

Comparative Analysis of River & Crushed Sand in Concrete

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ABSTRACT: Now a days the use of Natural sand is increasing rapidly this will lead to Scarcity of sand some river has reached its maximum limit of taking out sand from it on the other hand aggregate crusher plant gives out dust daily which is also known as artificial sand this artificial sand is considered to be wastage of crusher Plant. The mostly used fine aggregate is the sand extracted from river banks. Also large-scale extraction of river banks depletes natural resources. The particle shape of the aggregates is very important for making concretes. It is a well-known fact that the sand having cubical particles with grounded edges gives higher tensile strength and compression strength to the concrete. The main aim of research is to make use of this artificial sand in concrete replacing Natural sand by overcoming the Mechanical Factors affecting it these utilization will not only make use of wastage of sand but also reduced the use of Natural sand to large extent.

.KEYWORDS: River sand, Crushed sand, mix design compressive strength of concrete.

I.INTRODUCTION

The Main ingredients of concrete are cement, sand, and aggregate. The performance of concrete affected by properties of aggregate there are basic two types of aggregate fine aggregate and course aggregate. The mostly used fine aggregate is the sand extracted from river banks. Also large-scale extraction of river banks depletes natural resources. The particle shape of the aggregates is very important for making concretes. It is a well-known fact that the sand having cubical particles with grounded edges gives higher tensile strength and compression strength to the concrete. The grains should be of durable material and the size of the grains must be such that it should give minimum voids. The presence of clay and slit is avoided since it retards the setting of the cement and making concretethe main aim of research is to make use of this artificial sand in concrete replacing Natural sand by overcoming the Mechanical Factors affecting it this utilization. Fine aggregate it acts as voids filler and helps to minimize all the voids content in concrete, thus it contributes an improvement in the quality of concrete. Hence the searching of alternate for river sand is continued by the construction industry in terms of quality and economy.

II.LITERATURE REVIEW

A survey of Literature has shown that numerous studies have been conducted in past to utilize crushed rock sand in concrete Ilangovan(2000) Sahuetal.(2003) observe that concrete made using crushed rock attained a comparable strength in concrete. (Ahn and Fowler, 2001) including micro fines from 7 to 18% without the use of admixtures Hanson considered structural concrete (Craig-yr-Hesg) using 12% unseparated sandstone quarry fines (Lamb, 2005) Galetakis and Raka (2004) studied the effect of varying replacement proportion of sand with quarry dust (20, 30 and 40%) on the properties of concrete in both fresh and hardened state. Saifuddin (2001) studied the influence of partial replacement of sand with quarry dust and cement with mineral admixtures on the compressive strength of concrete (Gambhir, 1995), whereas Celik and Marar investigated the effect of partial replacement of fine aggregate with crushed stone dust at different percentages in the properties of fresh and hardened concrete. But in this research paper we compare the natural sand and crushed rock sand physical properties and then used in concrete.

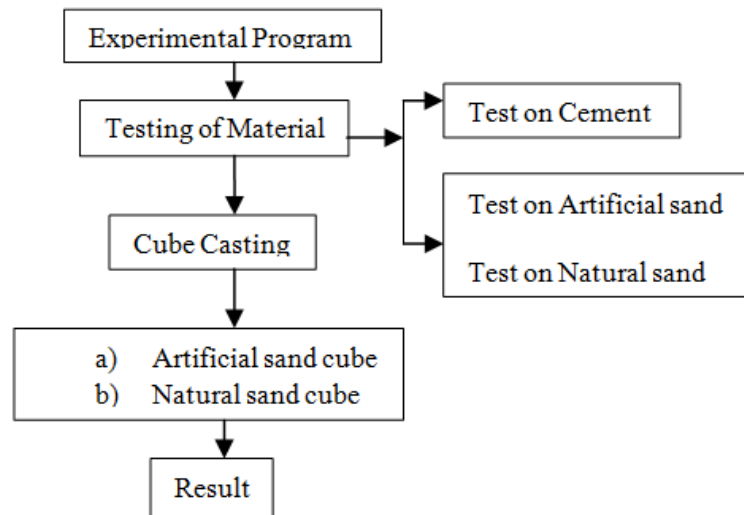
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III.METHODOLOGY



Experimental Program: - The experimental program divide in to two parts first is preparing concrete cube for river sand and second part is to prepare the cube for crushed sand. Before casting the cube we test the material and mix design of M20 Grade concrete.

