



EXPERIMENTAL INVESTIGATION ON THE EFFECT OF RICE HUSK ASH & COCONUT SHELL ON COMPRESSIVE STRENGTH OF CONCRETE

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Abstract

In this work, the characteristics of concrete employing coconut shell (CS) as the coarse aggregate and rice husk ash (RHA) as a partial replacement for regular Portland cement (OPC) were investigated. Workability, concrete density, and mechanical characteristics like compressive strength, splitting tensile strength, flexural strength, impact resistance, and elastic modulus were assessed and compared to benchmark values. For conventional concrete (CC) and coconut shell concrete, respectively, two concrete mixtures were used (CSC). Compressive strength increases as RHA replacement increases and provides satisfactory results up to 13% RHA replacement. This study demonstrates that adding RHA at a replacement rate of 16% improves the workability and mechanical characteristics of both conventional and coconut shell concrete.

1.INTRODUCTION

The idea of using different materials helps in material conservation, and replacement materials for those used in the production of concrete are now widely used. In this study, we will determine whether or not adding coconut shell and rice husk to concrete will increase its strength, impact resistance, and other properties.

If coconut shell is used in place of aggregates, costs can be reduced by 40%. Rice husk contains between 85 and 90 percent amorphous silica, which gives concrete its strength.

APPARATUS REQUIRED:

- 1.Coconut shell
- 2.Rice Husk
- 3.Aggregate, Cement, Sand
4. Compression Test Machine

PROPERTIES OF RICE HUSK ASH:

The concept of using diverse materials aids in the conservation of materials, and concrete replacement materials are now commonly used. Whether or if adding coconut shell and rice husk to concrete will improve its strength, impact resistance, and other attributes will be explored in this study.

Costs can be cut by 40% if coconut shell is used in place of aggregates. Amorphous silica, which provides concrete its strength, is present in rice husk in concentrations of 85 to 90 percent.

PHYSICAL PROPERTIES:

pH = 6

Moisture Content = 0.7%

Density = 2.20 g/cm³

PROPERTIES OF COCONUT SHELL:

1. Specific Gravity = 1.25
2. Water absorption = 20%
- 3.Shell thickness = 2-6 mm

ADVANTAGE OF COCONUT SHELL:

1. Coconut fibres reinforced composites have been use as cheap and durable non-structural element.
2. Production of light weight concrete.
3. It increases the speed of construction.
4. Coconut shell are more resistant toward crossing, impact and abrasion.

PROPERTIES OF CONCRETE BY IS CODE 456-2000

- Workability
- Strength of concrete
- Durability
- Creep
- Shrinkage

WORKABILITY

Workability is important property of concrete. The workability of concrete defines as the amount of work required to place concrete & to compact it thoroughly.

The workability is associated with the following four concept;

1. Internal friction
2. prevention of segregation
3. prevention of hardness
4. prevention of bleeding

STRENGTH OF CONCRETE

The strength of concrete increase with age:

AGE	STRENGTH OF %
1 Day	16%
3 Days	40%
7 Days	65%
14 Days	90%
28 Days	99%

DURABILITY

Durability of concrete is its ability to resist weather action, chemical attack, abrasion, or any other process of deterioration. Durability is;

1. The ability to do what it's supposed to
2. For as long as supposed to do it

CREEP

Creep is a time dependent deformation of concrete under permanent loads and permanent displacement.

Age at Loading	Creep Coefficient
7 days	2.2
28 days	1.6
1 year	1.1

SHRINKAGE

- Shrinkage is shortening of concrete due to drying and independent of applied load.
- Shrinkage of concrete is the time dependent strain measured in an unloaded and unrestrained specimen at constant temperature.

2. VARIOUS TEST:

- **Flow Test:**
The flow table test or slump-flow test is a method to determine consistency of fresh concrete. Flow Table Test is also used to identify transportable moisture limit of solid bulk cargoes. It is used primarily for assessing concrete that is too fluid (workable) to be measured using the slump Test, because the concrete will not retain its shape when the cone is removed.



