

**A STUDY OF USING WASTE MARBLE POWDER IN CONCRETE****Govind Lal Gehlot***

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DOI: 10.5281/zenodo.2202984**KEYWORDS:** marble powder, compressive strength, industry waste, compressive strength, flexural, tensile, workability.**ABSTRACT**

Concrete is the most critical factor used within the creation industry throughout the world, wherein the first-rate aggregates is typically natural sand [1]. Due to rapid growing demand has production enterprise. Marble powder is made out of processing plant at some point of the cutting and polishing of marble blocks and approximately 20-25 % of the processed marble is get into powder shape. Decomposing of marble is one of the major problem in environment. The use of marble in concrete formulation as a supplementary sand material was tested as an alternative to traditional concrete. The sand has been replaced by marble accordingly in the range of 10%, 20%, and 30% by the weight of cement for M-25. These tests were carried out to evaluate the mechanical properties for the tests results for compressive strength up to 28 days.

INTRODUCTION

As we know concrete is the most common material used now a days in construction which having as ingredients of cement, fine aggregates, coarse aggregates with some amount of water for making paste, here fine aggregates (sand) is natural sand. But an large amount of use of sand, affects the resources of earth due to which these type of material became comes to be exhausted. Sometime absence of sand near about plant and site increase the cost of construction. So here is the reason of saving natural resources by using another material and replacing with sand at some quantity without affect the ratio of concrete and there strength.

SCOPE AND OBJECTIVES

To establish alternative for sand with partial use of waste marble dust. To examine the compressive, flexural and tensile strength the use of waste marble powder with the given design mix. To study the effect of use of waste marble dust at the mechanical properties of concrete.

MATERIAL

3 (A) Cement - The maximum not unusual cement utilized in an everyday portland cement 43 (OPC forty three) changed into used, that is used for general concrete structure. The numerous check had been led on bond to determine closing putting time, fineness, soundness, particular gravity, popular consistency and compressive best, particular gravity 3.15

3(B) Coarse Mixture - in coarse aggregates maximum of which might be retained on the 4.75mm IS sieve and comprise simplest a lot of coarse material as is permitted by means of the specification are termed coarse aggregates. The grading of coarse aggregates must be as in line with specification of IS 383 – 1970

3 (C) Water – According Portable water was used for the training of all concrete specimens. The water used within the concreting paintings as nicely curing motive was the transportable water which is loose from impurities.

3(D) Marble powder – Marble is a popular material now a days in sculpture and in buildings, thought out which marble powder collected from marble cutting and dressing. After cutting and grinding the marble waste form present in wet condition so with the help of putting in sun rays it became be dry and sieved by IS-90 micron sieve before replacing in sand at some certain amount.

3(E) Chemical Admixture – Superplasticizers is a type of admixture which is used for having highly water reducing agents in it and such property be good for making controlling for segregation. According to market



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point of view AURAMIX 400 was most popular as a super plasticizer admixture for concrete. Synthetic admixture having specific gravity 1.1

