



## Characterization of Natural Fiber Coir

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### ABSTRACT

Natural fiber-primarily based composites are under intensive look at because of their ecofriendly nature and odd homes. The benefit of herbal fibers is their continuous supply, clean and safe coping with, and biodegradable nature. Even though herbal fibers showcase admirable physical and mechanical properties, it varies with the plant supply, species, geography, and so on. Coir is one of the abundantly to be had wastes substances of India and has not been studied but as its miles required. An in depth have a look at of chemical, bodily, and mechanical properties will deliver out logical and reasonable utilization of coir for diverse packages. From the socioeconomic angle, coir may be a brand-new source of raw cloth to the industries and may be potential substitute of the expensive and non-renewable synthetic fiber. But few research on coir had been completed describing the interfacial adhesion among fibers and reinforcement compatibility of fiber however a detailed examine on coir homes is not available. On this assessment, author covered the primary information of coir and in comparison, the chemical, physical, and mechanical residences with different herbal fibers. Moreover, it summarizes the current work said on physical, mechanical, and thermal homes of coir bolstered

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### 1. INTRODUCTION

Treatment of fiber the crucial substance fabric of Coir fiber is cellulose, hemi-cellulose, and lignin. Cellulose and hemi-cellulose is a polysaccharide compound while lignin is a Macromolecules polyphenolic compound. The electricity or flexibility of composite can be Received with the aid of reasoning of the relationship between the fiber floor with a grid, the Way to build the fiber, and reinforcer angle ought to have a higher flexible modulus Than the framework. The places of the composite not set in stone thru similarity among Homegrown strands. Likewise, the outer layer of everyday filaments moreover has dirt and One-of-a-kind materials which could affect the retaining electricity of the strands with the framework. Thus, specific explorations have been carried out to enhance the presence of strands specifically the initial step converted into NaOH remedy, contrasted with untreated strands, a sodium Bicarbonate ( $\text{NaHCO}_3$ ) treatment, with fluctuating fixations. Besides, after each step of remedy, the fiber was without delay dried in a broiler without washing with delicate water. The goal of this exploration is to investigate the aftereffect of compound cure on Coir fiber according to Coir fiber.

Coir is likewise referred to as Coir fiber, is a natural fiber extracted from the outer husk of Coir and used in products consisting of floor mats, doormats, brushes and mattresses and from cotton flax Plant became discovered. Coir is the fibrous material discovered among the hard, internal shell and the outer coat of a Coir. It's miles regularly applied in mats, brushes, and firing. The coir fiber is reasonably water-resistant and is one of a handful of the ordinary filaments impervious to harm via salt water. Each Modulus and elasticity rely emphatically upon the sort of fiber (P.C. Or single fiber) and Dampness content. The call for for timber as a constructing fabric increasing Every day but the availability has been diminishing. Subsequently there may be a want for the developments of alternative Cloth. There were many options that may Replace the timber among which the composite was great Appropriate. Composite substances were substances which Were fashioned from two or extra constituent cloth Which could provide the ideal properties and the Materials may be without difficulty separated. Composite material Has levels. Matrix section: The matrix phase is the non-stop section Inside the composite. It could be a polymer, metallic or ceramic. Amongst that polymer is remember to be pleasant by its Mechanical and thermal residences. It's far low fee and clean fabrication as a result it's miles economical. Reinforcing segment: The reinforcing segment is the Distribution phase inside the composite. Many reinforcing Materials have been to be had such as the natural fiber, Synthetic fiber, particle and so forth. Composite substances have excessive mechanical houses While in comparison to anybody fabric. Composite Material results in a newly cloth with high mechanical and thermal homes which cannot be Completed via a single cloth. Nowadays there was a developing hobby in Growing herbal fiber strengthened polymer composite for low price structures and constructing packages. In Many nations in which the availability of natural fibers Had been ample, the scientists and engineers apply



Appropriate generation to utilize the ones natural fibers Economically in growing notable fiber strengthened Polymer resin composite for constructing and exclusive Applications. A proper composite should have top Distribution of fibers in the matrix. An extraordinary Distribution method the fibers were absolutely isolated from Every of them and they want to be surrounded with the aid of polymer Matrix. As a end result there's a need for the improvement of the Fiber bolstered in a polymer composite for the Substitution to the scarce timber and also for the artificial Fibers.