Fig: -Flow Test

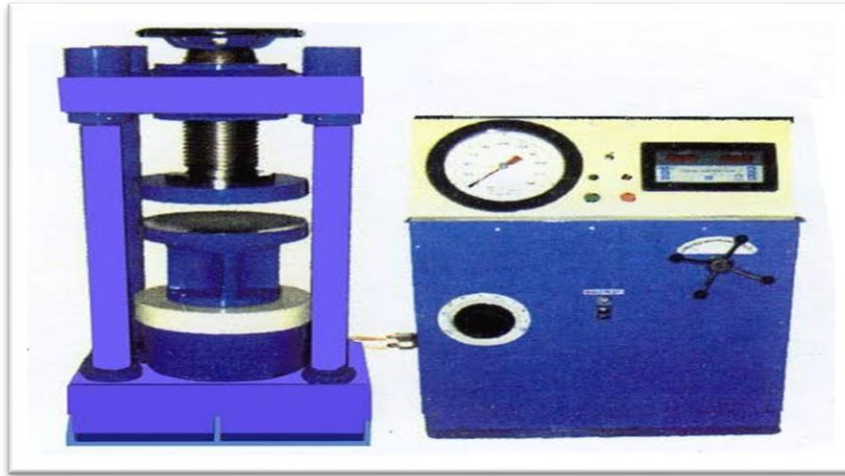
- **Slump Test**

The concrete slump test measures the consistency of fresh concrete before it sets. It is performed to check the workability of freshly made concrete, and therefore the ease with which concrete flows. It can also be used as an indicator of an improperly mixed batch. The test is popular due to the simplicity of apparatus used and simple procedure. The slump test is used to ensure uniformity for different loads of concrete under field conditions.



