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RESEARCH ON THE EFFECTS OF HYPO SLUDGE AS A PARTIAL REPLACEMENT OF CEMENT MORTAR

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Abstract - Paper production often produces a large amount of solid waste. Paper mortar `eats up a large portion of the landfill year after year. In order to reduce the problems of dumping and pollution from this industrial waste, it is very important to build materials that are profitable from them. In view of this, research is being done to produce a less expensive Mortar by combining different cement concentrations with Hypo sludge.

The rapid increase in construction activities leads to a severe shortage of common building materials such as cement, fine aggregate and solid aggregate. Many synthetic pozzolons are obtained by research such as fly ash, blast furnace slag, silica fume, rice husk ash, etc. Apart from this recent research has shown that waste from paper mills has a pozzolanic material called hypo sludge. . Hypo sludge contains low calcium and a small amount of silica and behaves like cement.

This study was designed to investigate the feasibility of using hypo sludge as a cement mortar and to assess the mechanical properties of the concrete and bond strength using hypo sludge in cement mortar and to find other ways to improve strength and reduce cube costs using paper. Industrial waste hypo sludge.Test experiments were performed using the use of hypo sludge as cement in flexible mud ranging from 0-50% in two different proportions 1: 3 and 1: 6 in terms of strength. Tests were performed with hypo-mud mud on the outside and on the outside and were shown showing positive strength.

Key Words: Hypo sludge, mortar, pozzolonas, cement, cement mortar

1.1 INTRODUCTION

In building construction various stone units such as brick and stone are fastened together with the help of a central container for binding materials such as cement or lime. This cement is often called amorori and is made by mixing together a specified amount of cement, sand and water. In these mixes cement materials are called matrix. It binds sand grains and the height of the brick stone in such a way that the adjacent layer creates a continuous structure that provides a strong response to stress from above and outside.

The safety, durability and durability of the walla resulting from any other structure depends on the quality of the mortarat used as a binding material. conditions, trucks, cars, pedestrian traffic, etc. The production of 1 ton of unconventional Portlandaacement will release an equal amount of acarbon-di-oxide into the atmosphere. This release of carbon-di oxideaemissions into actaas is a quiet killer in the environment as a variety. In this background there is a need for cheap search instead of the usual Portland cement. due to the need to conserve energy and environmental concerns, various research projects have been launched on the use of hazardous materials. Energy plays a vital role in the development of countries like India. By not using this industrial waste (hypo sludge) as a substitute for the amount of carbon-di-oxide emitted into the atmosphere can be reduced and energy and the environment can be conserved.

In this hypo sludge study it is also called alime sludge used as a substitute. Itas is a chemical-derived process found in paper production. Leahypo sludgeai is widely available in all paper industries, but its use is extremely limited. It is a relatively new material that includes cementitiousamadium. Originally introduced as a synthetic pozzolanica. In the papera industry, and paper waste products come from a variety of sources. In the middle of this rubble is the precursor waste due to the low calciumai taken in this project to replace the concrete floor.

1.2 Status of paper industry waste (hypo sludge) in India:

These days there is a growing emphasis on environmental cleanliness and maintaining the eco-systema balance of the biosphere. It is generally believed that ziroarisk environmental protection and economic growth are incompatible, but at the same time it is also true that sustainable growth in environmental quality is not an unattainable goal. The problem is multifaceted and

multifaceted and requires the collective effort of the sector, Government. policy makers, environmental managers and development agencies oversee the production, disposal and use of features.

The paper and pulp industry in India produces about 0.8 million lime sludge which is the only informal sector. The beginning of the modern paper industry in India from 1832 when the first paper mill was invented, however, the actual production took off towards the end of the century. Currently the average paper production in India is about 4.6 MTaout in its 380 paperamill scattered across the country. Of the 380 plants 32 plants are in the large scale industry and in the theater are medium to small scale. Production capacity in large parts of more than 100atpd frames for paper production and the medium and small scale sector is less than 100 tpd.

2. Objectives of the study

- Study the feasibility of using hypo-cement instead of cement instead of cement, in order to reduce the risk of waste disposal, pollution.
- Determining the characteristics of hypoasludge such as cement.
- Determining the features of masonryamortar using hypo sludgeaas cement.
- Performing test-based compression tests and the strength of solid cement waste with HypoaSludge.
- Testing the total volume of mud with Hypo mud.