In the present study an ordinary Portland cement (OPC 53 grade) was used. The physical properties of the cement tested according to Indian standards procedure confirms to the requirements of IS 12269 and the physical properties are given in Table 1.

Table No1. Experimental values of test on sand and aggregate

Test on Cement		
Fineness	7.5%	
Consistency	34%	
Test on sand		
Test	Natural Aggregate	Artificial sand
Fineness Modulus	3.22	2.95
Moisture content	0.98%	Nil
Silt Content	4%	2%
Test on Aggregate 20 mm		
Impact	8.5%	
Crushing	6.5%	
Abrasion	4 %	
Moisture content	0.98 %	

The river sand conforming to zone II as per IS-383-1987 was used for making reference concrete and its loose and compacted bulk density values of sand were 1455&1726 Kg/M³ respectively.

Crushed Fine aggregate conforming to IS 383-1987 of size 4.75 mm Passing. The loose and compacted bulk density values of aggregate 1460&1690 Kg/M³ respectively.

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Crushed coarse aggregate conforming to IS 383-1987 of size 20 mm and down having a specific gravity of 2.6 was used. The loose and compacted bulk density values of coarse aggregate 1483 and 1680 kg/m³, respectively.

Water is an important ingredient of concrete as it initiates the chemical reaction with cement, and the mix water was completely free from chlorides and sulfates. Ordinary potable water was used throughout the investigation as well as for curing concrete specimens.

Mix Design

a) Design Stipulation Table No2. Properties of Material

Characteristics compressive 20 Mpa Strength required in 28 days	
Maxi size of Aggregate	20 mm
Degree of workability factor	0.90 compaction
Exposure condition	Mild
Specific gravity of cement	3.15
Specific gravity of Coarse aggregate	2.65
Specific gravity of Fine aggregate	2.5
Specific gravity of Fine crushed aggregate	2.45
Water absorption	
Coarse aggregate	0.6%
Fine aggregate.	1%
Fine Crushed aggregate.	0.70%
Free surface moisture	
Coarse aggregate	Nil
Fine aggregate.	1.3%
Fine Crushed aggregate.	Nil

From the above data we prepare mix design Proportion (1: 2.4: 3.7) water cement ratio 0.52 and casting the two type cube for river sand and crushed sand cube separately for 7 days and 28 days.

Mix Proportion of Material.

Table No3. Quantity of Material

Cement	sand	Aggregate	water
350 Kg	805 Kg	1295Kg	182 Kg/Liter

Mixing:-

Thorough mixing of the materials is essential for the production of uniform concrete. The mixing should ensure that the mass becomes homogeneous, uniform in color and Consistency.

There are two methods adopted for mixing concrete Hand mixing: Hand mixing is used for small scale concrete works. As the mixing cannot be thorough and efficient, it is desirable to add 10 per cent more cement to cater for the inferior concrete produced by this method. Hand mixing should be done over an impervious concrete or brick floor of sufficiently large size to take one bag of cement.

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IV.RESULT

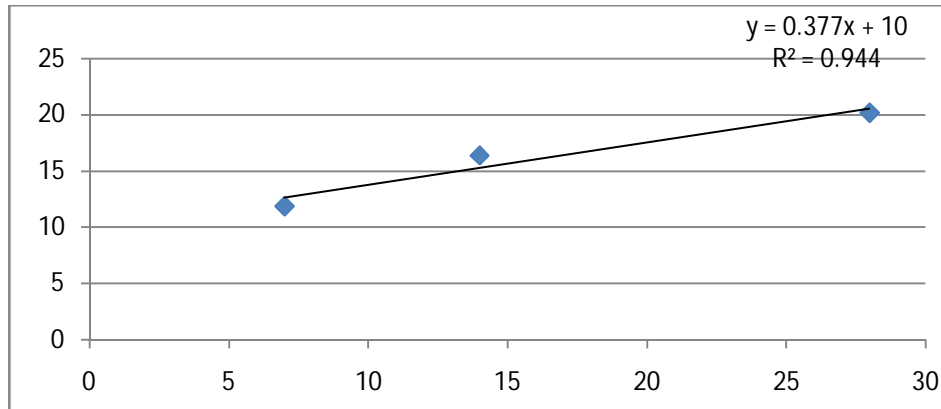
Workability test :-The workability of concrete was measured in terms of the slump value. As shown in table

