

An Experimental Investigation on the Effect of Curing Method and Aggregate Type on the Concrete

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Abstract- The concrete binds our every new construction and from its discovery concrete changes the world construction system and speed up to the mark, and so to test the important property like compressive strength of concrete has become so important. And this property of concrete depends on several values and among them some very prescribed are, curing method, water quality and type of aggregate. This study can be done in many ways, with many parameters, but according to further clear objectives are to examine the concrete and studying its effect on compressive and workability of concrete taking as ideal concrete mixed with potable tap water of local area, to justify the compatibility of Accelerated curing method for determining the compressive strength of concrete on above the traditional (water immersing method) curing methods, to compare the effect of using crushed quartzite as a coarse aggregate in concrete by partially and fully replacement of black metals (gravel), to make the comparative study with these three parameters water quality, curing method and replacement of gravel with crushed quartzite partially and fully. The various tests of compressive strength determination are performed to take the study to the further level

Index Terms- Concrete, Admixture, Curing.

1. INTRODUCTION

Concrete is the important and valuable discovery in construction which is being used from last many years with continuous experiment in mounting the important properties of concrete. According to the present state of the art, concrete has bypassed the stage of simple four components system. That is, cement, water, coarse aggregates and fine aggregates. It could be the blending of extreme supplementary number of ingredients. For example, a sensible grouping of ingredients as many as ten materials. Numbers of experiments were done in finding out an impressive relation of compressive strength of concrete. As concrete binds our every new construction and from its discovery concrete changes the world construction system and speed up to the mark, and so to test the important property like compressive strength of concrete has become so important. And this property of concrete depends on several values and among them some very prescribed are, curing method, water quality and type of aggregate. As we know, traditionally, quality of concrete in construction works is calculated in terms of its 28 days compressive strength, this procedure requires 28 days of moist curing before testing, which is too long a period to be of any value for either concrete construction control or applying timely

corrective measures. If after 28 days, the quality of concrete is found to be dubious; it would have considerably hardened by that time and also might have been buried by subsequent construction. Thus replacement of the concrete mass of questionable attributes becomes very difficult and often impractical. On the other hand, if the concrete is found to possess excessive strength than required, it would be too late to prevent wasteful use of cement on uneconomical mix proportioning. Hence, standard 28 days cube testing of concrete is not feasible for quality control.

The main objective of this study is to justify the compatibility of Accelerated curing method for determining the compressive strength of concrete on above the traditional (water immersing method) curing methods , to compare the effect of using crushed quartzite as a coarse aggregate in concrete by partially and fully replacement of black metals (gravel),to make the comparative study with these three parameters water quality, curing method and replacement of gravel with crushed quartzite partially and fully.

2. METHODOLOGY

For the research work regarding the objectives, some laboratory work is essential for achieving goal and gathers information for the project.

2.1. Materials

Cement (OPC): Cement used for this experiment was ACC ordinary Portland cement of grade 53 conforming to IS: 12269-1987, with specific gravity 3.5.

Sand: locally available river sand Specific gravity for fine aggregates was found by same manner and it was found to be 2.74.

Course Aggregate: Two types of aggregate ware used black and red colour with specific gravity 2.87 and 2.64.

Water: Tap water used for mixing and curing both.

Admixture: For this experimental work Super plasticizer was used as an admixture in concrete to increase the workability and to ensure the water reduction. Conplast SP430 G8 was used which is an admixture available by BENDALE CHEMICAL industry which compiles with the code IS: 9103-1999 and BS: 5075 part 3. Specific gravity 1.24 - 1.26 Chloride content nil.

3. Mix Design of Concrete

Concrete design for M40 grade as shown in table 1. For 1 m³ of concrete mix.

Table 1. concrete mix for 1 m³.

Elements	Black Metal Gravel		Red Metal Crushed Quartzite		Red Metal + Black Metal	
	W/O	0.5 %	W/O	0.5 %	W/O	0.5 %
Admixture (By Mass Of Cement)						
Cement (Kg)	438.13	350.5	438.13	350.5	438.13	350.5
Coarse Aggregate (Kg)	1046.22	1150	963	1057.45	998.83	1097.51
Fine Aggregate (Kg)	821	902	821	902	821	902
Water (Kg)	197.16	157.73	197.16	157.73	197.16	157.73

After concrete mix cubes ware cured for 7, 14, and 28 days for normal and accelerated curing.

