

MECHANICAL PROPERTIES OF EPOXY RESIN REINFORCED COCONUT COIR FIBER

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ABSTRACT – During this study the Mechanical Properties of epoxy resin reinforced coconut coir fiber by treating the fiber with NaOH by fraction of five you're studied here. All samples were created victimization hand lay-up technique and specimens were ready as per ASTM customary D3039. The samples were tested in line with ASTM D3039 customary victimization Universal Testing Machine (UTM). The numerous findings of the analysis showed that NaOH treatment improved the tensile properties, plasticity and hardness of the composite more Increase long of fibers was found to extend the enduringness. The utmost enduringness was found for fiber fibers.

I. INTRODUCTION

In recent years, the economic demand for composite materials is increasing rapidly. However, most composite materials are created from artificial fibers and resins. As a result, the present production of composite materials still has several issues and also the most worrying concern is that the setting and human health. From those challenges, fiber composite is step by step changing into a worldwide analysis and development trend. Natural fibers are associate in nursing well endowed and natural resource, so their value is comparatively low compared with different standard fibers. They are eco-friendly, perishable and cut back the matter of solid waste production once accustomed replace non-degradable fillers. The target of this study is to approach and find out about fiber composite, that is split into 2 main stages. Within the initial one, we have a tendency to find out about fiber and matrixes of natural fiber composites. In the second stage, material testing experiments were performed on the coir fiber sheet strengthened epoxy resin composites to see their mechanical properties still as to search out the mechanical properties of the coir fiber sheet victimization the rule of mixtures theory. Therefore, the more purpose of this study is to use fiber composites in aeronautical engineering like producing little pilot less aerial vehicle.

Composites: A definition A material is created by combining 2 or a lot of aterials to convey a singular combination of properties, one among that is created up of stiff, long fibers and also the different, a binder or 'matrix' that holds the fibers in situ.

Composites Properties: Natural fiber are currently thought of as an acceptable different to glass fiber, thanks to their benefits, that embody low value, high strength-to-weight ratio, and recyclability. Combining natural fiber with glass fiber conjointly decreases the usage of glass fiber. During this investigation, hybrid glass-/sisal-fiber composites were invented victimization the hand lay-up technique.

Epoxy resins: Epoxy resins are characterized by the presence of quite one, 2- epoxide teams per molecule. Cross-linking is achieved by introducing curatives that react with epoxy and hydroxyl group teams set on adjacent chains

Reinforcement: The target of the reinforcement in an exceedingly material is to enhance the mechanical properties of the resin system. All of the distinct fibers that are employed in composites have distinct properties so have an effect on the properties of the composite.

II . LITERATURE SURVEY

TITLE: MECHANICAL PROPERTIES OF COCONUT FIBER REINFORCED EPOXY POLYMER COMPOSITES

AUTHOR: SATENDER KUMAR, KAKALI DEKA, SURESH

DESCRIPTION: The sphere of composite materials has progressed significantly over the previous couple of decades. Properties like density, high strength and stiffness, chemical and corrosion resistance, etc. build composite materials a gorgeous different to metals and alloys. The well endowed availableness of natural fiber provides attention on the development of natural fiber composites primarily to explore added application avenues. Reinforcement with fiber in composites has recently gained attention thanks to low value, simple availableness, density, acceptable specific properties, easy separation, increased energy recovery. Natural fibers like ramee, hemp, jute, sisal, bamboo, banana, feather palm fibers, etc. are used as reinforcements in situ of glass fibers . Composite mechanical properties are improved with the rise in fiber weight fraction. However once the fiber weight fraction is simply too massive, the composite fiber bundle strength and supreme strength gets reduced. conjointly it depends on the method during which the fibers are aligned with matrix. Coir fibers are used as reinforcement during this work, because it is non-toxic, low cost, high polymer content, density, simple availableness and fewer tool wear. The studies unconcealed that fiber weight fractions have important effects on mechanical properties of composite like strength, stiffness and toughness. therefore the target of this work is to investigate the mechanical properties of coir fiber strengthened composites with completely different weight fraction of fiber.

