Engineering), [2]Head of the Department
Department of civil engineering, Jabalpur engineering college, Jabalpur, Madhya Pradesh, India.

ABSTRACT: Leaving the waste materials in to the environment directly can causes environmental problem. Hence the reuses of waste material has been emphasized. Waste can be used to produce new products or can be used as admixture so that natural resources are used more efficiently and the environment is protected from waste deposits. The rice mill industry generates rice husk waste from paddy (rice). The waste products generated during the process of milling paddy. It generated 40% wastes from paddy in the form of Rice Husk. It produced after burning of rice husk has high reactivity and pozzollanic property. Indian standard code of practice for plain and reinforced concrete IS: 456-2000 recommends use of RHA in concrete. So uses of RHA with cement improves workability and stability reduces heat evolution thermal cracking and plastics shrinkage. These increases strength development impermeability and during by strengthening transistion zone modifying the pore structure blocking the large voids in the hydrated cement paste through pozzollanic reaction. RHA minimizes alkali aggregates reaction reduces expansion refines, pore structure and binders diffusion of alkali ions to the surface of aggregates by micro structures.
Keywords: ***Lime, Rice Husk Ash, Portland pozzollana cement (PPC), water, sand, aggregate etc.***

I. INTRODUCTION

In this project our objective is to study the characteristic of partial replacement of cement in dry lean concrete with lime and RHA and to compare it with the compressive strength of ordinary 1:12 PPC ratio of concrete we also trying to find the optimum percentage % of RHA replaced in dry lean concrete that makes the strength of the dry lean concrete for road sub base is maximum.Now a day RHA has become a pollutant so, by partially replacing cement with RHA. We are proposing a method that can be of great use in reducing pollution to a great extent.Rice husk is an agricultural residue which accounts for 20% of the 649.7 million tons of rice produced annually worldwide. The rice husk produced from the milling plants used as a fuel also contributes to pollution and efforts are being made to overcome this environmental issue by utilizing this material as a supplementary cementing material. The chemical composition of rice husk is found to vary from one sample to another due to the differences in the type of paddy, crop year, climate and geographical conditions.RHA has not been utilized in the construction industry yet, the reason for that may be due to the lack of understanding of the RHA blended concrete characteristics. Cement and aggregate, which are the most important constituents used in concrete production, are the vital materials needed for the construction industry. This necessity led to a continuous and increasing demand for natural materials. Parallel to the need for the utilization of the natural resources emerges a growing concern for protecting the environment and need to preserve natural resources, by using alternative materials that are either recycled or discarded as a waste.One of the possibilities is to use Rice husk ash in concrete production. Studies have been carried out to investigate the possibility of utilizing for broad range of material as a partial replacement material for cement & aggregate in the production of concrete.

II. MATERIALS

The materials used in the preparation of concrete are cement, sand, coarse aggregates, rice husk ash, lime, and water.

- CEMENT: Portland Pozzollana Cement (PPC), IS: 1489 (Part-1) which is available in the market has been used.
- SAND: The natural river sand available in the local market which passes through 4.75mm sieve and having specific gravity of 2.65 (Conforming to Zone II) has been used.
- COARSE AGGREGATE: Crushed granite conforming to IS 383:1987and having specific gravity 2.80has been used.
- WATER: Water is an important ingredient of concrete as it actively participated in the chemical reaction with cement, clean portable water which is available in college campus has been used.
- RICE HUSK ASH: RHA is a carbon neutral green product. Lots of ways are being thought of for disposing them by making commercial use of this RHA. RHA is a good super-pozzollan. This super-pozzollan can be used in a big way to make special concrete mixes. There is a growing demand for fine amorphous silica in the production of special cement and concrete mixes, high performance concrete, high strength, low permeability concrete, for use in bridges, marine environments, nuclear power plants etc. This market is currently filled by silica fume or micro silica, being imported from Norway, China and also from Burma. Due to limited supply of silica fumes in India and the demand being high the price of silica fume has risen to as much as US$ 500 / ton in India .

FIGURE : 1 RICE HUSK ASH

METHODOLOGY:

- Collection of Rice Husk Ash
- Physical tests conducted on Rice Husk Ash and Lime.
- Preparation of standard mix of 1:12 ratio.
- Replace cement with Rice Husk Ash as 0%, 5%, 10%, 15%, 20%, and25%& 30.
- Making a number of samples of concrete cubes.
- Testing of cubes to 7days.

