Test on Coconut Shell as Partial Replacement of Coarse Aggregate in Cement Concrete

Ajay Lone#1, Aniket Deshmukh#2 , Pandit Jadhav#3,Rahul Patil#4 ,Pritee Mistry#5
Department Of Civil VOGCE, Mumbai University, Aghai, dist-Thane, Maharashtra, India.
ajaylone.lone@gmail.com1 , deshmukhaniket100@gmail.com2, panditjadhav786@gmail.com3
patilrahul916@gmail.com4 mistrypritee12@gmail.com5

Abstract:-In this constructed environment, the rising cost of building construction materials is the issue of great concern. The prices of building materials are rising day by day. The coarse aggregates are the main ingredients of concrete. In this paper, the utilization of coconut shell as a replacement for coarse aggregate has been discussed based on the results obtained from comprehensive experimental results. The construction industry totally relies on cement, sand and aggregates for the production of concrete. Properties of concrete with coconut shells (CS) as aggregate partial replacement were studied. Control concrete with normal aggregate and CS concrete with 25% & 50% coarse aggregate replacement were prepared with constant water – binder ratio of 0.45 For all mixes, workability, density, water absorption, compressive strength flexural strength and tensile strength were determined at 7, 14 and 28 days. The results showed a steady decline in the workability.

*****

I. INTRODUCTION

Base advancement over the world made interest for development materials. Cement is the head structural designing development material. Solid assembling includes utilization of fixings like concrete, totals, water. Among every one of the fixings, totals shape the significant part Utilization of common total in such a rate prompts an inquiry regarding the safeguarding of characteristic totals sources. Moreover, operations connected with total extraction and handling are the vital reasons for ecological concerns. In light of this, in the contemporary structural building development, utilizing elective materials as a part of spot of regular total in solid generation makes concrete as practical and ecologically well-disposed development material.

Aside from aforementioned waste materials and modern by items, few studies recognized that coconut shells, the agrarian by item can likewise be utilized as total as a part of cement. The utilization of coconut shell as coarse total in cement has never been a typical practice among the normal nationals, especially in regions where light weight cement is required for non-load bearing dividers, non-basic floors, and strip footings. It is obvious that the coarse total as a rule take around half of the general self-weight of cement.

II. METHODS AND MATERIAL

Experimental

Material used concrete 2.1 specimens

The cube size of 150x150x150mm will be used to conduct the compressive strength test. On the other hand, a beam of 330x100x100mm will be used to conduct the flexural strength test. A sample of specimen which contains 0% Coconut shell is also used as control sample. A total of 42 specimens will be prepared.

2.2 Cement

Ordinary Portland Cement (OPC) from a single source will be used throughout. Portland cement can be defined as hydraulic cement that hardens by the interaction between its properties and that of water which forms a water resisting compound when it receives its final set.

2.3 Coarse aggregate

Aggregate has a significant influence on the compressive strength of concrete, crushed coarse aggregate produces a concrete with higher strength than one with uncrushed coarse aggregate (smooth and rounded aggregate). Crushed gravel of 10mm size will be used as coarse aggregate with a density, relative density and absorption value of 2375kg/m3, 2.7 and 0.5% respectively ml

2.4 Fine aggregate

Fine aggregate refers to aggregate particles lower than 4.75mm but larger 75mm. Fine aggregate act as filler in concrete, fine aggregate is usually known as sand and it most complies with coarse, medium or fine grading requirement. The fine aggregate will be air dried to obtain saturated surface dry condition to avoid compromising water cement ratio. In this research, river sand is used and sieve analysis will is conducted to prior to obtain fine aggregate passing through 600 µm sieve.

2.5 Water

The chemical reaction between water and cement is very significant to achieve a cementing property. Hydration is the chemical reaction between the compounds of cent and water yield products that achieve the cementing property after hardening. Therefore it is necessary to that the water used is not polluted or contain any substance that may affect the reaction between the two components, so tap water will be used in this study.

2.6 Coconut Shell (CS)

For the purpose of this research, the Coconut shells were obtained from a local coconut field located in Seremban, Malaysia. They were sun dried for 1 month before being crushed manually. The crushed materials were later being transported to the laboratory where they are washed and allowed to dry under ambient temperature for another 1 month. The particle sizes of the coconut shell range from 10 to 14 mm.

 ISSN: 2321-8169
825 - 827

III. MIXED DESIGN

All the accessible blend plan techniques depend on test connections, outlines and charts created from a wide exploratory examination. Fundamentally, they comprehend the same presumptions imparted in the past area and just minor contrasts exist in various blend plan techniques during the time spent selecting the blend extents. The states of solid blend configuration are by and large impacted by the standard involvement concerning the basic outline conditions, sturdiness and setting conditions.

