

## **EFFECT OF RICE HUSK ASH ON THE RECYCLED AGGREGATE CONCRETE**

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**ABSTRACT:** *Concrete is most used construction material worldwide in the construction industry. Use of the concrete in the construction world is going high day by day. With the increasing urbanization the demands of the people are also increasing which is putting more pressure on the natural resources which are depleting day by day. On the other hand, the construction waste is increasing at drastic pace, which is currently dumped as waste in the landfills. In this research work, efforts had been made to utilize the waste .Production of cement also produces enormous amount of the greenhouse gases. Rice husk ash (RHA) which also shows the cementitious properties has the potential to be used in production of concrete as replacement of cement. This study covers the utilization of recycled aggregates in place of cement and RHA as a replacement of cement in the production of concrete. Their utilization in the concrete shows that the both can be used as alternate material for the concrete production paving the path to sustainable development. This study will help the construction industry to enhance the potential to use such waste in the construction.*

*Keywords: Recycled Aggregates, Rice Husk Ash, Concrete, Construction waste, Demolition waste.*

### **INTRODUCTION:**

Presently, the use of recycled concrete aggregates produced from the construction waste is being emphasized for overcoming of shortage of natural aggregates [2]. In addition to this, the issues associated with the safe disposal of large quantity of the construction and demolition waste can be solved to a large extent with the recycling of such waste discarded construction debris [1].The moisture in the recycled aggregates had more effect on strength and workability of concrete [5].Improvement in the interfacial Zone were attained through mixing methods which enhance the property of the recycled aggregates. Workability of the concrete is mainly dependent on the fineness of particles Rice Husk Ash [4, 6]. Therefore, this study has been done to determine the result of recycled aggregates and (RHA) on mechanical and durability of the concrete.

### **MATERIALS USED AND THEIR PROPERTIES**

#### **CEMENT**

Ordinary Portland cement of 43 grade was used. Cement used was complying with the Standards Specifications of IS: 8112-1989[7]. Its properties are shown.

#### **Table 1: Test of Cement**

S.no	PHYSICAL TEST	RESULTS	IS: 8112-1989
1	Normal consistency	30%	-
2	Initial setting time (mins)	110	30 min
3	Final setting time (mins)	255	600 max

**RICE HUSK ASH**

Rice husk ash (RHA) is an agricultural waste obtained by burning rice at a temperature range of 300°C to 500°C [8] when concrete is made using RHA in concrete. 2.

**Table 2: Properties of Rice Husk Ash**

S.No	Particulars	Percentage (%)
1	Silica	88.32
2	Alumina	0.46
3	Fe <sub>2</sub> O <sub>3</sub>	0.67
4	CaO	0.51
5	Magnesia	0.44
6	K <sub>2</sub> O	2.91

**Properties of Fine Aggregates**

Specific gravity	2.65
water absorption	2.41
Fineness Modulus	2.85

**Properties of Fine Aggregates**

Specific gravity	2.62
water absorption	0.89
Fineness Modulus	6.13

**EXPERIMENTAL PROCEDURE**

**Mix proportions**

To study the effect of inclusion of rice husk ash and Recycled aggregate in concrete production. Aggregates were replaced by the recycled aggregates by 0%, 10%, 20% and 30% and cement was

replaced by the rice husk ash by 5%.Concrete of grade M30 was prepared by following the guidelines of IS 10262:2009[9].Several concrete mixes designated as follows.

**Table 3: Concrete Mix Designations**

<b>S.No</b>	<b>Mix Designation</b>	<b>Recycled Aggregates (%)</b>	<b>Rice Husk ash (%)</b>
1	RA0A0	0	0
2	RA10A0	10	0
3	RA20A0	20	0
4	RA30A0	30	0
5	RA10A0	10	5
6	RA10A0	20	5
7	RA10A0	30	5

