iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 **Issue:** VI **Month of publication:** June 2019

DOI: http://doi.org/10.22214/ijraset.2019.6016

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.177
Volume 7 Issue VI, June 2019- Available at www.ijraset.com

The Study of Flexural Strength and Durability of Concrete Using Waste Material

Ashutosh Mishra[1], Prof. Vijay Kumar Shrivastav[2]
[1]*M'Tech scholar, Civil Engineering Department, Gyan Ganga Institute of Technology and Sciences, Jabalpur*
[2]*Asst. Prof. Civil Engineering Department, Gyan Ganga Institute of Technology and Sciences, Jabalpur*

Abstract: ***This project represents the experimental results of replacement of coarse aggregate with that of waste cuddapah stones and evaluates the effect of various properties of concrete. The basic objective of the study is to identify an alternative source of fine aggregate because the natural sources of aggregates are depleting very fast due to the fast pace of construction activities in India. In this study concrete of M30 grade were considered with a W/C ratio of 0.45 for the replacement of 0%, 5%, 10%, 15%, 20% and25% of course aggregate by Waste cuddapah stones. In this investigation the improvement in Flexural strength and durability properties. Based on the overall observations, it could be recommended that the Waste cuddapah stones could be utilized as coarse aggregate in the various applications of concrete. This study investigates the performance of concrete mixtures containing Waste cuddapah stones at various percentage and Flexural strength, at 7 and 28 days. Result shows that concrete with Waste cuddapah stones had higher flexural strength.***
Index terms: ***Waste cuddapah stones, flexural strength test and Carbonation Depth.***

I. INTRODUCTION

Concrete is a very important material and widely used in construction industry. It offers stability and design flexibility for the residential marketplace and environmental advantages through every stage of the construction and use the characteristic Flexural strength is usually measured according to BS approach. Concrete is a construction material which is a mixture of cement (commonly Portland cement) as well as other cementation material such as fly ash and slag cement, aggregate water and chemical add mixtures are widely used in construction industry. Now days there are many filler material used in construction industries. In cement based products such as concrete and mortars, a balance between the particle sizes of component must be kept in order to obtain the required material properties such as workability, strength and durability of concrete. The worldwide consumption of stones as coarse aggregate (CA) in concrete production is very high, and several developing countries have encountered some strain in the supply of natural Aggregate in order to meet the increasing needs of infrastructural development in recent years . So, there is large demand for alternative materials for coarse aggregates in construction industry. To overcome the stress and demand for natural aggregate , researchers have identified some alternatives for sand, namely scale and steel chips , waste iron , crushed granite fine , etc. Environmental management in developing countries is a complex issue because environmental problems are linked with social and economic aspects, which must be considered in the development of any environmental program or regulation .The problem of waste accumulation exists worldwide, specifically in the densely populated areas. Scale, granulated slag, and steel chips are industrial wastes in the iron and steel industry and cause a nuisance both to the health and environment when not properly disposed. Reuse of industrial solid waste as a partial replacement of aggregate in construction activities not only saves landfill space but also reduces the demand for extraction of natural raw materials.

II. MATERIALS

The Materials used for this experimental work are cement, sand, water, steel slag.

A. Sand

The fine aggregate used for all the specimens were Narmada River sand com plying the requirements of IS383:1970. The specific gravity of the fine aggregate is 2.74. The fractions from 4.75mm to 150 micron are termed as fine aggregate.

B. Water

Portable water was used for experimentation.

©IJRASET: All Rights are Reserved

C. Cement

Ordinary Portland cement of 43 grade. It was used in this experimentation confirming to IS-12269-1987.

D. Coarse Aggregate

Crushed granite coarse aggregates of 20-mm maximum size were used

E. Waste Cuddapah Stones

The Waste cuddapah stones were obtained from local construction industries, and they are used to replace coarse aggregate partially in the production of concrete. The nature and the physical structure of the Waste cuddapah stones used for the investigation. The physical and chemical characteristics of the Cuddapha stoneswere determined in the laboratory as per standard methods.



Waste cuddapah stones

TABLE 1
Typical Composition Of Ordinary Portland Cement

Chemical	Weight
Tri- calcium silicate-C3S	55%
Di -calcium silicate-C2S	18%
Tri- calcium-aluminate-C3A	10%
Tetra- calcium alumino ferrite –C4AF	8%
Calcium sulphate dehydrate-CSH2	6%

III. EXPERINMENTAL WORK

The research is completely based on IS-456-2000. The three set of mixture Mix A, Mix B & Mix C was prepared by using M-30 grade and the proportions are 1:2.1:2.95 The Waste cuddapah stones is used to replacement of aggregates of saving natural resources. The tests are conducted on prepared concrete cube that is compression strength test.