Fig: - Flow Test

- Compressive test

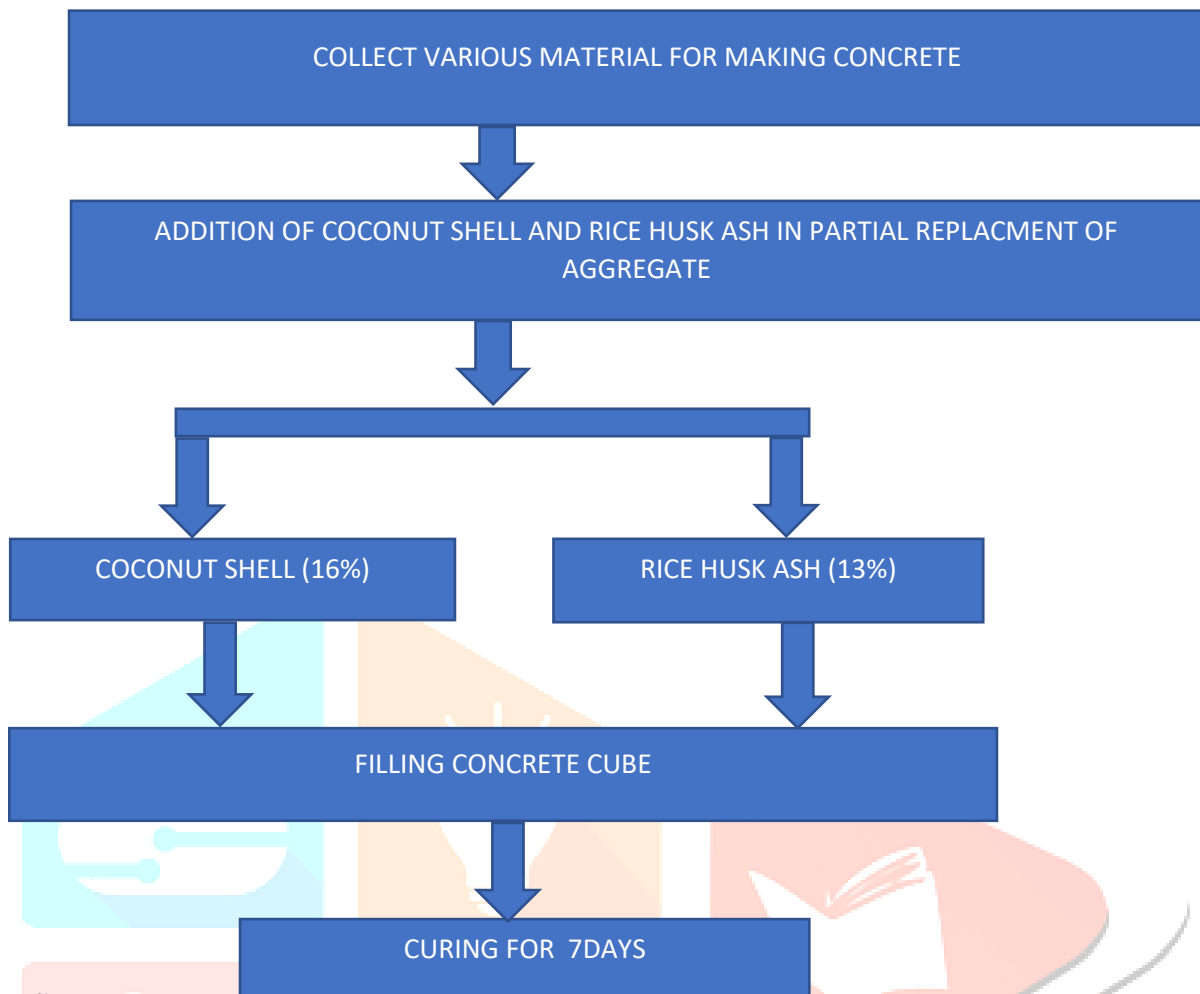


Compressive strength of Concrete can be defined as the ability of material or structure to carry the loads on it without any crack or deflection. material under compressive load tends to reduce the size, while in tension, size elongates.

3.OBJECTIVE

- To study the effect on some durability properties of coconut shell concrete for the optimized percentage of rice husk ash.
- To study the properties (FLEXURE STRENGTH, CREEP, SHRINKAGE, ETC.) of concrete after adding coconut shell and rice husk.
- To study the strength after adding these components on concrete.
- Comparison of results before and after addition of above said material in concrete

4. METHODOLOGY:



STEPS:

1. Collecting the coconut shell from waste and the rice husk ash.
2. Replacing 16% aggregate by coconut shell and 13% sand by rice husk ash.
3. And then all these materials are mixed with cement and M20 grade of concrete is made.
4. Then after the appropriate amount of water is added on it and the concrete paste is made.
5. After paste is made the concrete is putted on mould so that it get proper shape for our experimental work.
6. And after 24 hours it is kept for curing .
7. And lastly after 7days the concrete cube box is teste



Fig: - COCONUT SHELL



Fig: - RICE HUSK ASH

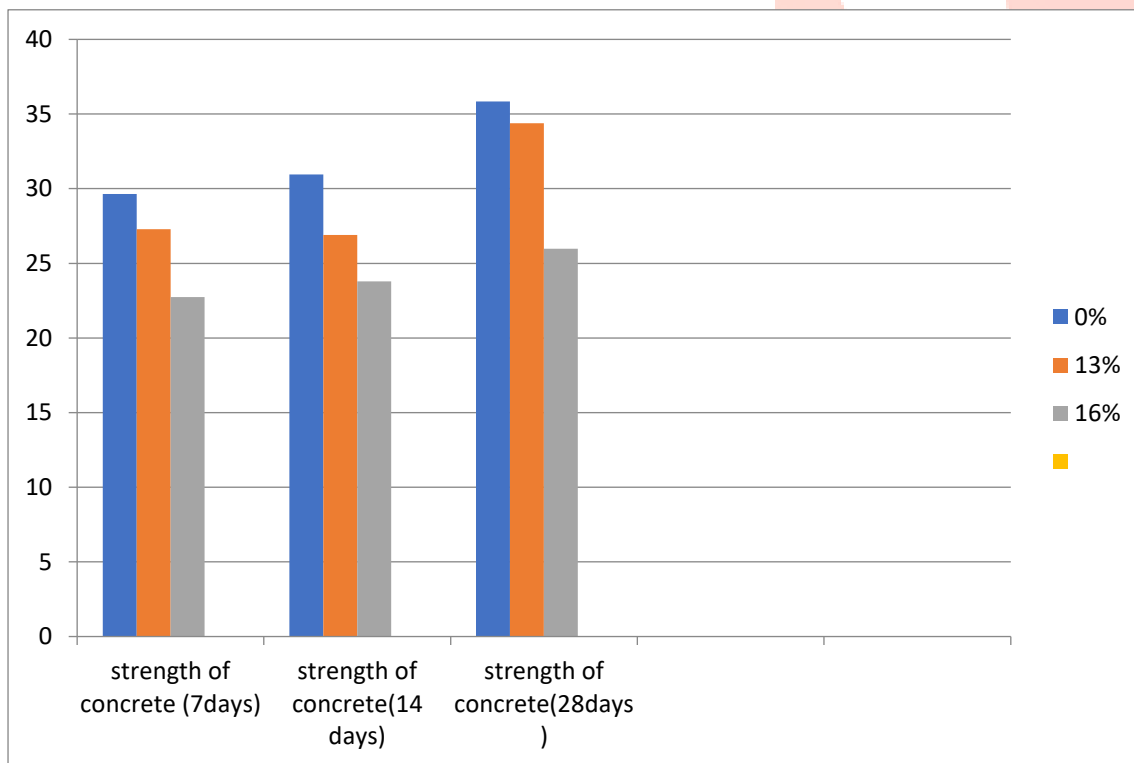
5. LITERATURE SURVEY:

