

Comparative Analysis of Black Metal And Crushed Quartzite Along With M40 Grade Concrete Mixture -A Review

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Abstract—In this world, concrete is the most widely utilized material after water. It comprises of cement, sand, coarse aggregates and water. Along with these materials various admixtures can also be used which can enhance the properties of concrete. There are various alternative materials which are being tested in order to replace the ingredients of concrete. Some of the industrial and agricultural waste is being used as a partial replacement. Concrete has strength, and ability to attend desire shape properties but with all these advantages it's also cognition that concrete has very low tensile strength due to which it cannot use in tension zone. The concrete is thus reinforced to make it helpful in bearing the tensile load. In this study I have tried to compare the concrete mixes containing crushed quartzite (100%) as coarse aggregates, Black gravels (100%) as coarse aggregates and thirdly 50% quartzite and 50% gravels as coarse aggregates in M40 grade concrete mix. Also the effect of using mixture Conplast SPG8 in these concrete mixes has been taken into consideration. The ultimate aim is to find out the best type mix amongst these in terms of the compressive strength. The detailed study on determining the compressive strength for 7days, 14days and 28days has been carried out with and without adding the admixture. Finally the analysis has been done to find out the best type of aggregates with or without the admixture in the concrete.

Keywords—Crushed quartzite, super plasticizer, compressive strength, black metal, Ordinary Portland cement, specific gravity

I. INTRODUCTION

Concrete is the most important and valuable discovery in construction which has been utilized from last several years, although experiments have been done continuously in mounting the important properties and applications of concrete. Now a days concrete has bypassed the stage of only being the combination of cement, water, coarse and fine aggregates. It could be the blending of extreme supplementary number of ingredients such as even the sensible grouping of as many materials.

Materials and Method

Cement- In general Portland cement is widely used as cementing material which is present in concrete. Basic compounds of cement are calcium, silicon, aluminum, iron, and another metallic oxide.

Aggregate- These are primarily naturally available granular material like sand, gravel, or crushed stone comes in this

category but with new technology recycled material and synthetic product also be used as an aggregate

Chemical Admixtures - These are some other ingredient mixed in concrete other than Portland cement, water, and aggregate that added to the mixture immediately before or during the mixing to enhance the properties of concrete like water requirement, setting time and durability

Water -water is one of the main ingredients in concrete. It is responsible for the chemical reaction (hydration process) by which concrete form C-S-H gel and gain their strength. For HFC minerals and chemically dissolved in it play an important role and crucial for the strength of concrete

Fine Aggregate - This type of aggregate mostly which passes through a 4.75 mm IS sieve and contains only that much coarser material as is permitted by the specification. Sand is generally considered to have a lower size limited of about 0.07mm. The material between 0.06mm and 0.002mm is classified as silt, and still smaller particles are called clay.

Design mix: The concrete having high strength specially above M30 grade shall not be prepared with nominal mix, in fact it should be prepared and designed as per the requirements and desired properties of our concrete which is done following the IS standards.

Crushed Quartzite: It is a hard, non foliated metamorphic type of rock which is also commercially used as ballast because it has impact value of higher order.

Super Plasticizer: A special class of admixture which is used for reduction in water quantity and for the present research work Conplast SPG8 is used.

II. LITERATURE REVIEW

Abdullahi. M Civil Engineering Department, Federal University of Technology, 2012 published a journal on "Effect of aggregate type on Compressive strength of concrete" concluded that the aggregate type has effect on the compressive strength of normal concrete. The highest compressive strength was achieved from the concrete containing crushed quartzite, followed by concrete made from river gravel. Concrete containing crushed granite shows the least strength development in all phases of life.

They adopted a nominal mix of concrete (1:2:4) and prepared concrete of three different types that is by replacing coarse aggregates with crushed quartzite, crushed granite and river gravels. They tested the compressive strengths at 3, 7, 14, 21 and 28 days respectively. The highest compressive strengths were obtained when crushed



quartzite was replaced with the coarse aggregates as compared to granite and river gravels replacement. The water cement ratio chosen was 0.6 for entire work. The coarse aggregates were utilized as 100% replacement in all the three cases.

The value of slump obtained for concrete containing quartzite was 44mm, while concrete containing granite gave slump value of 32mm and concrete having river gravel as coarse aggregate gave slump value of 50mm.

Behr H, Almusallam, A.A. and Maslehuddin, M in 2003 also got the research on effect of coarse aggregate quality on the mechanical properties of high strength concrete. And they also concluded that aggregate type has effect on the compressive strength of concrete.