The blend outline technique in this exploration is appreciated in view of the Department of environmental (DOE) United Kingdom. Selecting the best extents of bond, fine and coarse total and water to produce concrete having indicated properties is an essential problem in planning solid blend. Consequently, the configuration blend is exceptionally key in accomplishing the outline trademark quality. Table demonstrates the blend extents and Figure 1, demonstrates the procedure of DOE blend plan technique.

Mix Proportion Table:

Content /bag	Water (lit)	Cement (kg)	Fine agg (kg)	Ca. agg (kg)	Coconut shell (kg)
M-20	0.45	1	1.5	2.25	0.75
25% cs	22.5	50	75.19	117.10	39.03
50% cs	22.5	50	75.19	75.19	75.19

IV. TEST

4.1 Compressive Strength

The most valuable property in concrete is the concrete compressive strength because it gives the overall definition of the quality concrete strength that relates to the hydrated cement paste. Basically, the specimens were being tests for three selected curing periods namely: 7, 14, 28 days, detail test results are shown in table

Compressive Strength Table:

Concrete class	Coconut shell replace	Average Compressive Strength(mpa)		
		7 Days	14 Days	28 Days
A	0%	13	17.67	22.87
B	25%	12.5	18.19	22.00
C	50%	8	14	18.85

The normal test consequences of the compressive quality in their predefined curing times of 7, 14 and 28 days and rate substitution of CS were compressed as appeared in Table Similarly, the outcomes displayed in The outcomes demonstrated that the compressive quality of the solid diminished as the rate of the shells expanded in the blend proportion .It was watched that the solid compressive quality of the 3D shape examples increments with expanding age. The outcomes further demonstrated that evaluations 20 lightweight cements can be acquired if the rate substitution levels of the traditional coarse total with CS don't surpass and half.

4.2 Flexural Strength

Flexural quality can be portrayed as the limit of a bar or even a chunk of cement to oppose disappointment because of twisting. This flexural quality is otherwise called Modulus of Rupture. The impact of cement with different rate of coconut shell (CS) on flexural quality is appeared on table 7. The flexural quality was tried on 7, 14 and 28 days of curing. The outcomes demonstrated that the flexural quality of the solid diminished as the rate of the CS expanded in the blend proportion. It was watched that the solid flexural quality of the bar

Examples increments with expanding age. The outcomes demonstrated that the flexural quality of the solid diminished as the rate of the CS expanded in the blend proportion. It was watched that the solid flexural quality of the shaft examples increments with expanding age.

Flexural Strength Table:

Concrete class	Coconut shell replace	Average Compressive Strength(mpa)		
		7 Days	14 Days	28 Days
A	0%	2.41	3.43	4.88
B	25%	2.50	3.19	4.8
C	50%	2.0	2.80	3.36

4.4 Tensile Strength

The split tensile strength of the concrete specimens was determined at 28 days following table

Tensile Strength Table:

Concrete class	Coconut shell replace	Compressive Strength in 28 days(mpa)
A	0%	2.50
B	25%	2.45
C	50%	2.30

The normal test aftereffects of the split elasticity in their predefined curing times of 28 days and rate substitution of CS were abridged as appeared in Table Essentially. The outcomes demonstrated that the rigidity of the solid diminished as the rate of the CS expanded in the blends. It was watched that the solid elasticity of the barrel shaped examples increments with expanding age.

.

V. CONCLUSION

Broad exploration was completed on control concrete with ordinary total and CS incomplete percentile supplanting on total for cement with 25 - half coarse total supplanting were set up with consistent water – folio proportion of 0.45. For all blends, workability, thickness, water assimilation, compressive quality flexural quality and rigidity were resolved at 7, 14 and 28 days. The accompanying conclusions can be gotten from the present examination:

The outcomes demonstrated a relentless decrease in the workability. The 0.45, water bond proportion which was kept consistent all through the blend made the workability lower. The workability really diminishes as there is an expansion in the measure of CS added to the blend. Because of the nonappearance of super plasticizers the workability of the solid was on the lower side.

The water ingestion tests demonstrated that the rate water retention increments with expansion in the rate supplanting level of coarse total with CS. half of CS substitution demonstrates the most noteworthy water retention took after by 25% and in conclusion half of CS.

The compressive qualities of CS 1concrete were observed to be lower than ordinary cement by 5–55% following 7 days, 9-half following 14 days and by 12–52% following 28 days, contingent upon the curing environment. Their qualities were inside the typical extent for auxiliary lightweight cement.

Flexural quality of solid examples diminishes with expansion in the rate supplantings of coarse total with CS for all curing days. 25% CS level was distinguished as the ideal substitution rate since its shows the most noteworthy flexural quality by supplanting a coconut shell by 25% as coarse total are helpful and all test outcome are effective.

VI. REFERENCES

[1] Research paper on IJSRSET15151
[2] Research paper on "coconut shell concrete as partialy replace of coarse aggregate"
[3] www.chemistryworld.com
[4] Experimental assessment on coconut shell aggregate