METHODOLOGY

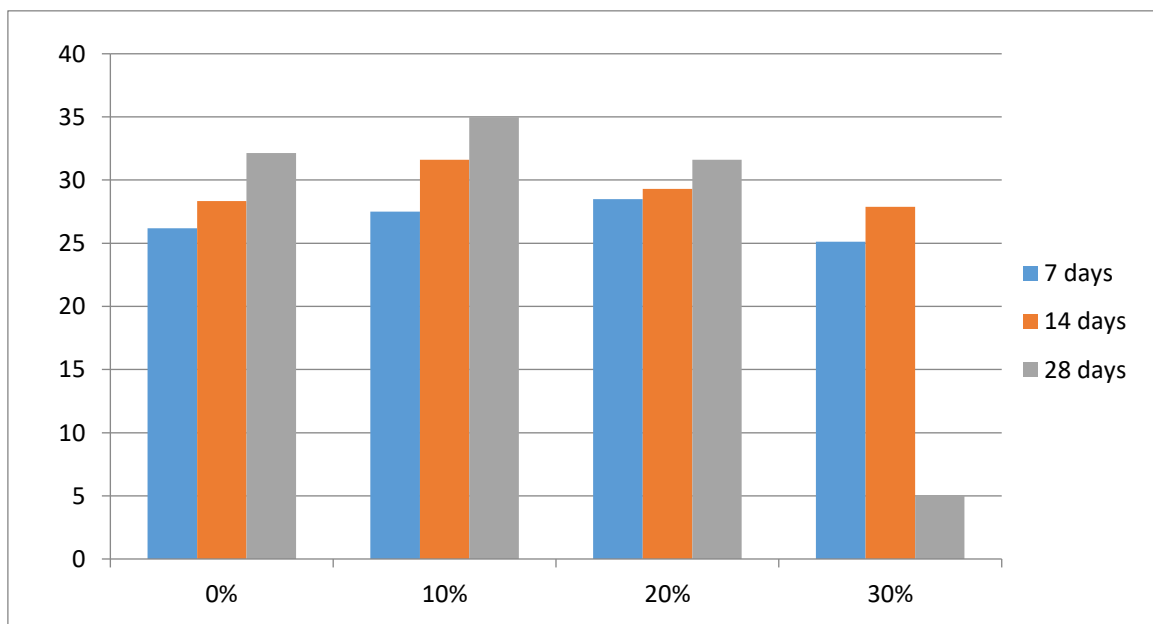
In this research in concrete the marble became replacing with sand 10%, 20% and 30%. Coarse aggregate of 2.66 and fine aggregate ratio 1.5 and water ratio 0.38 with chemical admixture of 0.06% was used in experiment. Each series having beam, cylinder and cubes as per IS code. This test is conducted for compressive test, flexural test and split tensile test of 7 days, 14 days and 28 days to find out the best effective mixture in following of strength characteristics of concrete mix.

COMPRESSIVE STRENGTH

Concrete cubes conforming to IS: 516-1964 of size 150*150*150 mm was cast for assurance of compressive strength. After 24 hours the concrete cube became be placed for water curing for 7 days, 14 days and 28 days respectively. Before testing, the cubes were air dried for 2hours, breaking loads were noted for 7days, 14days and 28 days.

Compressive Strength

S.NO	% of marble powder	Water absorption	Compressive strength		
			7DAYS	14DAYS	28DAY
1	0	0.38	18.85	21.42	23.81
2	10	0.38	21.45	23.22	24.67
3	20	0.38	21.88	23.38	25.31
4	30	0.28	19.51	21.65	23.21





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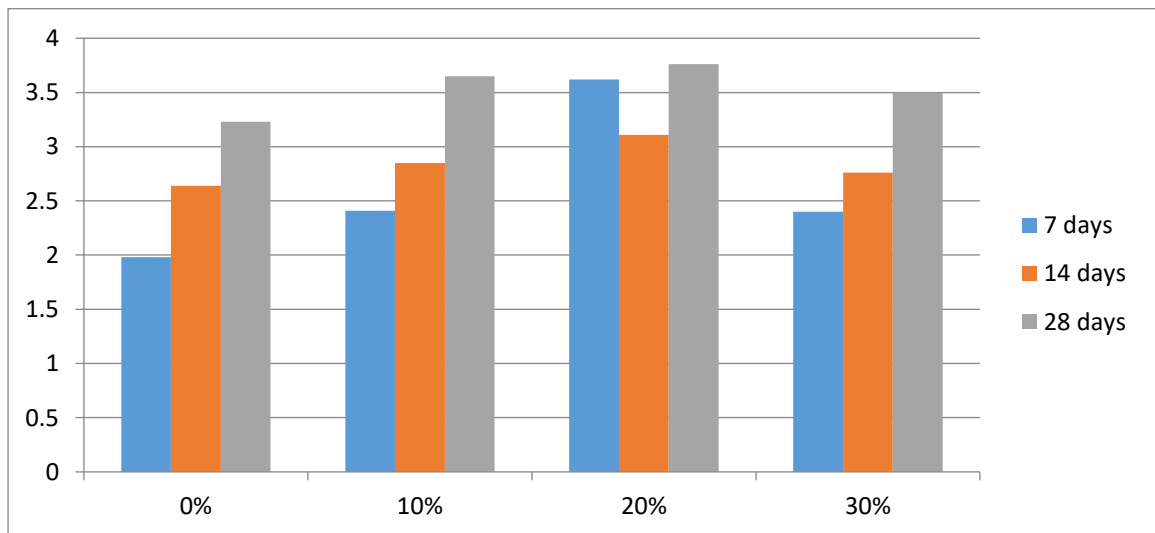
It is observed that at 10% and 20% replacement of concrete by marble powder compressive strength improve over 0% of marble powder. Further 20% of compressive strength reduce over 0% . The maximum replacement of sand by admixture marble powder is 10% and 15% compressive strength increase.

