CHEMICAL TREATMENTS OF MOROCCAN SISAL FIBER FOR MECHANICAL APPLICATIONS ON BIOCOMPOSITES

Ilham. ESSAKET[1,3(*)] , Mohamed. EL WAZNA[2], Anas. EL MALIKI[1], Omar. CHERKAOUI[3]

[1]*Laboratory of Mechanics, engineering and innovation, (LM2I), ENSEM, Hassan II University, Casablanca, Morocco (E-mail:* a.elmaliki@ensem.ac.ma*)*

[2] *Laboratory of physic-chemical of applied materials, Sciences Faculty of Ben M'sik, University Hassan II Casablanca Morocco.(E-mail:* elwazna-mohamed@hotmail.fr*)*

[3] *Laboratory REMTEX, HigherSchool of Textile and clothing Industries, Casablanca Morocco(E-mail:* cherkaoui@esith.ac.ma*)*

(*) Email: i.essaket@esith.ac.ma

Abstract:

The aim of this work is to develop durable and functional sisal fiber reinforcements for bio composites to absorb and control the moisture in headspace of packaging to stabilize the water activity of the product [1]. Since the interface plays a major role in transferring the mechanical stress from the matrix to the fiber, it was important to develop a functional surface in order to increase interfacial adhesion between the fiber and polymere matrix in composite [2]. For this purpose, sisal fibers were first treated with sodium chlorite solution and then with potassium permanganate solution in 1% acetone

Alkaline Treatment & Chemical Enhancements Sisal fibers were extracted using an alkaline treatment, with 0.5% NaOH at 65°C for 40 minutes. Post-optimization, the fibers underwent two different treatments: one with potassium permanganate ($KMnO_4$) and the other with sodium chlorite ($NaClO_2$), to analyze the impact on physical and chemical properties through mechanical tests and water resistance.

Sisal fibers represent an attractive solution to reinforce composites, the main objective of our work was to improve the moisture absorption and mechanical properties of sisal fiber to produce band-wrapping composites in different spectroscopic differences . The results showed that the treatments reduced the impurities located on the fiber surface and increased the surface area .

Efficacy The Moroccan sisal fiber exhibited a low density of 1.21±0.0347 and high cellulose content of 63.33%. The most effective treatment for increasing tensile strength was with 0.5% NaOH and 0.09% KMnO4, achieving a maximum of 535MPa ±8MPa. This treatment also reduced the moisture and water absorption of raw sisal fibers by 61% and 56%, respectively. Pull-out tests indicated that treating Moroccan sisal fibers with KMnO4 and NaClO2 could increase tensile strength from 26N to 98N±1.8N and 87N±1.5N, respectively.

The treatments we have undergone which will be useful to reinforce biocomposites for the manufacture of packaging, the following objective to better justify the interfacial movement between the fibers and the matrix during the application of tensile stresses and identification of the dielectric properties of the composite plates made.

Keywords: *Bio composite; chemical modification; sisal fiber; absorption rates; mechanical properties*

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