Table No4. Workability test

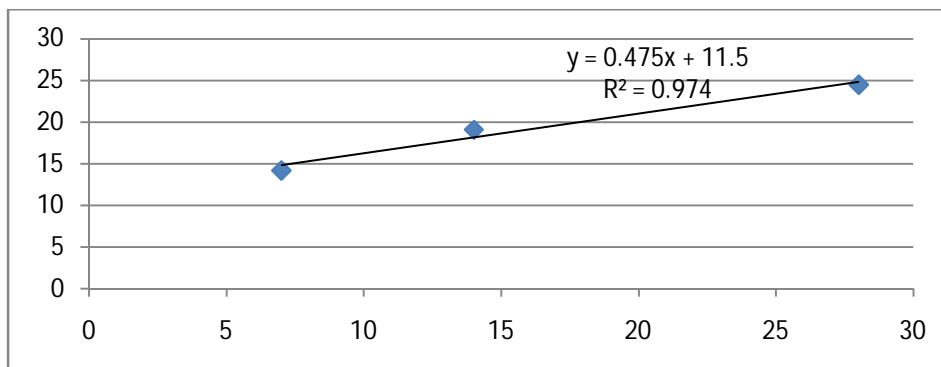
Slump Value	River sand	Crushed sand
Very Low (0-25)	NIL	20
Low (25-75)	35	NIL
Medium (75-100)	NIL	NIL
High (100-150)	NIL	NIL

Table No5. Compressive strength Mpa

Compressive strength in Mpa			
Grade	7 days	14 days	28 days
M20 River sand	14.2	19.1	24.5
M20 Crushed sand	11.90	16.4	20.2



Graph No.1 (Crushed sand)



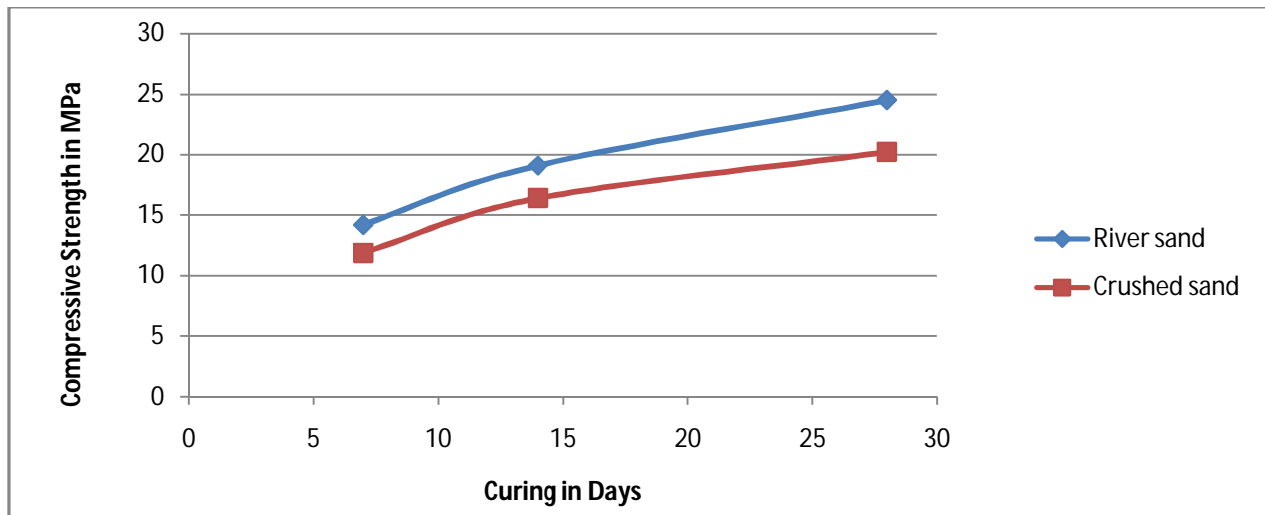
Graph No.1 (River sand)

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Graph No.3

V.CONCLUSION

From the laboratories studies we found the physical properties of crushed sand satisfied the IS requirement. But in workability test it is less workable as compare to river sand concrete and it is also practically found in the time of concreting in site by using concrete pump the blockage of concrete pump is found and is not working properly. At same pump type of concrete means river sand concrete is used in same pump can work properly. It is ones more time to prove the workability of crushed sand concrete. Similarly we compare the compressive strength result of concrete it is found that gives the result is 8% less than the river sand concrete. From the all observation we suggest that at the time of concrete used in crushed sand always used admixture for workability and strength improvement of concrete.

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