3. Materials and methodology

Materials used in the present study are as follows,

1.Cement-OPC 53 grade.
2. Fine aggregate- River sand
3.Hypo sludge-collected from Bhadravathi.
4.Water.

Table-3.1 Properties of cement

Sl no.	Characteristics	Obtained results	Requirement as per IS:8112:1989
1	Fineness of cement	6%	Max 10.00%
2	Setting time • Initial setting • Final setting	90mins 480mins	Min 30.00 Max 600.00
	Standard consistency	29%	Max.35%
4	Specific gravity	-	Max.3.15
5	Compressive strength of cement	54 N/mm^2	53 N/mm^2

Table- 3.2 Properties of fine aggregate

Physical properties	Results	Requirement As per IS-383-1970
Specific gravity	2.62	2-2.7
Bulk density	1735.07	-
Bulking of sand	18%	>10%

Table-3.3 properties of Hypo sludge

Characteristics	Value	Requirement as per IS:1727-1967
Fineness (retained on 90 Micron IS sieve)	6	Max 10.00%
Setting time • **Initial setting** • **Final setting**	90 480	Min 30.00 Max 600.00
Standard consistency	36	Max.35%
Specific gravity	2.4	Max.3.15
Compressive strength of cement	38 N/mm^2	53 N/mm^2

4. RESULTS AND DISCUSSIONS

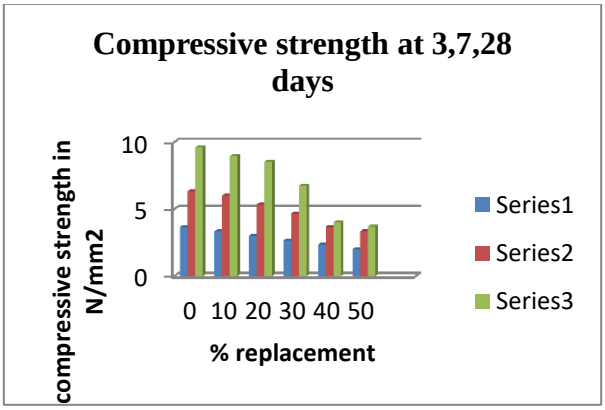

Chart no.4.1: comparision of compressive strength of 1:6 mortar mix at 3,7,28 days

The compressive strength of the mud with various percentages of hypoasludge at 3.7 and 28 years of adding 1: 6 amortar mixture as shown in the graph. This clearly shows, as the percentage of change increases with the compressive force of the amortar decreases.

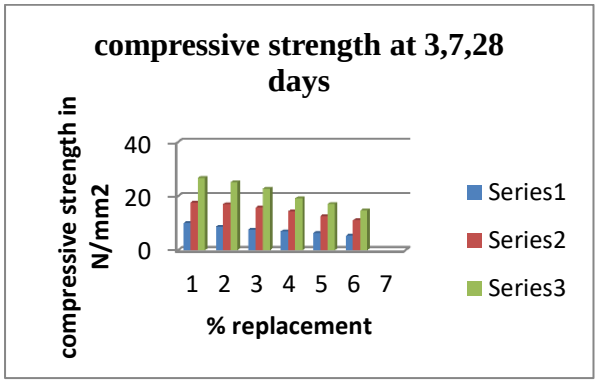

Chart no.4.2: Comparision of compressive strength of 1:3 mortar mix at 3,7,28 days

The compressive strength of mud containing various percentages of hypo sludgeaat 3,7 and 28 days of the year 1: 3 mortaramix is similar to the graph shown. It clearly shows that, as the conversion rate increases with the compressive force of the mud decreases.

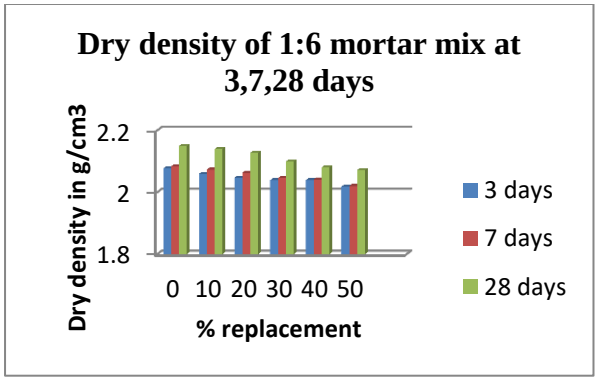

Chart no.4.3 Comparision of dry density of 1:3 mortar mix at 3,7,28 days

Concentration of mud with various percentages of hypo sludge at 3 and 7 days of 1: 6 mortar mixture as shown in the graph. It clearly shows that, as the percentage of conversion increases the concentration of mud decreases.

