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EXPERIMENTAL STUDY OF CONCRETE MADE WITH HYPO SLUDGE AND WOOD ASH: A REVIEW

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ABSTRACT

Rapid development of construction industry increased demand of consumption of cement. But productions of cement increase the greenhouse gases and carbon dioxide. Hence there is need to search for alternative materials in construction. Wood ash and Hypo Sludge (paper waste) is obtained as waste by goods from paper industry and wood industry. This paper industry required large percentage of land space in nearby vicinity every year. Some of wastes are land spread on reap as a disposal technique and some companies blaze their industrial waste in incinerators raising concern about major air pollution problems. Wood ash is obtained from combustion in wood fired, paper mill and other wood blazing facilities. This paper introduces the effect of using wood ash and hypo sludge as partial cement replacement in concrete. The wood ash 5 % take as constant and further adding of hypo sludge from 0% to 20% as cement replacement with concrete. To find out the outcome of these materials on concrete in M25 design mix. To compare compressive strength of concrete at age of 7days, 14 days, 28 days and compare cost with conventional concrete.

Keywords: Cement replacement, Compressive strength, Concrete, Compare Cost analysis with Conventional concrete. Hypo sludge, Wood ash.

I. INTRODUCTION

Liveliness plays a vital role in developing countries like India. Industrial waste management is a one of the most challenging issues related to the environment. Due to the generation of huge quantity of solid waste we are facing serious air pollution problems. While producing paper many type of wastes are comes out from many process and from these waste preliminary waste is name as hypo sludge. This paper waste contain minimum amount of calcium and silica content. Due to its low calcium is taken out for our project. And during cement production green house gases are emitted in to the environment hence there is a need to find out alternative materials in the construction. By utilizing these waste strength will be increased and reduce the cost of construction. Wood ash is obtained from combustion of wood. And this is prepared from unrestrained blazing of timber. During the last decades it has been recognized with wood ash waste from large volume. Eco friendly and economical solution will be archived by using this waste. Paper waste and wood waste required a large amount of local land space each and every year for disposal technique. Some of wastes are land spread on reap as a disposal technique and some companies blaze their industrial waste in incinerators raising concern about major

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air pollution problems. Paper industry is a major issue related to the environment and pollution. The re-use of waste is really crucial as it not only decrease the pollution and prevent green house effect but also helps in saving energy in production process by recycling. During the cement production green house gases and CO2 is emitted in the atmosphere which is harmful to environment. Concrete is mix with Cement, water, coarse, fine aggregates and admixtures. Paper making generally produces a large amount of solid waste. Paper fibers can be recycled only a limited number of times before they become too short or weak to make high quality paper. It means that the broken, low- quality paper fibers are separated out to become waste sludge. The chemical composition of paper will depends on the type or grade of paper. Typically most grades of paper consist of organic and inorganic material. Organic portion consisting of cellulose, hemi-cellulose, lignin. Hypo-sludge which is available in abundance in the vicinity of every paper mill is not a waste but a useful material which can be used in concrete manufacturing.

1.1 Paper Waste And Wood Ash

Paper waste is behaves like a cement due to low silica content. It consist of minimum silica and calcium and maximum calcium chloride content. Paper sludge is depends upon manufacturing process and characteristics of paper sludge is also depends upon source. Wood ash is the Wood ash is generated as a by-product of combustion in wood fired power plants, paper mills, and wood burning factories. Since wood is a potential source of energy and environmentally being friendly material, there will be increased usage of wood in energy production in future. During the last decades it has been recognized with growing wood ash waste of large volume and that is increasing year in the household, mills and factories.

The objective of the study is:

1. to provide most economical concrete
2. to minimize the maximum degradation in environment due to cement and safeguard the ozone layer from greenhouse gases
3. to evaluate cost comparison with the conventional concrete.
4. To minimize the disposal techniques as well as disposal problems.
5. To minimize and utilization of waste production.
6. To minimize maximum demand for cement production.
7. To investigate the utilization of Hypo Sludge and Wood Ash as Supplementary Cementations Materials and increase the Strength of concretes made with different Cement replacement levels.

“fig” 1 Hypo Sludge **“fig” 2 wood ash**

General properties of hypo sludge and wood ash:

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Properties of sludge are moisture content (56-72%), mgo (3.3-6.5 %), calcium oxide (29.5- 46.2%), silica (9-15%), loss of ignescent (27-59%). And general properties of wood ash is SiO_2, Al_2O_3, Fe_2O_3, calcium oxide, MgO, NaO, L.O.I

II. LITERATURE REVIEW

Jayeshkumar Pitroda, L B Zala & F S Umrigar A Techno-Economic Study On Paper Industry Waste- Hypo Sludge Concrete In Rigid Pavement Vol. 3, Issue 5, Dec 2013, 133-144 [1] This research work describes the feasibility of using the paper industry waste in concrete production as partial replacement of cement. The cement has been replaced by hypo sludge accordingly in the range of 0%, 10%, 20%, 30% and 40% by weight of cement for the M-40 mix. Concrete mixtures were produced, tested and compared in terms of flexural strength with the conventional concrete. These tests were carried out to evaluate the mechanical properties for the test results for flexural strength up to 90 days are taken.