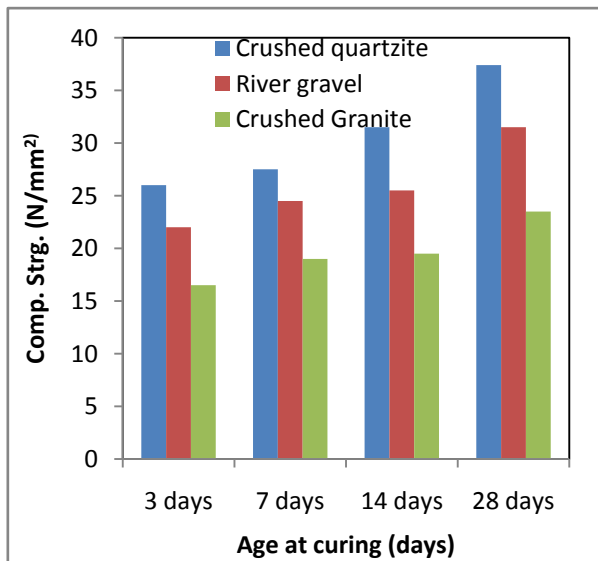


Fig. 1 Comparative analysis of Compressive strength

K. Surendra and G. Nagesh crushed quartzite as fine aggregates replacement along with super plasticizer and performed compressive strength, Tensile strength test, slump flow test to check the properties of Self compacting concrete (SCC). They replaced cement with fly ash in proportions of 10%, 20%, 30% and 40% and simultaneously crushed quartzite was replaced with fine aggregates in 10%, 20%, 30%, 40% and 50% proportions.

The research showed that on 10%, 20%, 30% and 40% replacement of fine aggregate with quartzite showed positive effect on fresh properties of concrete whereas negative effects were seen on 50% replacement only. Also the hardened properties of concrete were not influenced due to replacement of fine aggregates with quartzite up to 50%. The super plasticizer used in mix design was Master Glenium Sky. The water cement ratio of 0.4 was maintained.

"RyzaPolat, MehrzadModabbi " The correlation between aggregate shape and compressive strength of concrete: Digital image processing approach" analysed the mechanical behaviour of concrete based on use of different types of aggregates like flat, elongated, spherical and mixed shape (control). They determined that spherical size of aggregates are better for compressive strength factor and workability of the concrete mix. Flat shape of particles in coarse aggregate

content produces concrete mix of comparatively lesser compressive strength.

TABLE I MIX PROPORTIONS FOR SCC

S, No.	Mix Designation	Mix Proportions
1	M0	100% Cement
2	M1	90% Cement+ 10% Fly ash
3	M2	80% cement + 20% fly ash
4	M3	70% cement + 30% fly ash
5	M4	60% cement + 40% fly ash
6	M5	70% cement + 30% fly ash + 10% Crushed quartzite
7	M6	70% cement + 30% fly ash + 20% Crushed quartzite
8	M7	70% cement + 30% fly ash + 30% Crushed quartzite
9	M8	70% cement + 30% fly ash + 40% Crushed quartzite
10	M9	70% cement + 30% fly ash + 50% Crushed quartzite

TABLE II HARDENED PROPERTIES OF SCC

S. No.	Mix ID	Compressive Strength (MPa)	Split Tensile Strength (MPa)
1	M0	33	2.57
2	M1	34.66	2.8
3	M2	36.88	2.97
4	M3	38.96	3.225
5	M4	34.22	2.54
6	M5	39.87	3.22
7	M6	40.56	3.24
8	M7	41.18	3.25
9	M8	41.77	3.30
10	M9	42.07	3.38

The spherical shape of aggregates gave the highest compressive strength followed by aggregates of mixed shape. The admixture used in this study was Glenium 303 and water cement ratio of 0.3 was maintained for preparing the concrete mix with all the 4 types of coarse aggregates.

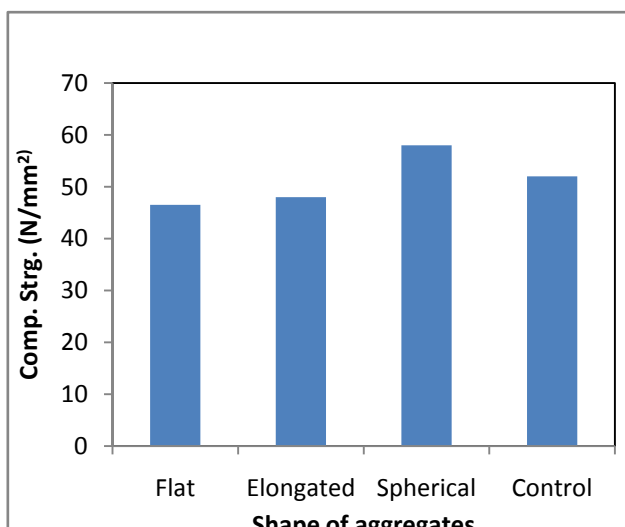


Fig. 2 Compressive strength for different shapes of aggregates

III PROBLEM IDENTIFICATION

After study and analyzing the results of various authors it can be change size, materials, admixture etc. that is change the compressive strength. Our work M40 determining the result of new compressive strength. And find out the best result of our work.

IV METHODOLOGY

For the research work regarding the objectives, some of the test in the lab is required to be done so that we can get the desired results. The obtained data can be utilized as a

reference for conforming the utility of the research project. Various test which needs to be performed are as per the specifications of IS codes. Some of the important test includes Compressive strength test, Specific gravity test etc. to obtain the desired mix of concrete.

Some of the steps which needs to be followed includes

- Performing the required test.
- Preparing the charts and tables of obtained values.
- Comparative analysis of the obtained values.
- Maintaining proper record of the used materials and the experiments performed.

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This Paper is presented in conference
Conference Title : Advances in Mechanical and Civil Engineering
Organized By : Mechanical and Civil Engineering Department, SIRTE Bhopal, M.P.
Date : 25th June - 26th June 2021