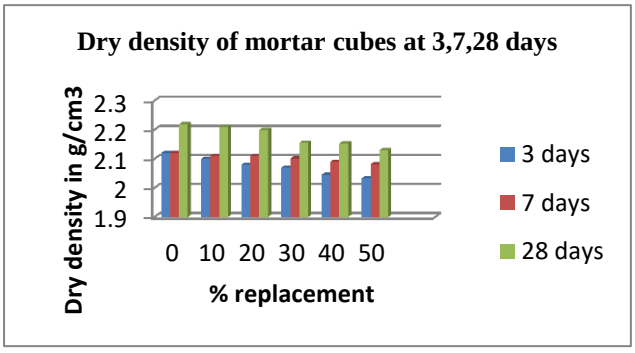

Chart no.4.4 Comparision of dry density of 1:3 mortar mix at 3,7,28 days

The density of mortar with various percentage of hypo sludge at 3,7 and 28 days curing age for 1:3 mortar mix is as shown in graph.It clearly indicates that ,as the percentage of replacement increases density of mortar decreases.

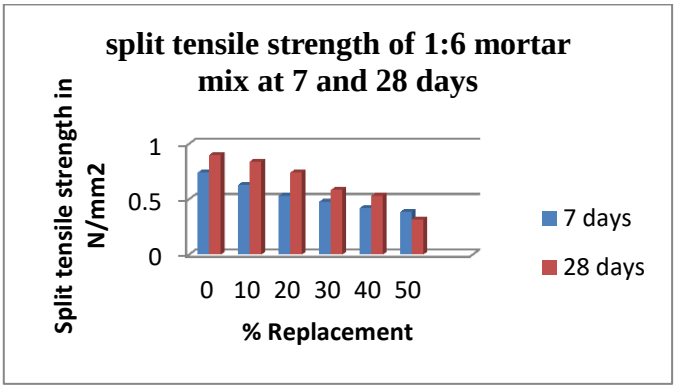

Chart no.4.5 Comparision ofsplit tensile strength of 1:6 mortar mix at 7,28 days

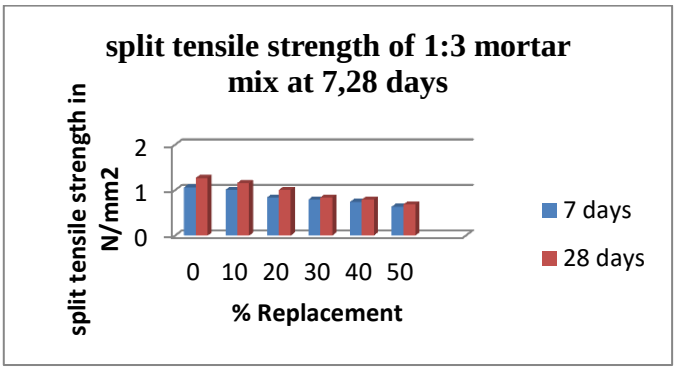

Chart no.4.6 Comparision ofsplit tensile strength of 1:3 mortar mix at 7,28 days

5. CONCLUSIONS.

- The gradual reduction in compressive strength compared to conventional mix can be observed in both 1:3 and 1:6 mortar mix at curing age 28 days. In 1:3 mortar mix , the percentage reduction in strength is in the order of 6.2%,14.84%,28.12%,36.12%,45.25% and for 1:6 mix it is 6.86%,11.13%,29.86%,58.25%,61.49% for 10,20,30,40,50% replacement when compared to nominal mix.Here the reduction in compressive strength with 10% and 20% is not significantly different. But above 30% replacement the strength is less. This reduction in compressive strength probably comes from the worse connection of the interface between cementitious material and aggregates.

- A reduction in split tensile strength can also be observed compared to conventional mix at curing age of 28 days. Here also upto 20% replacement it doesn't affect the strength but later decrease in strength can be noticed.

- Tests conducted on masonry prism such as compressive strength and flexural bond strength test (modified bond wrench test) indicates that upto 30% replacement there is no significant difference in strength of masonry prism.

- The overall study of this thesis gives the conclusion that the use of made of with various percentages of Hypo sludge offers promise for applications as medium or light weight mortar. About 0-20% of Hypo sludge can be effectively replaced to cement.

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