1) *FOR Mix A1:* 0 % of Cuddapha stones and 100 % coarse aggregates by weight.
2) *FOR Mix A2:* 5 % of Cuddapha stones and 95 % coarse aggregates by weight.
3) *FOR Mix A3:* 10% of Cuddapha stones and 90% coarse aggregates by weight.
4) *FOR Mix A4:* 15% of Cuddapha stones and 85% of coarse aggregates by weight.
5) *FOR Mix A5:* 20% of Cuddapha stones and 80% of coarse aggregates by weight
6) *FOR Mix A6:* 25% of Cuddapha stones and 75% of coarse aggregates by weight

Steel mould was filled with material to about half height and the layer was compacted by tamping it with tamping rod in a uniform manner over mortar surface in such a way to produce full compaction of the mortar with neither segregation nor excessive laitance. The moulds were then be completely filled and the upper layer of the mortar compacted in a similar manner.

Flexural strength = Ultimate load / bearing area

Finally the relation between carbonation depth and Flexural strength is found out. The specimen was tested an interval 7 and 28 days. The test is made three types of test specimen of M-30 grade of concrete.

A. Testing Method
B. Flexural strength
C. Durability test

©IJRASET: All Rights are Reserved

IV. RESULT AND DISCUSSION

1) In this study, Cuddapha stones have been used as a partial replacement of coarse aggregate. The ordinary Portland cement, sand and aggregate mixing proportion is 1: 2.1:2.95. Fig 1 and 2 shows the result of the Flexural strength depending upon the changes in the mixing percentage of the Cuddapha stones. The test result shows that Mix-A1, A2, A3, A4having incremental increase in the strength while A5
2) As per the fig.3 and 4 shows the result of the flexural strength and the value of flexural strength in line with compressive strength .the flexural strength of mix A1, A2, A3and A4 increased by 1.62%,2.54%,4.86%,4.39% With respect to the normal Mix A for 28 days respectively and strength of A5 decreased by 0.23%.

Table 1.
Test Results of flexural Strength Depending Upon Various Percentages of Mixing Cuddapha stones.

S,no	% CUDDPA Stone	Average strength 7 days N/mm2.	Average strength 28 days N/mm2
1	0	3.6	4.32
2	10	3.5	4.39
3	15	3.65	4.43
4	20	3.8	4.53
5	25	3.75	4.51

Fig1. Relation between flexural strength of M30 concrete at various percentages of Cuddapha stones.

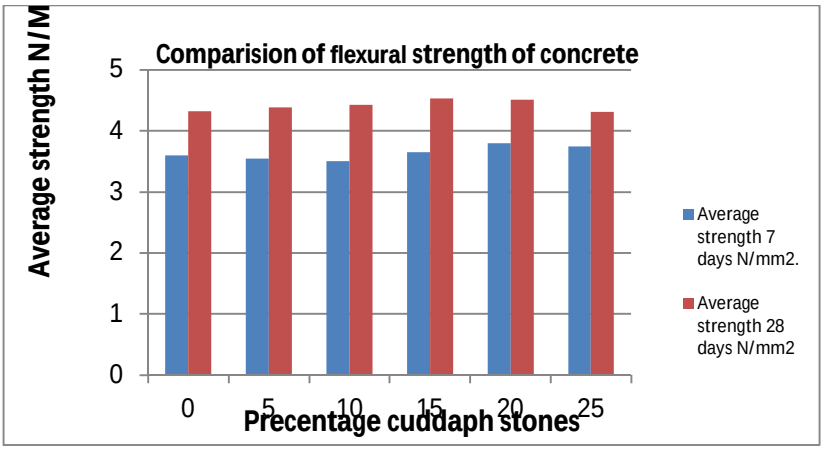
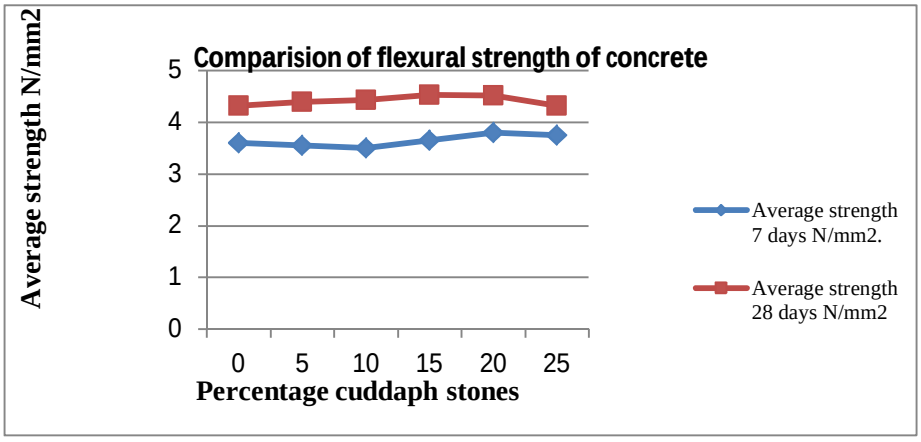