Fiber	Density (g/cm <sup>3</sup> )	Elongation (%)	Tensile strength (MPa)	Moisture absorption	Young's modulus (GPa)
Cotton	1.5-1.6	3.0-10.0	287-597	8-25	5.5-12.6
Jute	1.3-1.46	1.5-1.8	393-800	12	10-30
Flax	1.4-1.5	1.2-3.2	345-1500	7	27.6-80
Hemp	1.48	1.6	550-900	8	70
Ramie	1.5	2.0-3.8	220-938	12-17	44-128
Sisal	1.33-1.5	2.0-14	400-700	11	9.0-38.0
Coir	1.2	15.0-30.0	175-220	10	4.0-6.0
Softwood kraft	1.5	—	1000	—	40.0
E-glass	2.5	2.5-3.0	2000-3500	—	70.0
S-glass	2.5	2.8	4570	—	86.0

Mechanical properties of fibers

Table 1: Chemical and Mechanical properties of natural fiber.

Properties	Natural fiber	Glass fiber
Density	Low	Double
Cost	Low	High
Renewability	Yes	No
Recyclability	Yes	No
Energy consumption	Low	High
Distribution	Wide	Wide
CO <sub>2</sub> neutral	Yes	No
Abrasion to the machine	No	Yes
Health risk when inhaled	No	Yes
Disposal	Biodegradable	Nonbiodegradable



## 2. Objectives

Within the present paintings, a composite containing Coir leaf fibers as reinforcing section and epoxy Resin as matrix segment is developed by the use of hand layup technique.

Then the evolved specimens had been subjected to Tensile check, flexural take a look at and hardness check to Determine the residences.

The received values of mechanical houses of Each quantity ratio is tabulated and compared.

The choicest extent ratio for which the composite Show higher mechanical residences is concluded.

## 3. MATERIALS AND METHODS

Fiber treatment method

Purpose methodology

- 10% NaOH solution
- 20 gm coir and wash and soak in H<sub>2</sub>O for 2 Hr
- NaOH treatment
- Clean the coir and deep in 10% NaOH solution for 2 Hr
- After 2 Hr clean the coir in H<sub>2</sub>O and put in a hot air oven for 6 hr (90 - 100 C).

Purpose methodology

- 10% NaHCO<sub>3</sub> solution
- 20 gm coir and wash and soak in H<sub>2</sub>O for 2 Hr
- NaHCO<sub>3</sub> treatment
- Clean the coir and deep in 10% NaHCO<sub>3</sub> solution for 2 Hr
- After 2 Hr clean the coir in H<sub>2</sub>O and put in a hot air oven for 6 hr (90 - 100 C).

Purpose methodology

- 10% H<sub>2</sub>O<sub>2</sub> solution
- 20 gm coir and wash and soak in H<sub>2</sub>O for 2 Hr
- H<sub>2</sub>O<sub>2</sub> treatment
- Clean the coir and deep in 10% H<sub>2</sub>O<sub>2</sub> solution for 2 Hr
- After 2 Hr clean the coir in H<sub>2</sub>O and put in a hot air oven for 6 hr (90 - 100 C).