S.NO	AUTHOR	TITLE	CONCLUSION
1.	M. Mohamed Barveen K. Gunasekaran	Study on the effect of rice husk ash in coconut shell concrete	The compressive strength increases with increase in RHA replacement and gives good result up to 10% of RHA. The study proves that replacement of RHA at 10% in coconut shell concrete enhance the workability and mechanical properties of both conventional concrete.
2.	Narain Das Bheel Sajjad Ali Mangi	Coconut Shell Ash as Cementitious Material in Concrete	Replacing OPC with CSA in concrete can increase, split tensile strength with due to pozzolanic properties. However, the recommended replacement with OPC is 10%.
3.	Rajeena A.P Anju Ealias Sivadutt S (2014)	Improvement of strength of concrete with Partial Replacement of Coarse Aggregate with coconut shell and coir fibres	The result conclude that the concrete with coarse aggregate partially replaced with coconut shell and coir fibres shows lesser strength but can recommended for low-cost construction with addition of fly ash. strength properties having coconut shell

			and coir fibres improve to 80%-95% addition of fly ash.
4.	Gaurav Batra Ajay Tharwani Sakshi Tiwari Divya Reel	Study of Strength of Concrete by Using Coconut Shell	Up to 15% of aggregate is replaced by coconut shell is good according to strength and cost wire. This can also be useful for construction of low-cost housing society.
5.	Sandhya Mathapati (April 2014)	Compressive strength of Concrete by using Coconut Shell	From one cube calculation bulk amount of coconut shell replacement can be evaluated and reduce overall construction cost. It can be useful for construction of low housing society.

6.RESULT AND DISCUSSION: -

COMPRESSIVE STRENGTH AFTER 7, 14 & 28 DAYS



RESULTS:

From the work carried out, the effect of RHA on the properties such as workability, compressive strength, splitting tensile strength, flexural strength, impact resistance and modulus of elasticity of concrete of CSC is discussed.

7.SUMARRY AND CONCLUSION

CONCLUSIONS

- From the present work carried out, due to addition of RHA
- Workability of concrete increases.
- Density of concrete decreases with increasing percentage of RHA in CC and CSC.
- Due to addition of RHA, the 28 days strength shows good results up to 13% replacement of RHA. Hence the optimum percentage replacement of RHA is 13% in CC and CSC.
- The impact resistance of CSC is high when compared to CC.
- These experiments prove that use of RHA enhances the mechanical properties of concrete irrespective of CCA and CSA.

FUTURE SCOPE:

- Seismic analysis of structure made by concrete with partial replacement of aggregate with coconut shell and rice husk can be carried out.
- Addition of coconut shell and rice husk ash on reinforced concrete can be studied.

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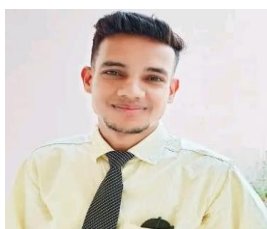
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