SPLIT TENSILE STENGTH TEST

Tensile strength is second major properties for concrete. Size of test sample of 15cm diameter, 30cm height and 0.3cm thick cylindrical mould is used in the test. The cylinder is placed left and right between the two plates of the compressive testing and the load is applied on it. The load at which the sample in the end fails is noted and split tensile strength is calculated.

Split tensile strength

S.NO	% of marble powder	Water absorption	Split Tensile strength		
			7DAYS	14DAYS	28DAY
1	0	0.38	1.98	2.64	3.23
2	10	0.38	2.41	2.85	3.65
3	20	0.38	3.62	3.11	3.76
4	30	0.28	2.40	2.76	3.50



FLEXURAL STRENGTH TEST

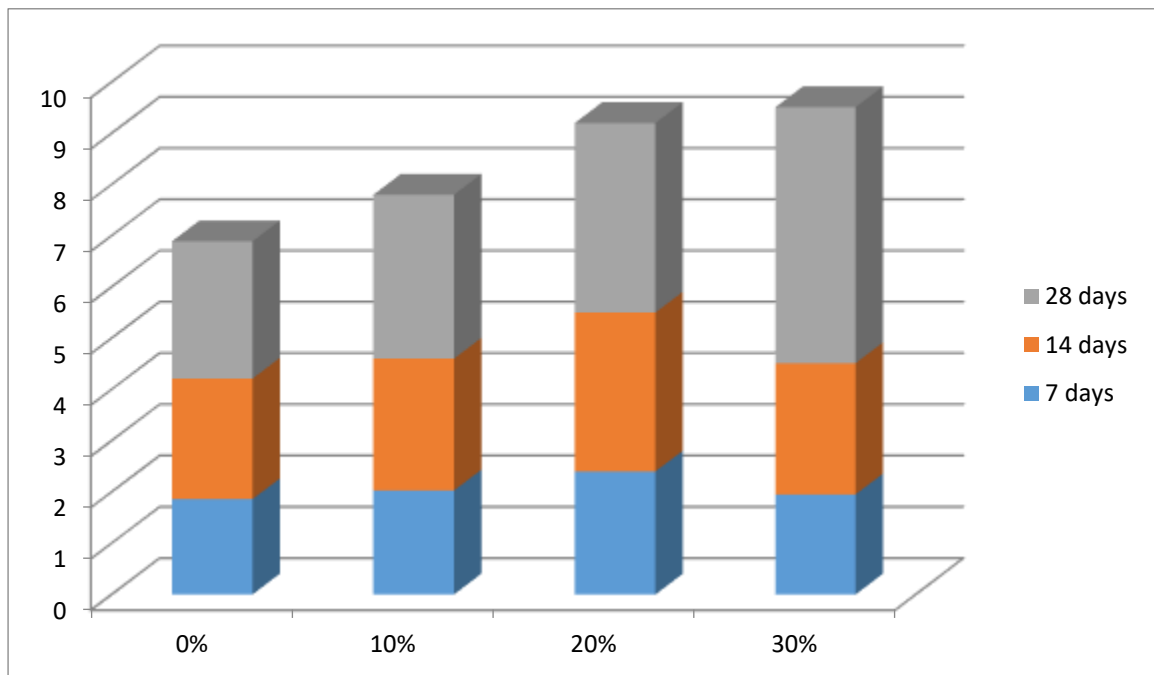
The beam is tested to check the flexural behavior of the hardened concrete. The test is carried out in a universal testing machine of 60T load ability. Standard beam of size 10cm*10cm*50cm were tested under one point loading to study the flexural strength of concrete. The maximum tensile stress discover at the failure of beam is known as modulus of rupture and is calculated.



