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EFFECTS OF DIFFERENT PRETREATMENTS ON BIOMASS COMPOSITION EVALUATED BY SPECTRAL AND CHEMOMETRIC TECHNIQUES

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Abstract

Biomass is a very important source for the production of biofuels. During the hydrolysis step of the process for obtaining biofuels the rate of decomposition of biomass is strictly related to its organic matter content and the operating mode of the facilities. This paper highlights the effect of different pretreatments on the composition of biomass at the molecular level using Fourier Transform Infrared Spectroscopy (FTIR) and Principal Component Analysis (PCA). For this experiment, a mixture of vegetable waste as a potential source of abundant and sustainable feedstock for biofuels was used. Vegetable wastes were subjected to physical and chemical pretreatment. The physical pretreatment comprised in exposing the wastes at a temperature of 120°C for 20 minutes in an autoclave. For the chemical pretreatment, Schweizer reagent, sodium hydroxide and urea were used. FTIR analysis shows that the chemical pretreatment leads to important changes at the molecular structures level, associated with the presence of sucrose, amide, phospholipids and carboxylic acids. Moreover, results of PCA analyses confirm that the region of C=O and C=C stretching vibrations (1500-1800 cm⁻¹) are sensitive to NaOH and urea pretreatments on the biomass. For the physical pretreatment, no substantial changes at the molecular structure level were observed.

Key words: biomass, chemical pretreatment, FTIR, physical pretreatment, vegetable waste

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