A Balwaik; S P Raut, ISSN: 2248-9622 [2] The use of paper-mill pulp in concrete formulations was investigated as an alternative to landfill disposal. landfill disposal. The cement has been replaced by paper sludge accordingly in the range of 5% to 20% by weight for M-20 and M-30 mix. By using adequate amount of the waste paper pulp and water, concrete mixtures were produced and compared in terms of slump and strength with the conventional concrete.

Shah and Pitroda (2013) analysed [3] the performance of cement mortar by replacing the cement with hypo sludge. The evaluation of Hypo Sludge for use as a supplementary cementations material as a pozzalona, begins with the mortar testing. Mortar is similar to concrete in that it contains cement, water and aggregate, except that in mortar graded fine aggregate is the only aggregate present. With the control mortar, i.e.10 %, 30% and 50% of the ordinary Portland cement (OPC) confirming IS 269IV is replaced with Hypo Sludge, The data from the Hypo Sludge mortar is compared with data from a "control" mortar without Hypo Sludge. Three cube samples were cast in the mould of size 70.7 x 70.7 x 70.7 mm for each 1:3 cement mortars with partial replacement of cement with Hypo Sludge with W/C ratio as 0.43 were also cast. After about 48 h the specimens were de-moulded and water curing was continued till the respective specimens were tested after 7 & 28 days for compressive strength.

Pitroda, Zala and Umrigar (2013) [4] checked the durability of concrete by replacing cement with hypo sludge. The pores in concrete as a result of incomplete compaction are voids of larger size which give a honeycomb structure leading to concrete of low strength. There is a need for another type of test rather than the absorption test and permeability tests to measure the response of concrete to pressure. This test should measure the rate of absorption of water by capillary suction, “sorptivity” of unsaturated concrete. In this paper, an attempt is made to study the properties of Paper Industry Waste (Hypo Sludge) concrete to check durability. The mix design was carried out M40 grade concrete as per IS: 10262-2009.

Balamurugan and Karthickraja (2014) [5] replaced the cement content with 0%, 5%, 10%, 15% and 20% hypo sludge and found the compressive strength after 28 days. He concluded that Casting of conventional cement concrete cubes has been done and casting of concrete cube added with industrial waste has also been done. Comparison of results has been done Testing of concrete cubes with various methods like compression and

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slump test has been done for both cubes. Up to 10% of hypo sludge concrete, the compression strength has been increased, so up to 10% cement has been replaced by hypo sludge. By replacement of hypo sludge the cost of construction should be minimized. By effective utilization of waste product into concrete also reduce the environmental effects. If silica is added the strength will be considerably increased because hypo sludge has less quantity of silica as compared to cement. This type of concrete will be used for road works effectively with less consumption of cement.

Pitroda and Umrigar (2013) [6] Evaluated the Modulus of Elasticity of Concrete with Partial Replacement of Cement by Paper Industry Waste (Hypo Sludge). The cement has been replaced by hypo sludge in the range of 0%, 10%, 20%, 30% and 40% by volume for M-40 mix. Concrete mixtures were produced, tested and compared in terms of modulus of elasticity with the conventional concrete. The test was carried out to evaluate the modulus of elasticity after 56 days. This study included different concrete mixtures which were produced to determine the influence of hypo sludge derived from J.K.Papers mill Pvt.Ltd, plant near Songadh, Tappi District to the Modulus of Elasticity.

Siddharth Talsania, Jayeshkumar [7] Pitroda, Prof. Chetna M. Vyas A Review Of Pervious Concrete By Using Various Industrial Waste Materials. (Volume II 2015)He concluded that by using waste material by partially replacement of cement in pervious concrete, overall cost of making of concrete can reduce. It can reduce the disposal problems of waste materials and also consume the cement used for making of pervious concrete. When cement is replaced by various industrial waste compressive strength, flexural strength and split tensile strength and permeability of pervious concrete for various mixes is depends upon the type of waste materials used for making of pervious concrete.

III. CONCLUSION

From above literature review it can be concluded that hypo sludge and wood ash has potential utilization as a replacement of cement in concrete. the various factors affecting the process are waste utilization, waste minimization, reduce construction cost, reduce cement production, reduce carbon dioxide and green house gases from cement production. And reduce waste disposal problems.

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