Fig2 . Relation between Flexural strength of M30 concrete at various percentages of Cuddapha stones.

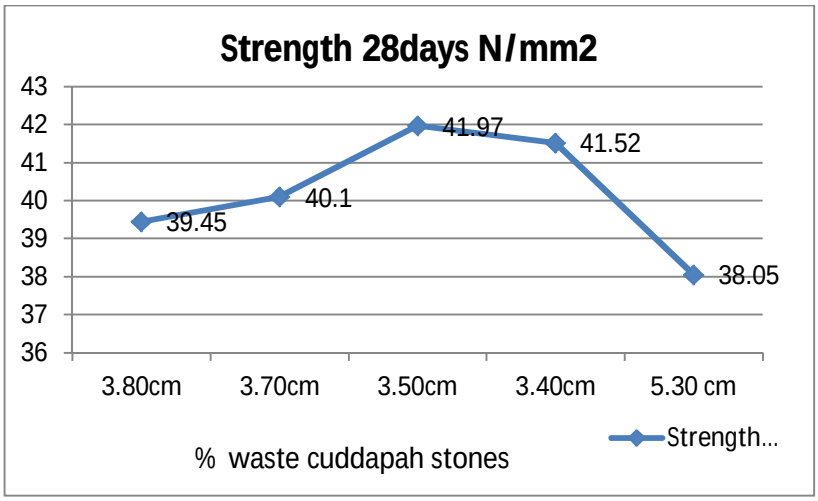


©IJRASET: All Rights are Reserved

Table 2.
Test results of compressive strength and carbonation depth depending upon various percentages of waste cuddapah stones

S.No.	% Waste cuddapah stones	Carbonation Depth (Cm)	Strength 28days N/mm^2
1	5	3.80cm	39.45
2	10	3.70cm	40.10
3	15	3.50cm	41.97
4	20	3.40cm	41.52
5	25	5.30 cm	38.05

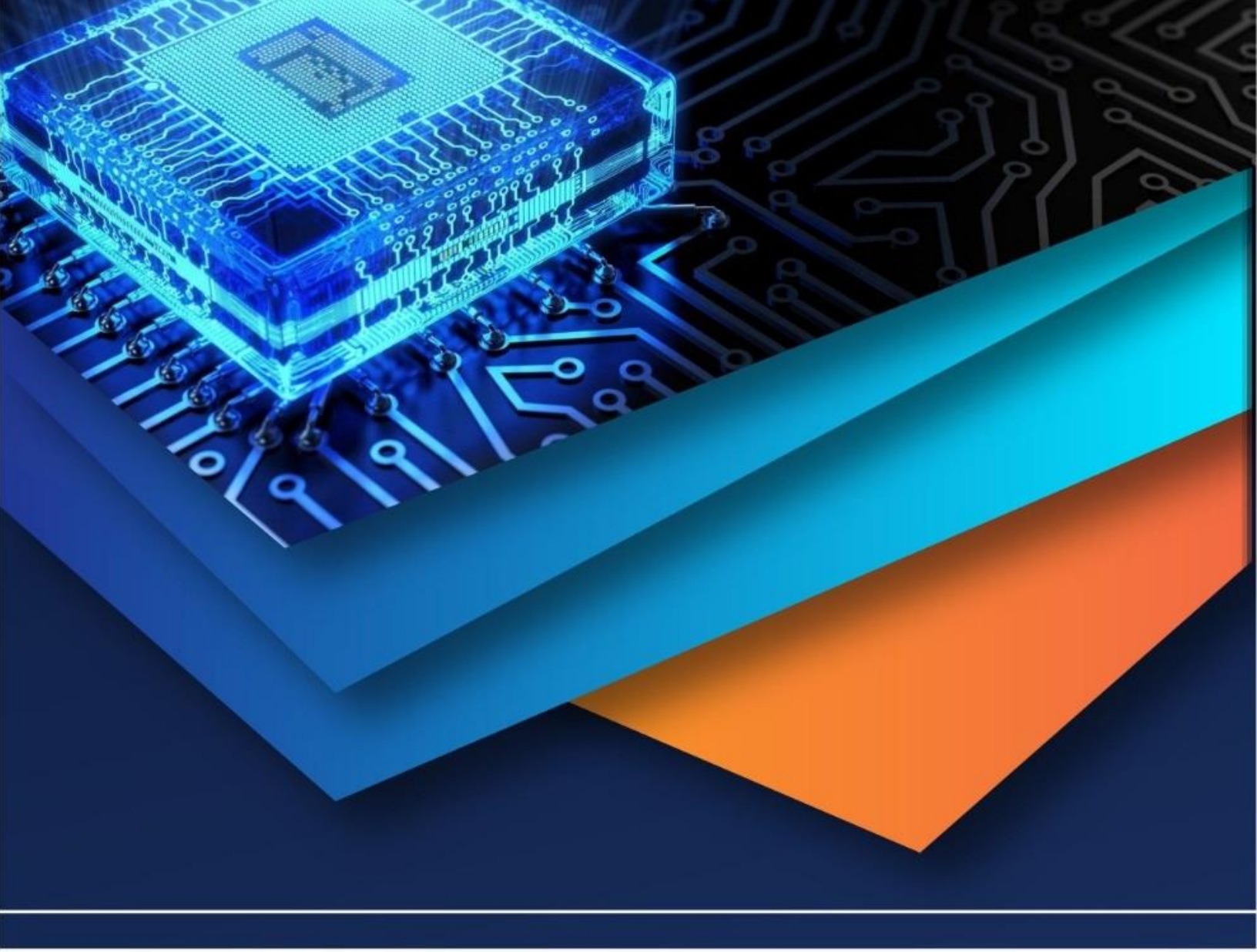
Figure 3 Relation between compressive strength and Carbonation depth of M-30 grade concrete at various percentages of waste cuddapah stones.