RA denotes Recycled Aggregates and A represents Rice Husk Ash

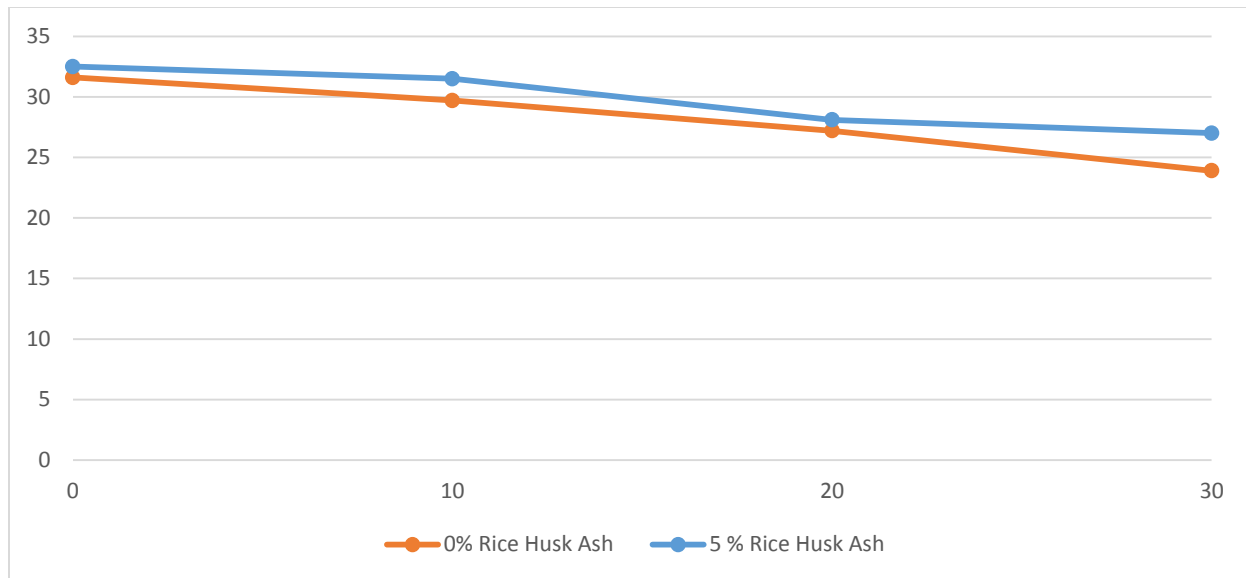
### **Specimen preparation and Curing**

Concrete mix was prepared in the pan concrete mixer. After the concrete was prepared its put into cubical moulds of 150 mm for compressive strength test [9], Cylindrical mould of 150mm dia and 300 mm height for split tensile strength test [10] and beam of 150 mm width and 700 mm span for determining the flexural strength [11] of concrete.

## **RESULTS AND DISCUSSIONS**

### **COMPRESSIVE STRENGTH**

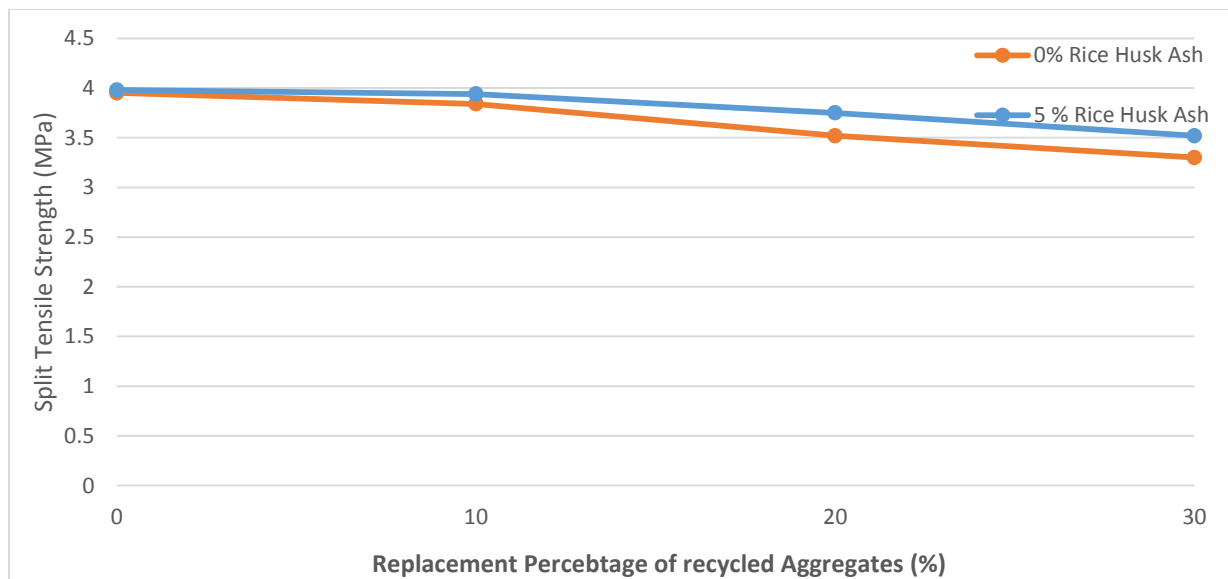
Experimental results Variation of the strength with aggregates is as shown.