## 4. RESULTS

FTIR results of coir treated with chemicals

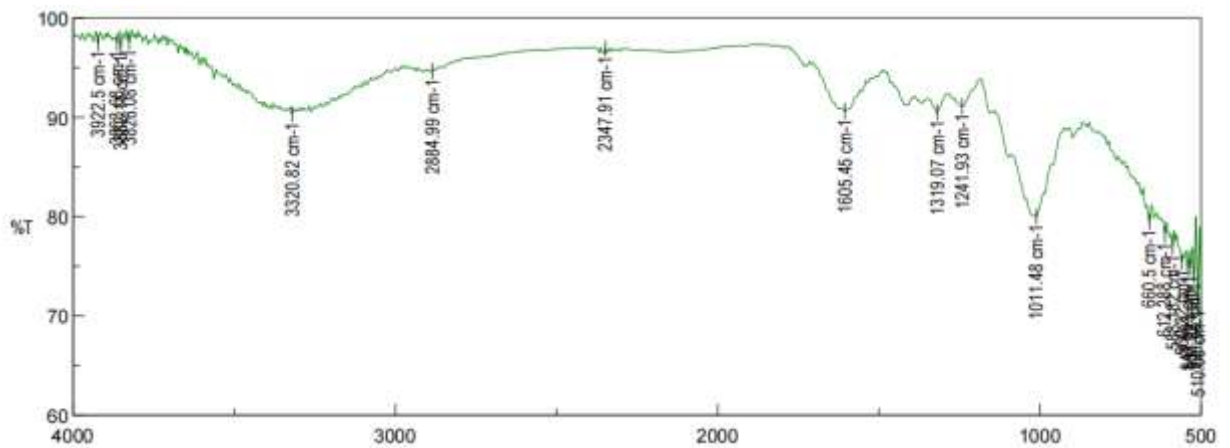


Figure 1- UNTREATED COIR FIBER

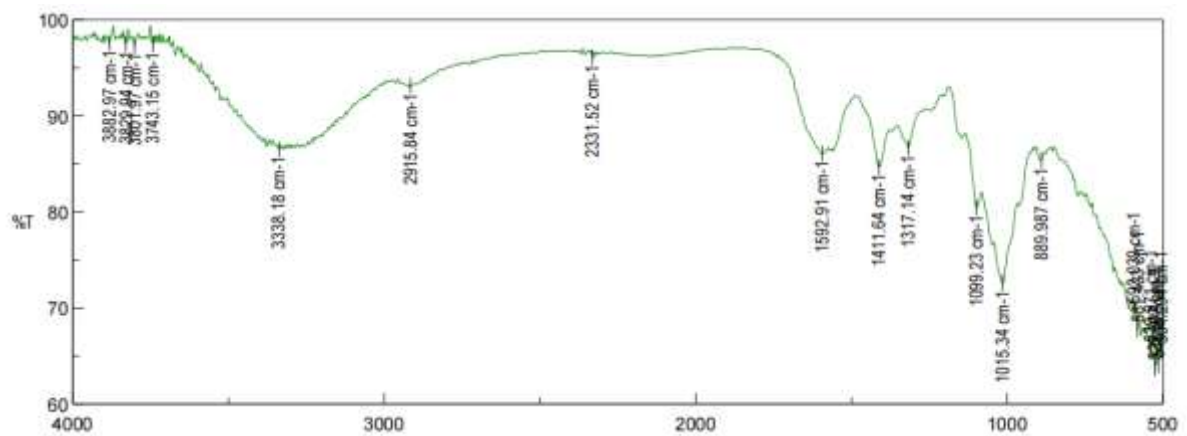


Figure 2- COIR FIBER TREATED WITH 10% NaOH SOLUTION

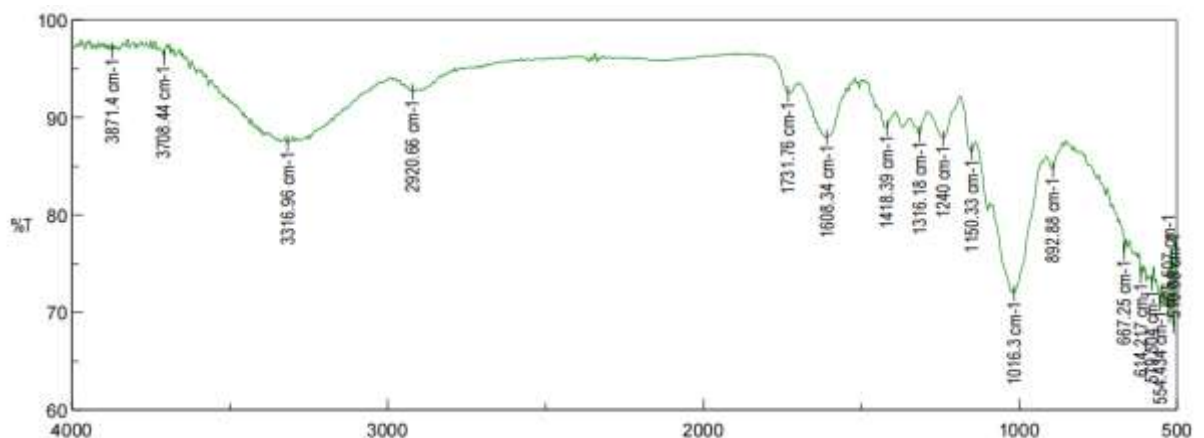


Figure 3- COIR FIBER TREATED WITH 10% NaHCO3 SOLUTION

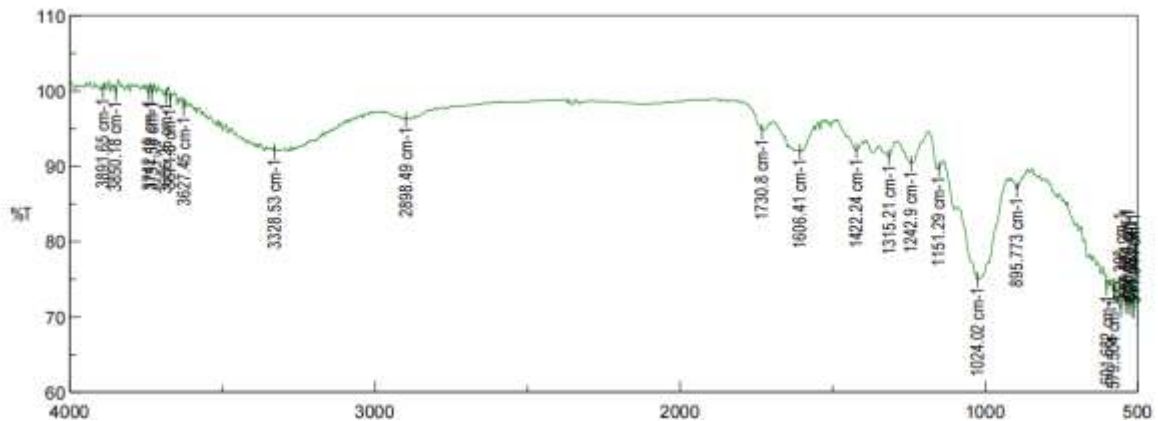


Figure 4- COIR FIBER TREATED WITH 10% H<sub>2</sub>O<sub>2</sub> SOLUTION

### 5.Result &Discussion

Perceive demonstrates the coir fiber untreated. Perceive demonstrates the hard surface of the fiber in view of the crystallization of NaOH answer for drying at a temperature of 90 °C for five hours. Decide shows enormous grain crystallizations while in parent recommendations little grains converge with each other, it seems strong. Salt cure makes the harshness of a fiber surface exceptionally unique from the untreated Fiber surfaces. Regardless of the way that, the harshness isn't super durable because in reality crystallization of NaOH can be delivered effectively while the coir fiber is absorbed by other responses. This happened after the coir fiber absorbed Response a water as demonstrated parent. Crystallization that is diminished is likewise found by the parent, the (FTIR) investigation impacts an Almost straight line other than inside the cure.

### 6.Conclusion

Coir leaf fiber is very common in tropical regions and very simple to extract fibers from its leaves. The utilization of coir leaf fiber in composite material is a new source of materials which can be economic, ecofriendly, and recyclable. However, the main issue of Coir Leaf Fibers is its hydroscopic nature, which makes a big hurdle for fiber utilization as a reinforced material in polymer composites. Surface modification of Coir Leaf Fibers is required to improve for good interfacial adhesion of Coir Leaf Fibers with polymers in fabrication of polymer composites. Synthetic fibers can be replaced or partially substituted with Coir Leaf Fibers in fabrication of composite products for different applications.



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