COMPRESSIVE TEST:

The Compressive strength test is the most common test conducted on hardened concrete, because it is easy to perform, and also most of the desirable characteristic properties of concrete are related to its Compressive strength. The Compressive strength of concrete is one of the most important and useful properties of concrete. In most structural applications concrete is employed primarily to resist Compressive stresses. In those cases where strength intension or in shear is of primary importance, the compressive strength is frequently used as a measure of these properties. Compressive strength test is carried on specimens of cubical in shape. The cube specimen is of the size150mmX150mmX150mm.The cube moulds are coated with oil on their inner surfaces and placed on Plate. Concrete is poured into the mould in three layers, each layer is tempered properly so as not to have any voids. The top surface is finished using a trowel. After 24hours concrete cubes are de-moulded and the specimens are kept for curing under water. These specimens are tested by compression testing machine after7 days curing.

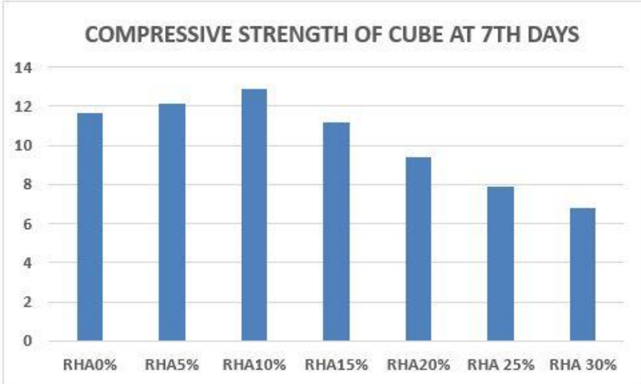
III. RESULTS AND DISCUSSION

TABLE 5.1 : Graph of Compressive Strength at 7 days Vs % 0f RHA

S. NO.	Designation of mix	Compressive Strength in Tons					Average compressive strength in Tons	Average compressive strength in N/mm2
		Cube 1	Cube 2	Cube 3	Cube 4	Cube 5		
1	RHA0%	25	26	25	27	26	25.8	**11.68**
2	RHA5%	26	28	25	27	28	26.8	**12.14**
3	RHA10%	28	30	29	27	28	28.4	**12.87**
4	RHA15%	24	24	25	25	24	24.6	**11.14**
5	RHA20%	21	20	22	20	21	20.8	**9.42**
6	RHA 25%	19	17	16	18	17	17.4	**7.88**
7	RHA 30%	15	15	16	15	14	15.0	**6.79**

Compression test carried out on sample cubes by using compression testing machine. The specimens were loaded at a constant strain rate until failure. The compressive strength first increases with increase in the percentage of Rice Husk Ash content upto 10% but start decreasing on further addition of ash content. The results of compressive strength cubes for7 days curing is given in Table-2, and its corresponding graph is shown in Figure-2.

Table 5.2



The compressive strength development at various ages is given in Table 6. The results showed that at early ages the strength was comparable, while at the age of 28 days, finer RHA concrete exhibited higher strength than the concrete with coarser RHA. For example, at replacement level of 10%, the percentage of increment for RHA concretes compared to the control OPC mix were 22.2, 26.7 and 30.8% for 10F1, 10F2 and 10F3, respectively. This is due to the fact that the higher fineness of RHA allowed it to increase the reaction with $Ca(OH)_2$ to produce more calcium silicate hydrate (C-S-H) resulting in higher compressive strength, in addition to that, the fine RHA particles contributed to the strength development by acting as a micro-filler and enhancing the cement paste pore structure. Similar results were found by Ismail and Walliuddin, that studied the effect of RHA on high strength concrete and found that RHA fineness can enhance the strength. Figure 9 represents the effect of RHA particle size on strength.

IV. CONCLUSION

It is observed that the behaviour of compressive strength of cubes decreases as the percentage of rice husk ash replacing cement increases, this nature continues further.

However, the compressive strength test result shows improvement when ash replaces less or equal to 10% of cement in comparison to the control cube (0% cement replacement), but strength falls when ash replaces more than 10% of cement. The cubes are tested at the 7^{th} and day after they were moulded. Thus,replacement cement up to 30% is suitable for construction sub base of rigid pavement.

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