ADMIX	BLACK METAL GRAVEL 100 % (STRENGTH IN N/mm ²)		RED METAL QUARTZITE 100 % (STRENGTH IN N/mm ²)		RED+BLACK METALS 50%-50% (STRENGTH IN N/mm ²)	
	W/O	W	W/O	W	W/O	W
7 DAYS	18.11	20.22	23.00	21.67	23.89	26.66
14 DAYS	30.23	26.68	36.89	23.45	39.45	32.11
28 DAYS	37.56	32.45	53.78	38.89	47.23	40.76
ACC	41.43	38.73	42.48	41.71	37.71	36.95

4. Result and Discussion

The compressive strength of concrete ware tested at 7, 14 and 28 days the test result are shown in table 2.

Table 2. Compressive Strength.

Fig.1. Materials Strength With Tap Water Containing No Admixture

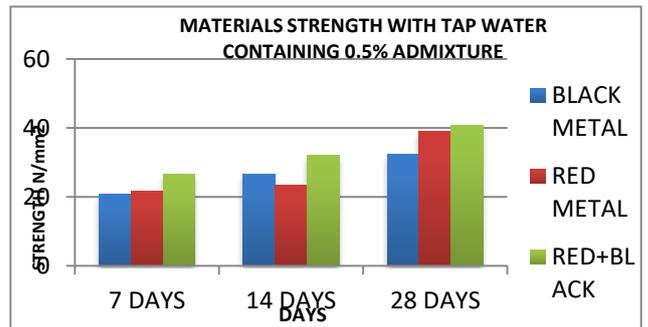


Fig.2. Materials Strength With Tap Water Containing 0.5% Admixture

Strength Comparison between Black, Red, Red+Black Metals With 0.5 % Admixture (W) and With Out Admixture (W/O) Cured Under Accelerated Curing

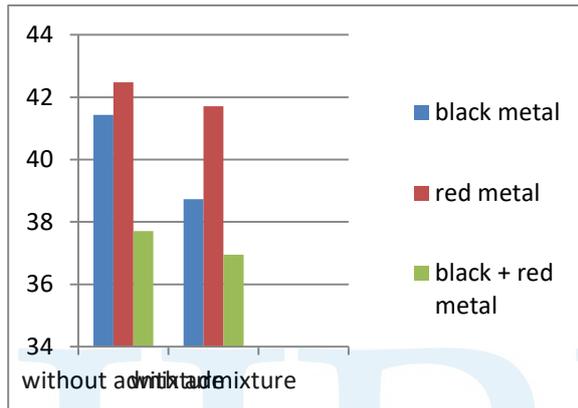
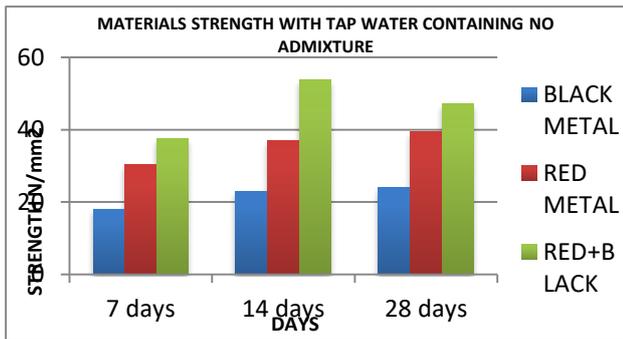


Fig.3. Strength Comparison

5. Conclusion

From the given result can be concluded that,

1. Containing admixture in concrete shows higher strength for all mix concrete and in all edges.
2. In case of without admixture the RED + BLACK METAL shows the higher strength followed by RED METAL and in last BLACK METAL.
3. While in case of specimen containing admixture RED + BLACK METAL contains high strength followed by BLACK METAL and then RED METAL.

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