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A STUDY ON PARTIAL REPLACEMENT OF M-SAND BY PURIFIED SEA SAND IN MAGNETIC WATER CONCRETE

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ABSTRACT

Concrete is a major construction material used in the construction. Nowadays M-sandiswidely using in concrete as fine aggregate. Quarrying activities causes a lots of environmental and health issues. To an extent, quarrying impacts can be controlled by replacement of M-sand by purified sea sand in concrete. But studies had proved that the compressive as well as tensile strength of sea sand is low. The replacement of M-sand by purified sea sand in magnetic water concrete may increase these properties. Magnetized water can be produced by passing water through a magnetic field, some of its physical properties change and as a result of such changes, the number of molecules in the water cluster decrease, which causes a decrease in the water surface tension and it has a promising potential in saving water amount used in concrete construction. Using magnetized water in concrete mixtures can improve its workability, tensile and compressive strength. Here we are conducting a study on partial replacement of M-sand by purified sea sand in magnetic water concrete

KEYWORDS: Concrete, Sea sand, Magnetic water, M-sand.

1. INTRODUCTION

Nowadays M-sandiswidely used in concrete production. The key procedure in Ms and production is quarrying. These activities have negative impacts on environment and human health. Sea sand can used as an alternative to M-sand. Sea sand tends to very fine and rounded, smooth rounded particles would offer less resistance to rearrangement than angular orelongated particles with rough surfaces and its does not have high compressive and tensile strength. The salt in seasand tends to absorb moisture from atmosphere, bringing dampness to the structure. Salt content in sea sand can be removed by washing. The use of magnetic water can compensate the strength related issues of purified sand. Magnetised water can be produced by passing water through a magnetic field. In magnetic field, magnetic force can break apart water clusters into single molecules or smaller ones, therefore activity of water is improved. While hydration of cement particles, the MFTW can penetrate the core region of cement particles more easily. Firstly, hydration takes on surface of cement particle. A thin layer of hydration products is formed on cement particles, allowing a more complete hydration process to occur. Hence, hydration can be done more efficiently which in turn improves concrete strength. Magnetic water can enhance workability, compressive and tensile strength of concrete. This study investigates the maximum percentage of sea sand as an alternative to M-sand with maximum strength properties in magnetic water concrete.

2. MATERIALS ANDMETHODS

Materials

Cement: Cement used in this experiment work is ordinary Portland cement of 53- grade confirming to IS 12269 with a specific gravity of 3.1

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Fine Aggregates: Locally available sand conforming to grading zone lll which is passing from 4.75 mm sieve and of specific gravity of 2.9 is used.

Purified seasand: Seasand were collected and washed to remove salt content. Grading zone were found by sieve analysis ie, grading zone4.

Coarse Aggregate: Locally available crushed stones conforming to graded aggregate of nominal size 20 mm.

Magnetic water: Prepared by passing normal water through a permanent magnetic field with a constant speed for 90mintues.

Mixproportion

The concrete mix used was M20 designed according IS 456 - 2000. Water cement ratio was 0.53. The M-sand was replaced by purified sea sand in magnetic water concrete in different percentages. 20%, 40%, 60% and 100 % replacement were done. Specimen Identification details are given in Table.3 and mix proportions are shown in Table. 4

Table 1. Specimen identification details

Specimen Id	Specimen details
20% MCpss	replacement of M-sand by purified sea sand in magnetic water concrete
40% MCpss	replacement of M-sand by purified sea sand in magnetic water concrete
60% MCpss	replacement of M-sand by purified sea sand in magnetic water concrete
100% MCpss	replacement of M-sand by purified sea sand in magnetic water concrete
100% NCms	100% M-sand in normal concrete

Table 2 Mix Proportion

Sl. No	%Replacement	- sand (kg)	Coarse aggregate (kg)	urified sea sand (kg)	ement (kg)	Water (kg)
1	0%	33.24	66.24	0	22.16	12.18
2	20%	26.6	66.24	6.7	22.16	12.18
3	40%	20	66.24	13.3	22.16	12.18
4	60%	13.3	66.24	20	22.16	12.18
5	100%	0	66.24	33.25	22.16	12.18

3. RESULTS AND DISCUSSION

A no of tests were carried out to determine the design mix properties of concrete in the laboratory. In this work the strength of the hardened concrete is determined. The strength criterion includes measurement of parameters such as compression strength on cubes, flexural strength on beams and split tensile strength on cylinder.

