

Study of Concrete Properties using Bone Powder by Partial Replacement of Cement

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Abstract- Study of concrete, structural properties of formed accreted concrete with and In this without pulverized bone were investigated. The flexural behaviour of foam concrete containing pulverized bone as partial replacement of cement. A total no. of forty two cubes were used to investigate the flexural behaviour of the specimen. The pulverized bone content was varied from 0 to 15% at interval of 2.5%, 5%, 7.5%, 10%, 12.5% and 15% in used to bone powder at replacement of cement. The result of control specimens at 28 days curing age in the cube. It can be concluded that formed aerated concrete used for this study has potential for structural applications. Also pulverized bone can be used to reduce the quantity of cement used in aerated concrete production thus, ridding our environment of potentially harmful wastes as well as reduce the consumption of non enable resources. To a mix of cement and bone powder to a concrete. The bone powder are used 2.5%,5%,7.5,10%,12.5%,15% by partial replacement of cement in a cubes test than the strength increases and reached maximum compressive strength at 7.5% and then start to decreases 10%,12.5%,15%.

Keywords- Concrete, Cement pulverized bone workability, replacement and compressive strength.

I. INTRODUCTION

The concrete of the most important components in a building and production is cement. But cement manufacturing is at a great environment cost. The fact that components of concrete, cement, sand, gravel, admixture and additives, vary in properties, size and function make concrete a heterogeneous, complex and brittle material. To a bone powder is used in a building material and other industrial areas. increased the setting times, improved workability and increase the compressive and flexural strength of concrete. It has also made possible the use of many industrial and agricultural waste products in its production with attendant environmental benefits. To a bone powder made by calcium oxide and other chemical sources. To a waster product suitable for use in foam concrete production especially for lowest construction is pulverized bone obtained from cow bones generated. pulverized bone is suitable as a partial replacement of cement. The use of pulverized bone was also found to be

cost effective when compared with normal concrete of comparable strength. To a investigate of a bone influence of pulverized bone on the consistency and the setting time of paste incorporating pulverized bone. Assess the strength development of cement sand mortar incorporating pulverized bone. Concrete has contained to maintain its dominant position over all other construction material due to the fact it allows investigation and varying of the forms and strength, using the same basic components of cement, sand, graves, and water of all of these materials cement is only the most expensive.

II. MATERIALS AND EXPERIMENTAL INVESTIGATIONS

2.1 Materials: In this investigation study the following materials normally, cement, fine aggregate, coarse aggregate water and bone powder are partial replacement o cement were used.

2.2 Ordinary Portland cement (OPC): The cement of 43 grade confirming by IS Code 8112 - 1989 manufactured by Jaypee Company was used in this experimental work. Cement with specific gravity 3.15 was used for preparation of test specimens.

2.3 Coarse Aggregates: Broken stone from the local quarry of site 20 mm and 10 mm in the ratio of 60:40 respectively confirming IS:383 - 1970 was used as coarse aggregate. The specific gravity of 10 mm and 20 mm coarse aggregate were taken as 2.69 and 2.72 respectively.

2.4 Fine Aggregates: River sand was used for the fine aggregates of Zone II conforming to IS 383-1970 with specific gravity 2.62. The particle size of sand were these passing through sieve size 3.75mm but retained on sieves of 65.

2.5 Water: Fresh clean and portable water from tape was used from mixing and curing the concrete as per IS-456-2000 in the entire experimental programme.

2.6 Superplacizier: A superplaticizer was used in all mixes was added 0.2% by weight of cemencious to all mixes

confirming to IS 9103:1999. The specific gravity of master glenium sky 8630 superplasticizer was 1.18.

2.7 Bone Powder: The material was bone powder used in concrete mix in % of 2.5%, 5%, 7.5%, 10%, 12.5%, 15% bone powder in a cubes and check the strength and was bagged and store in a cool place.

III. MIX DESIGN

Concrete for M25 grade were prepared as per IS 10262:2009 for M25 grade concrete for material of as follows:

Table-1 Quantities of Materials

Material	Quantity
Cement	400.98 Kg/m ³
Sand	610.5328Kg/m ³
Coarse aggregate	1196.32 Kg/m ³
Water	172.42 Kg/m ³
Admixture	1.6039Kg/m ³

IV. TESTING

4.1 Workability Slump cone test was performed to determine the workability using standard size of slump moulds as per IS:1199-1999.

4.2 Compressive strength: 42 cubes mould of size 150x150x150 mm were constructed and allowed for curing in a curing tank for 28 days and they were tested at 7 days, 14 days and 28 days. on compression testing machine as per IS : 516-1959. Cube compressive strength (fck) in Mpa = P/A where P=cube compression Load, A=Area of the cube.