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It is calculated that at 10% and 15% replacement of concrete by marble powder flexural strength improve over 0% of marble powder. its shows the maximum replacement of sand by admixture marble powder is 10% and 15% flexural strength increase.

S.NO	% of marble powder	Water absorption	Flexural Strength		
			7DAYS	14DAYS	28DAY
1	0	0.38	1.86	2.35	2.68
2	10	0.38	2.03	2.57	3.20
3	20	0.38	2.40	3.09	3.70
4	30	0.28	1.95	2.56	3.10



CONCLUSION

The aim of this research is to use useless material as marble in a useful way. After the practically perform the following conclusion come out –

1. Upto 10-20% replacement of fine aggregate with marble increase the compressive strength
2. Further increasing the percentage of marble decrease the compressive strength of concrete
3. Upto 10-20% replacement of fine aggregate with marble increase the tensile strength.
4. Further increasing the percentage of marble decrease the tensile strength of concrete
5. Using waste marble in concrete make a main role in cost-cutting.
6. Due to use of marble powder in concrete the water absorption became be less, the amount of permeability became reduce which make an important role to make concrete stable for a longer time.



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7. Decomposing of waste marble facing a major problem and this the best way to use in concrete.

REFERENCES

1. Parminder Singh and Dr. RakeshkumarSingla , utilization of waste ceramic tiles as coarse aggregate in concrete (JMEST) ISSN : 3159-0040 vol 2 Issue 11, November – 2015
2. G.Yamini and Dr. S. Siddiraju , An experimental research and strength properties of concrete by the influence of Flyash and Nanosilica as a partial replacement of cement . International Journal of Civil Engineering and Technology, 6(10) , 2015 pp. 25-35
3. BaharDemirel , “The effect of the using waste marble dust as fina sand on the mechanical properties of the concrete”, International Journal of the Physical science vol. 5(9) , PP. 1372-1380 , 18 August , 2010
4. Prof. Veena g.et.al (2014) Feasibility and need of use of waste powder in concrete production (ISOR-JMCE) E-ISSN : 2320-334 , pp. 23-26
5. Raman kumar and Ankit , An experimental study of marble powder on the performance of concrete. IJCIET , 7(4) , 2016 , pp491-497
6. AdarshMinhas and Veena Uma Devi , Soil stabilization and alluvial soil by using marble powder. International journal of Civil Engineering and Technology , 7(5) ,2016, pp.87-92.
7. IS : 383-1970 , specification for coarse and fine aggregates from natural sources for concrete – Bureau of Indian Standards , New Delhi .
8. IS : 10262-1982 recommended guidelines for concrete mix design – Bureau of Indian Standard , New Delhi.
9. Bamboo Rai“ Influence of marble powder / granules in concrete mix “ , International Journal of Civil and Structural Engineering Volume 1, no 4, 2011 .
10. Ahmed N. Bdour and Mohammad S. Al-Juhani , “ utilization of waste marble powder on cement Industry” December 2011, Associate Professional , Civil Engineering Department , University of Tabuk , Saudi Arabia Corresponding Author Dean , college of engineering university of Tabuk , Saudi Arabia .
11. TasniaHoque , “ influence of stone dust as partially replacing material of cement and sand on some mechanical properties of mortar “, international journal of Advanced structures and Geotechnical Engineering SSN 2319-5347, vol.02,no.02, April 2013
12. Vaidevi c, “study on marble dust as partial replacement of cement concrete” Indian Journal of Engineering , volume 4, No 9 july 2013