**Fig 2: Variation of Compressive strength with the replacement percentage of Recycled aggregates.**

**SPLIT TESILE STRENGTH**

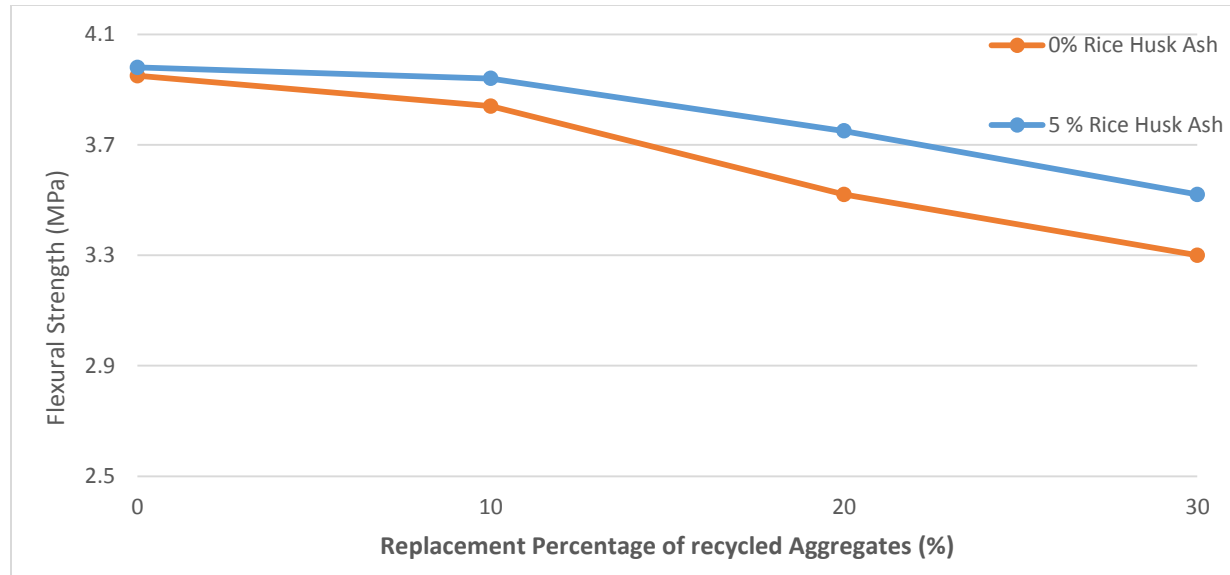
Experimental test result demonstrate that the split tensile strength decreases with the rise in the replacement of the recycled aggregates due to the weak attached mortar. Variation of Split tensile strength is shown. below



**Fig 3: Variation of Split tensile Strength with the replacement percentage of Recycled aggregates.**

**FLEXURAL STRENGTH**

This property also shows the same trend as of the compressive and split tensile Strength. Replacement of the recycled aggregates decreases the flexural strength of the concrete and addition of the RHA enhances it. Results of this test on concrete are shown in the Figure below.



**Fig 4: Variation of the Flexural Strength of the concrete with recycled Aggregates**

## CONCLUSIONS

This Study revealed that the Mechanical properties of concrete diminishes with increase in the replacement of Recycled aggregates and enhanced with the enhancement in rice husk ash replacement with the cement. Concrete having 10% recycled aggregate and 5% Rice Husk ash shows almost same strength as that of normal concrete mix without any replacement.

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