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# Review Paper on Thermal Insulating Material for Low Cost Housing

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**Abstract:** It is found that so many waste in traditional concrete e-waste like rubber, glass waste etc. the coconut shell is also main waste which can be used. It is an agriculture bio-degradable waste in most of the tropical countries in Asia which becomes much popular nowadays because of its easy handling and low deadload. Coconut shells dumped improperly in environment produced breeding places for the rats and mosquitoes so as to reduce the waste from the environment. Thermal insulation is a series of measures taken in order to keep the internal temperature of places at the desired level, to save energy used in heating-cooling operations for external climatic conditions, to overcome environmental problems and to reduce air pollution. Thermal insulation is a necessary practice in buildings so as to save energy, to ensure comfortable living settings and to avoid adverse physical problems caused by heat loss. Make thermal insulating material by using coconut shell with wax to reduce the temperature in low cost housing.

## I. INTRODUCTION

Thermal Insulation materials are very basic and important requirement for heat transfer operations. The basic aim of insulation is to retard the rate of heat flow in order to minimize the change of temperature of the system or the space. It examines factors that need to be taken into account for design and control of physical movements in a structure. Following a normal growth in population, the amount and type of waste materials have increased accordingly. Many of the non-decaying waste materials will remain in the environment for hundreds, perhaps thousands of years. The non-decaying waste materials cause a waste disposal crisis, thereby contributing to the environmental problems. However, the environmental impact can be reduced by making more sustainable use of this waste. This is known as the Waste Hierarchy. Its aim is to reduce, reuse, or recycle waste, the latter being the preferred option of waste disposal. Comfort, economy is found wherever human is found, comfort and economy necessitates insulation. Heat insulation, one of the types of insulation, described as all of the measures taken to decrease heat transfer among inner, outer and different temperatures has come to the fore as energy becomes indispensable to the daily life. Our project is for making insulating material by using coconut shell powder mixing with the wax and apply its coat to the house to decrease the temperature of the house. It is found that so many wastes which can be used in traditional concrete like e-wastes, rubber tyre waste, glass waste etc. The coconut shell is also a main waste which can be used in traditional concrete. Generally, coconut shells are used in traditional concrete in the form of viz., coconut shell aggregate and coconut shell fiber.

## II. STATE OF DEVELOPMENT

V. P. Kumbhar, S. S. Pawar Concrete is world's most widely used construction material. The utilization of concrete is increasing at a higher rate due to development in infrastructure and construction activities all around the world. However, there are some negative impacts of more production of concrete like continuous extensive extraction of aggregate from natural resources will lead to its depletion and ecological imbalance. Researchers are in search of replacing coarse aggregate to make concrete less expensive and to lead sustainable development. This environmental reason has generated a lot of concern in the construction world. The use of sugarcane bagasse, wooden chips, plastic waste, textile waste, polyethylene, rice husk ash, rubber tyres, vegetable fibers, paper and pulp industry waste, groundnut shell, waste glass, broken bricks are some examples of replacing aggregates in concrete. Modification in Concrete: This has necessitated research into alternative materials of construction. There is an increasing interest in what happens to products at the end of their useful lives, so natural materials have an advantage in that they can biodegrade or burn in a carbon-neutral manner. Concern for sustainable development has emerged as one of the major societal issues of the late 20th century. This pertains among others to environmental issues and the conservation of natural resources. The beginnings of this awareness are difficult to pinpoint, but it is clear that it did not originate in the United States, where a public accustomed to an abundance of natural resources was relatively late to realize the limits of these resources and the real costs associated with their wasteful exploitation. But at present, environmental consciousness is being encountered in all walks of life. In the construction industry, increasing attention is being paid to the concept of "green buildings". The search for "green" or environmentally friendly

materials in the building industry involves the development of new materials but might also lead to the reconsideration of traditional ones. The use of sugarcane bagasse wooden chips, plastic waste, textile waste, polyethylene, rice husk ash, rubber tyres, vegetable fibers, paper and pulp industry waste, groundnut shell, waste glass, broken, bricks are some examples of replacing aggregates in concrete.

Shengjeliu, School of highway Chang University, China The penetration ductility at 15°C, m-value reduce gradually as content of wax increases while the penetration index and softening point, creep stiffness result decreases. The wax addition could reduce binding viscosity at high temperature thus allow low mixing and laying temperature. But when the asphalt temperature below the wax melting point reduce the viscosity is offset again or effect is reverse. Both the test conducted arrive the same result that the wax can enhance the consistency of asphalt and reduce the temperature sensitivity of asphalt by high temperature of asphalt. Based on analysis the result of classic and SHRP test this is the meaningful relationship between penetration, softening point. In contrast there is no relationship between ductility stiffness/M value parameter.