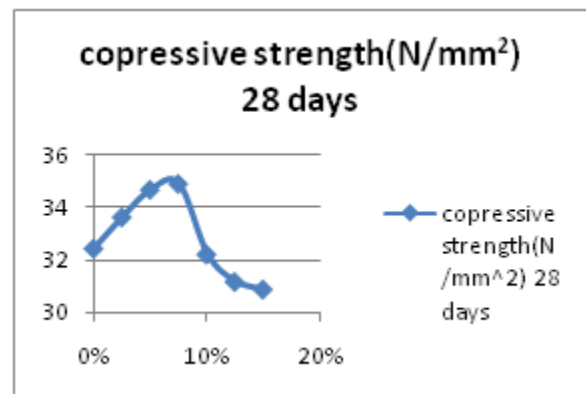
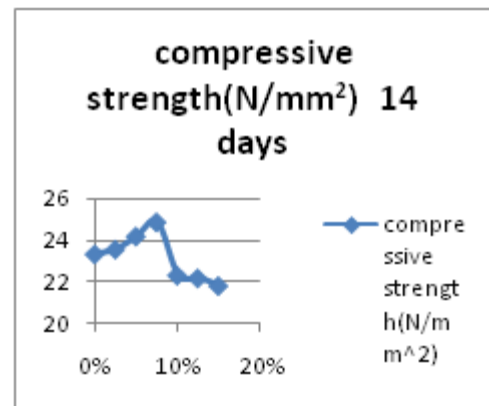
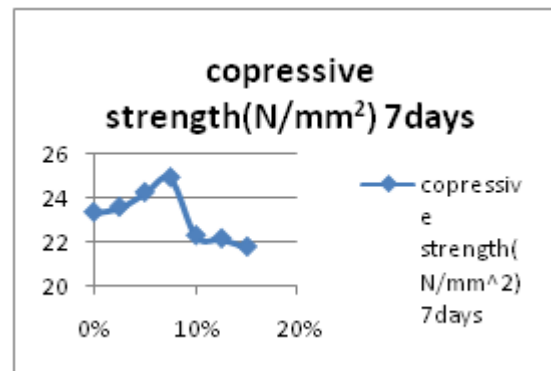
V. RESULTS & DISCUSSION

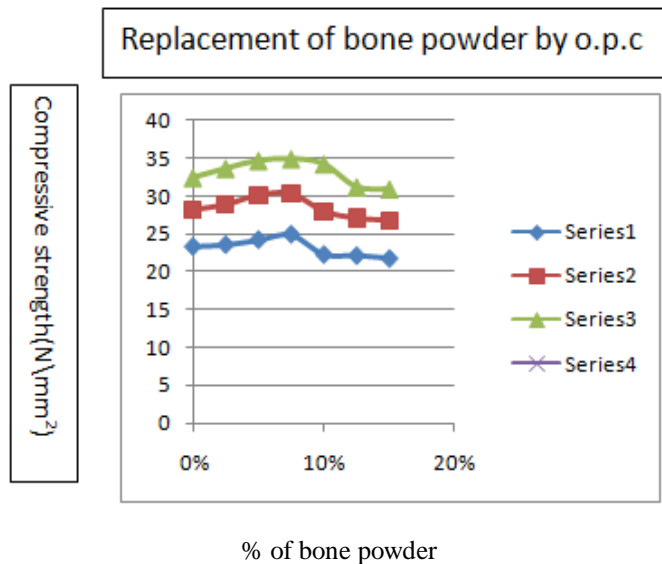
5.1 Compressive strength: Max compressive strength 34.89N/mm² is gain when replacement of cement by bone powder at 7.5% and other % of replacement of cement by bone powder as listed below- $fck = fck + 1.65s$

$$= 25 + 1.65 \times 4$$

$$= 31.6 \text{ N/mm}^2$$

% of bone powder	Compressive strength(N/mm ²)		
	7 days	14 days	28 days
0%	23.33	28.22	32.44
2.5%	23.56	28.92	33.63
5%	24.22	30.16	34.67
7.5%	24.89	30.35	34.89
10%	22.29	28.03	32.22
12.5%	22.15	27.13	31.18
15%	21.78	26.87	30.89





COST COMPRESSION OF BONE POWDER AND CEMENT-

It means bone powder is 525% costlier in compare to cement

S. NO	REPLACEMENT OF CEMENT BY BONE POWDER IN (%)	COST OF BONE POWDER (Rs.)	COST OF CEMENT (Rs.)	COST DIFFERENCES (Rs.)	COST IN (%)
1	2.5	100	16	84	525
2	5	200	32	168	525
3	7.5	300	48	252	525
4	10	400	64	336	525
5	12.5	500	80	420	525
6	15	600	96	504	525

VI. CONCLUSION

From the investigation following conclusions are -

1. By curing 28 days of 7.5% of cement replaced concrete cubes by bone powder and achieved max compressive strength 34.89 N/mm².
2. The using of pulverized bone powder in replacement of cement to help clean the environment.
3. Bone powder may be used in place of cement.
4. Bone powder is costlier than cement not easily available.

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