CBECiMat
Congresso Brasileiro de Engenharia e Ciência dos Materiais
06 a 10 de Novembro de 2016
Natal - RN - Brasil

PHYSICOCHEMICAL CHARACTERISTICS OF THE COCONUT PULP (*Acrocomia aculeata*) FOR USE AS SUPPORT OF PROTEINS AND METAL MATERIAL

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1. INTRODUCTION

The fruit of the Acrocomia aculeata, native palm tree typical of the tropical region, is exploited mainly for the manufacture of oils and animal consumption. This study was aimed to determine the physicochemical characteristics of the residue of the Acrocomia aculeata coconut pulp in order to apply it in the development of new materials that can retain metals and proteins like as enzymes

2. MATERIALS AND METHODS

STEP 1

Collected fruits and pulverized coconut pulp

STEP 2

- *Assessed the solubilities of the native material and the obtained modified material*
- *Analysis of crude fiber, protein, fat and calories and INAA by GAFTA standard methods*
- *IR for evaluate functional groups*

STEP 3

Analysis by EPR and SEM

STEP 4

Generate magnetized biocomposite and retain protein (lipase) on surface

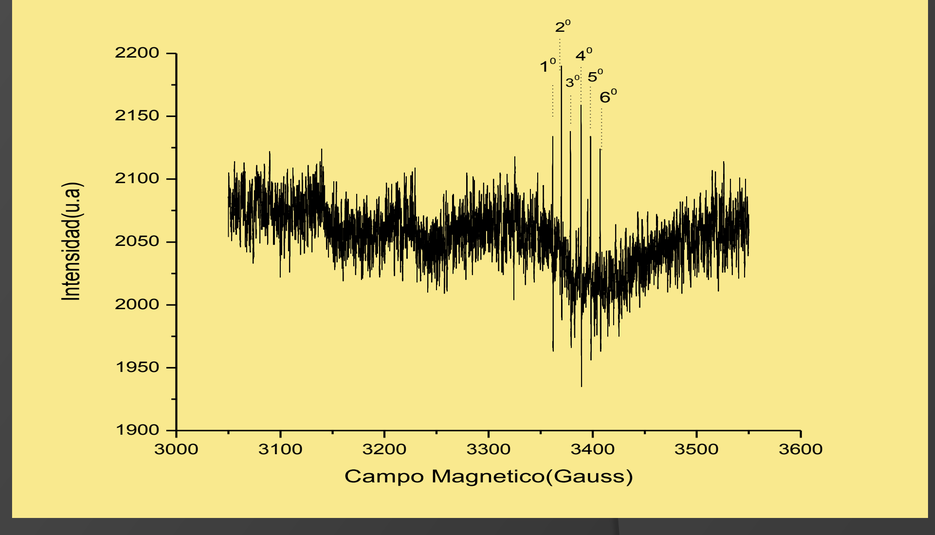

Fig.1: Spectrum of EPR at room temperature for native coconut pulp shows that is not paramagnetic material

Reaction mechanism for obtaining the magnetic biocomposite with coconut pulp :

$$Fe^{+2} + 2Fe^{+3} + 8OH^{-} \leftrightarrows Fe(OH)_2 + 2Fe(OH)_3 \rightarrow Fe_3O_4 + 4H_2O$$

IR with Transformed Fourier showed the existence of changes in the double link lengthening conjugated and aromatic; and link double nitrogen C=N/N=O that appears at 1600 cm^{-1}. For the native coconut pulp powder and bleached coconut pulp powder watched peaks in 2400 cm^{-1} and 3600 cm^{-1} that indicate the presence of elongations of links (+NH) and NH bonds elongations unassociated
INAA analysis shows the presence of potassium and magnesium in this ecomaterial

3. RESULTS AND DISCUSSIONS

Table 1: Solubility of *Acrocomia aculeata* coconut pulp in differents solvents for native and modified material

Solvent	*Solubility in native system*	*Solubility of bleached coconut pulp*	*Solubility of coconut pulp derivatized with glutaraldehyde*
Hexane	Insoluble	Insoluble	Insoluble
Isobuthanol	Insoluble	Insoluble	Insoluble
Terbuthanol	Insoluble	Insoluble	Insoluble
Ethanol	Insoluble	Insoluble	Insoluble

Table 2: Physicochemical parameters (dry base) of native coconut pulp (*Acrocomia aculeata*)

Parameters	Mean	Method
Fat (%)	25,2 ±0.5	GAFTA 3:0:2014
Crude fiber content (%)	6.95±0.5	GAFTA 9:0:2014
Protein concentration (%)	5.48±0.5	GAFTA 3:0:2014
Heat capacity cal/g	5262,0173±4	Calorimeter

Fig. 2 Scanning electron microscopy (SEM) of pancreatic lipase immobilized on bleached coconut pulp with glutaraldehyde

Table 3: Retention rate of pancreatic lipase enzyme immobilized on three types of supports

Pancreatic lipase immobilized on bleached coconut pulp	
Retained Protein concentration	77,53%
Retained lipase activity	14,24%
Pancreatic lipase immobilized on bleached coconut pulp with glutaraldehyde	
Retained Protein concentration	63,61%
Retained lipase activity	13,87%
Pancreatic lipase immobilized on magnetized coconut pulp	
Retained Protein concentration	80%
Retained lipase activity	14%

4. CONCLUSION

Due to the easy acquisition of the raw material and that its processing does not require high technology; the coconut pulp powder has a structure for use as a support of metals and proteins. The percentage of crude fiber, insolubility in solvents of varying degrees of polarity, functional groups of carbon-nitrogen and its versatile results in the immobilization of lipase generate an ecomaterial able to be a ferromagnetic support of enzymes.