B.Damodhara Reddy<sup>1</sup>, Fawaz Shaik In our study, we replaced coarse aggregate with coconut shell, by volume. Specimens were cast by replacing 25%, 50%, 75% and 100% of coarse aggregate with coconut shells. Tests were conducted on the cast specimens after 28 days as mentioned in the IS code. Tests for workability, flexure, compression and split tensile strength were conducted and results were obtained. Coconut shell concrete has better workability because of the smooth surface on one side of the shells and the smaller size of coconut shells. So we could possibly use coconut shell concrete in concretes where high workability is desirable. The flexural strength of CSC is approximately 5.36 N/mm<sup>2</sup>, 4.32 N/mm<sup>2</sup>, and 2.4 N/mm<sup>2</sup> for specimens replacing 25%, 50%, 100%, of coarse aggregate respectively. But in case of 100% replacement of coarse aggregate flexural strength was not obtained as the specimen failed under its self-weight. Its corresponding compressive strengths were obtained as 24 N/mm<sup>2</sup>, 22.62 N/mm<sup>2</sup>, 14.93 N/mm<sup>2</sup> and 5.48 N/mm<sup>2</sup>. The splitting tensile strength of CSC was obtained as 2.48 N/mm<sup>2</sup>, 2.22 N/mm<sup>2</sup>, 1.27 N/mm<sup>2</sup> and 0.495 N/mm<sup>2</sup> respectively. From the above results we can see that in CSC where 25% of the coarse aggregate is replaced, shows properties similar to the nominal mix and 50% replaced CSC shows properties similar to light weight concrete which can be used as filler materials in framed structures, flooring tiles, thermal insulating concrete etc.

Abdullah Anwar. Experimental investigation is performed to determine the Compressive Strength of Coconut Shell Concrete on partial replacement of natural coarse aggregate and also to compare the behavior of concrete for more fruitful outcome. At different proportions, varying strength of concrete was observed, which are measured in N/mm<sup>2</sup>. The results obtained for 28-day compressive strength confirms the optimal percentage requirement for substitute of natural coarse aggregate with Waste Coconut Shell. The purpose of this research is to compare and find out the characteristic strength of M20 grade Coconut Shell Concrete at the water cement ratio of 0.50. Using the waste coconut shell by replacing fast depleting conventional aggregate source construction material and thereby getting the solution for social and environmental issues. Coconut shell concrete is also classified as structural lightweight concrete. It is concluded that the Coconut Shells are more suitable as low strength-giving lightweight aggregate when used to replace common coarse aggregate in concrete production. The compressive strength of concrete was reduced as the percentage replacement increased. Concrete mixtures were tested and compared in terms of compressive strength of the conventional concrete at 28 days. The results showed that Coconut Shell Concrete (CSC) can be used in light weight concrete construction. Utilization of Coconut Shell will not only be cost effective and Eco friendly, but also resolve the issues related to shortage of conventional material and problem of disposal of waste material.

Parag s. Kambli, Sandhya R, Mathapathi

From the experimental results and discussion, the coconut shell has potential as lightweight aggregate in concrete. Also, using the coconut shell as aggregate in concrete can reduce the material cost in construction because of the low cost and abundant agricultural waste. Coconut Shell Concrete can be used in rural areas and places where coconut is abundant and may also be used where the conventional aggregates are costly. Coconut shell concrete is also classified as structural lightweight concrete. It is concluded that the Coconut Shells are more suitable as low strength-giving lightweight aggregate when used to replace common coarse aggregate concrete

concrete production. Oil palm shell (OPS) is a waste from the agricultural sector and is available in large quantities in the tropical regions. The high cost of conventional building materials is a major factor affecting housing delivery in world. This has necessitated research into alternative materials of construction. The project paper aims at analysing compressive strength characteristics of concrete produced using crushed, granular coconut as substitutes for conventional coarse aggregate with partial replacement. The main objective is to encourage the use of these 'seemingly' waste products as construction materials in low-cost housing. It is also expected to serve the purpose of encouraging housing developers in investing these materials in house construction.

### III. CONCLUSION

From study done results obtained we reach on conclusion that these Coconut shell powder and wax can be used as insulation material for low cost housing. Also these coconut shells are light weight and easy to handle and can reduce the overall material cost of any low cost house. Micro-crystalline wax can be used as a binder for coconut shell powder for insulation purpose external wall and interior wall of proposed model. Overall we have concluded that regular room temperature can be reduced by 4-5°C.

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