REFRENCES

[1] A R Nihith Chowdary, E Prema Latha Experimental Studies on Partial Replacement of Shabath Waste as Course and Fine Aggregate International Journal of Innovative Research in Science, Engineering and Technology Vol. 5, Issue 2, Februray 2016
[2] M. Anusha1, N.R. Gowthami 2,T. Naresh kumar3 Experimental investigation on mechanical properties of concrete by partial replacement of cement with flyash and kadapa stone powder International Journal of Advance Engineering and Research Development Volume 4, Issue 12, December -2017
[3] Rajendra D [1], H Gokulram [2] Effect of Strength Properties on Concrete by Partial Replacement of Coarse Aggregate with Waste Cuddapah Stones International Journal of Engineering Trends and Technology (IJETT) – Volume-44 Number-5 -February 2017
[4] Sreekrishnaperumal Thanga Ramesh*,et.al.Use of furnace slag and Cuddapha stonesas Replacement for sand in concrete International Journal of Energy and Environmental Engineering 2013, 4:3
[5] P. Murthi, S. Alan,et.al Sustinable Replacement of Steel slag as a course concrete International Journal of applied engineering research,ISSN 0973-4562 vol,10 no 53(2015)
[6] Bahar Demirel The effect of the using waste Marble dust as fine sand on the mechanical Properties of the concrete International Journal of The Physical Sciences Vol. 5(9), pp. 1372-1380, 18 August, 2010
[7] Suchithra S1, Manoj Kumar2 et.al Study On Replacement of Coarse Aggregate by E- Waste In Concrete International Journal of Technical Research and Applications e-ISSN: 2320-8163 Volume 3, Issue4 (July-August 2015), PP. 266-270
[8] A.M. Shende1, A.M. Pande2 et.al International Refereed Journal of Engineering and Science (IRJES) ISSN (Online) 2319-183X(Print) 2319- 1821 Volume 1, Issue 1 (September 2012), PP. 043- 048
[9] P. R. Wankhede1, V. A. Fulari 2 International Journal of Emerging Technology and Advanced Engineering Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 4, Issue 7, July 2014)
[10] Indian standard code of practice for specification For course and fine aggregate from natural sources Of concrete IS: 383-1970, Bureau of Indian Standards New Delhi.
[11] Indian standard code of practice for plain and reinforced concrete IS: 456-2000, Bureau of Indian standards New Delhi.
[12] Indian standard methods of tests for strength of concrete ARE: 516-1959, Bureau of Indian standards New Delhi.
[13] Indian standard code of practice for recommended guidelines for concrete mix design IS: 10262- 2009, Bureau of Indian standards New Delhi.

©IJRASET: All Rights are Reserved



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)