**TITLE: CHARACTERISTICS ANALYSIS OF COCONUT SHELL HUSK
REINFORCED POLYMER COMPOSITES**

AUTHOR: VINOTH KUMAR, CHANDRASEKARAN, SANTHANAM

DESCRIPTION: At the start fiber fiber was move a length of 10mm, and calculated volume of fiber is weighed and it's mixed with the resin completely. Coconut shell powder was conjointly weighed as per volumetrical fraction and mixed with the resin. Hand lay-up technique was followed to fabricate the composite samples. The ultimate mixture is gently mixed to avoid any formation of bubbles. Finally the mixture is poured into the mould and allowed to cure. A light-weight compression is applied by inserting a weight of around 200N over the mould. Once natural action, the composite samples were taken and they were cut as per ASTM standards for mechanical properties testing. To prepare samples for wear testing, 2 halves of steel mould was employed in the form of a hollow cylinder. The mixture of resin, fiber and filler was poured into the mould for specimen preparation. Pin holotype of length 35mm and 10mm diameter was ready for wear test.

**TITLE: FABRICATION AND TESTING OF REINFORCED COMPOSITES
USING NATURAL RUBBER AND NATURAL FIBER**

**AUTHOR: RAMEEZ, REVAL ALEXANDER, RONNIE THOMAS ROY,
RONNIE MATHEW, HARIKRISHNAN**

DESCRIPTION: The mechanical properties of elastomers will with success be improved by adding reinforcing ingredients, like atomic number 6 and oxide. Lately it has become evident that the addition of an acceptable short fiber leads to more improvement in mechanical properties. Reinforcement of elastomers with short fibers combines the rigidity of the fiber with the snap of rubber. Progresses within the field of materials science and technology have born to fascinating and extraordinary materials called 'composites'. A material will be outlined as a macroscopic combination of 2 or a lot of distinct materials, having a recognizable interface between them. Composites are created from continuous and discontinuous medium. The discontinuous medium that's stiffer and stronger than the continuous part referred to as [is named] [is termed] the reinforcement and also the thus called continuous part is said because the matrix. The properties of a composite are hooked in to the properties of the constituent materials,

and their distribution and interaction. At gift composite materials play a key role in region trade, industry and in different engineering applications as they exhibit outstanding strength to weight and modulus to weight magnitude relation. Over the past few decades, we have a tendency to found that polymers have replaced several of the standard metals and materials in numerous applications. This can be doable thanks to the benefits polymers supply over standard materials. The foremost necessary benefits of victimization polymers are the benefit of process, productivity, and cost reduction. In most of those applications, the properties of polymers are changed victimization fillers and fibers to suit the high strength/high modulus necessities. Fiber-reinforced polymers supply benefits over different standard materials once specific properties are compared. These composites are finding applications in numerous fields from appliances to spacecrafts. Natural fibers have recently attracted the eye of scientists and technologists thanks to the benefits that these fibers give over a subject of interest for the past few years. These natural fibers are inexpensive fibers with density and high specific properties. These are perishable and nonabrasive, in contrast to different reinforcing fibers. Also, they're without delay accessible and their specific properties are like those of different fibers used for reinforcements.

**TITLE: REINFORCED THE MECHANICAL PROPERTIES OF COCONUT
FIBER FIBER STRENGTHENED WITH EPOXY GLUE AW 106 & HV 953 IN**

AUTHOR: ABDUL NAZEER

DESCIPTION: The NaOH treatment on coir fiber would take away the impurity and rougher fiber surface could result once treatment. This may increase the adhesive ability of the coir fiber with the matrix within the invented composite leading to smart enduringness. The treated fiber have higher reinforcing property than un-treated fiber. It is determined that the tensile strain at break for treated fibers is quite un-treated fibers, that shows deflection of treated fibers is quite un-treated fibers, that conclude that by treating the fibers with NaOH increase the property of ductility. It is determined that by dynamical the length of fibers the mechanical property of the composite changes increase long of fiber increase the mechanical property. The investigation resulted that if the fibers are treated, then the extension of composite at break is quite un-treated fibers and extension of composite will increase with increase in fiber length. The load at break will increase with increase in fiber length

**TITLE: MECHANICAL BEHAVIOR OF COIR FIBER REINFORCED
EPOXY COMPOSITES WITH VARIABLE FIBER LENGTHS**

AUTHOR: V. S. JAGADALE, S. N. PADHI

DESCRIPTION: A radical survey of the mechanical conduct of the fiber / epoxy composite was performed supported numerous fiber lengths. Alkali coir fiber medical care has conjointly been performed. The analysis resulted to the subsequent findings.