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Compressive strength

Comparison of compressive strength at 28th day for MCpss and NCms

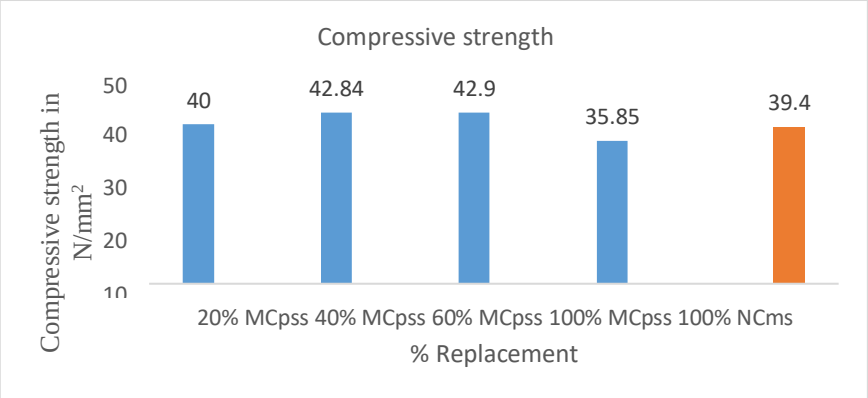

Fig 3.1. Comparison of compressive strength of Mcpss & NCms

A no of tests were carried out to determine the design mix properties of concrete in the laboratory. In this work the strength of the hardened concrete is determined. The strength criterion includes measurement of parameters such as compression strength on cubes, flexural strength on beams and split tensile strength on cylinder.

Split tensile strength

Comparison of split tensile strength of MCpss and NCms

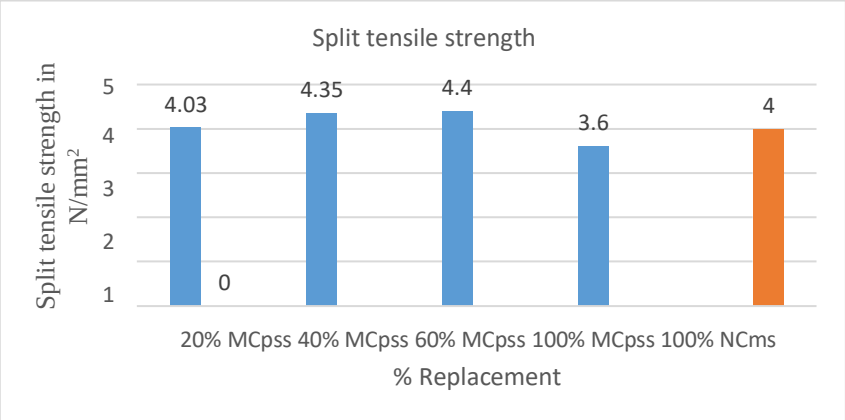

Fig 3.2: Comparison of split tensile strength of MCpss and NCms

Upto 60% the split tensile strength of concrete shows an increasing nature after that decreases. There is about 10% increase in tensile strength as compared to normal concrete at 60% replacement in magnetic water concrete.

Flexural test

Comparison of flexural strength

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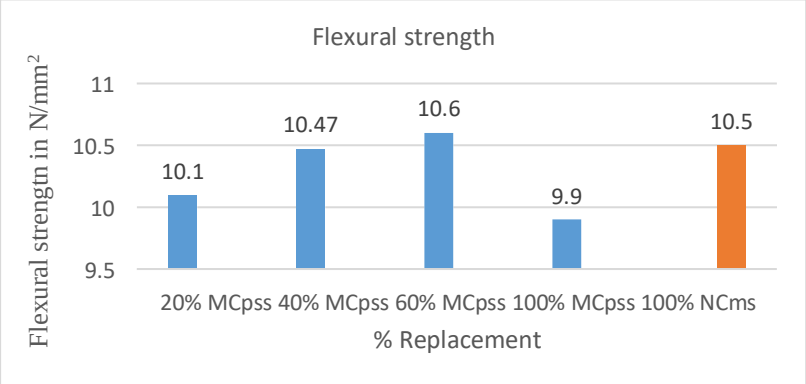

Fig 3.3 Comparison of flexural strength of MCpss and NCms

Upto 60% the flexural strength of concrete shows slight increasing nature after that decreases. Here there is a slight increase in flexural strength when compared to other properties such as compressive and tensile strength.

4. CONCLUSION

From this study upto 60% replacement of M-sand by purified sea sand shows maximum strength properties after that decreases. After 60% replacement the strength properties of concrete decreases it may due fineness modulus ofpurifiedseasandislessthanthatofM-sand.Thereisanincreasecompressivestrengthof3%at7dayand8.9% at 28 day and 10% increase in tensile strength as compared to normal concrete at 60% replacement in magnetic water concrete. According to previous studies, in normal concrete at 40% replacement of purified sea sand has maximum strength properties. But in our study with the use of magnetic water there is about 60% replacement of purified sea sand is possible.

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