1. epoxy glue are often created with alkaline-treated fiber by hand-laying technique.
2. In tensile testing, tensile resistance with growing fiber length step by step improves. It conjointly has been discovered that alkaline-treated composites with fiber load show outstanding enduringness. With a fiber length of fifteen millimetre, the very best enduringness is therefore non heritable.

III . TESTING METHODS

TENSILE STRENGTH

The check was done employing a universal testing machine and performed in line with ASTM D638. The equation declared below was accustomed calculate the tensile properties of the fabricated composites:

Tensile strength = maximum stress (nm or mpa)

Stress = load/ cross sectional area

Strain = change in length/ original length

Tensile modulus = stress/ strain

FLEXURAL STRENGTH

Flexural check for the samples was performed employing a universal testing machine. The 3 purpose flexural check was conducted in line with ASTM D790. Flexural strength was calculated victimization equation.

Flextural strength (mpa) = $3pl/2bd$

Wherever p = applied load (n), l = span length(mm), b = breadth of specimen (mm),

D = thickness of specimen(mm)

IMPACT STRENGTH (CHARPY)

Charpy impact check was administrated to see the toughness of the composites samples in line with ASTM D256 victimization charpy principle.

IV. CONCLUSION

The mechanical properties of epoxy resin reinforced coconut coir fiber have been studied and mentioned here. The subsequent conclusions are often drawn from the study of survey. Here, we've used arbitrarily continuous fiber layout within the composite, in order that the magnitude relation of fibers within the composite is high. This investigation shows that increase long of fiber will increase the enduringness. By help of these knowledge we can do it in better way.

V. REFERENCE

- [1] Aireddy, H., Mishra, S.C., Tribological behaviour and mechanical properties of bio waste reinforced polymer Matrix composites, J. metal. And Mater. Sci., 53(2) (2011) 139-152.
- [2] Jia Yao, Yingchang Hu, Wen lu, Performance Research On Coir Fiber And Wood Debris Hybrid Boards. Bio Res.7 (3)(2012) 4262-4272.
- [3] Mazan, S., Zaidi, A.M., Ahmad, Arsat N., Hatta, M.N.M, Ghazali, M.I, Study on sound absorption properties of coconut coir fiber composite with added recycled rubber, Inter. J. of integ. engg. 2(1) (2010) 29-34.
- [4] Slate, F. O. (1976). "Coconut Fibers In Concrete." Eng J Singapore, 3(1), 51-54.
- [5] Geethamma, V.G, Kalprasad, G, Thomas Sabu, dynamic mechanical behaviour of short coir fiber reinforces natural rubber composite, Elseveir compos. part A ,36(11) (2005) 1495-1506.
- [6] A.Karthikeyan , K.Balamurugan and A.Kalpana "The Effect Of SLS treatment On Tensile Property Of Coconut Fiber Reinforced Epoxy Composites". IJST, 2014, pp 157-166.
- [7] Arpitha G.R, Sanjay M.R, L.LaxmanaNaik, B.Yogesha "Mechanical Properties Of Epoxy Based Hybrid Composites Reinforced with Sisal/SIC/Glass Fibers". IJEIT, Aug-Sep,2014.
- [8] A. Karthikeyan, K.Balamurugan and A. Kalpana "The new approach to improve the impact property of coconut fiber reinforced epoxy composites using sodium laulryl sulfate treatment". JSIR, Feb 2013, pp. 132-136.
- [9] U.S.Bongarde, V.D.Shinde "Review on natural fiber reinforcement polymer composites". IJEST, March 2014