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Influence of grape stem pre-treatment on properties of extracted lignin

AUTHORS

AINOA CANDELA GIL / CETEM, C / PERALES S/N, YECLA
ALEJANDRA ARGÜELLES / CETENMA, C/ SOFÍA 6, CARTAGENA
ANAHÍ GINESTÁ / CETENMA, C/ SOFÍA, 6, CARTAGENA
MARTA MUÑOZ MARTÍ / CETEM, C/PERALES S/N, YECLA

PURPOSE OF THE ABSTRACT

Lignocellulosic biomass is a recalcitrant material with excellent chemical resistance due to its highly crosslinked structure between hemicellulose, cellulose, and lignin chains. Nevertheless, structural components of biomass show a wide range of applications to the depletion of fossil resources, as a renewable alternative if they are isolated, such as lignin. In south-east Spain, the winemaking sector is one of the leading economic activities, due to that, is a large lignocellulosic waste productor, and one of these wastes is stem grapes.

To achieve a high yield for isolated lignin, physic-chemical fragmentation technologies were investigated and the relation between the final lignin properties and the conditions of fragmentation was analysed. Different NaOH concentrations for alkali pre-treatment and alkali hydrolysis (at low molarity) were used for these fragmentation technologies which were combined with alternative technologies such as microwaves and ultrasound.

The influence of pre-treatment on properties of extracted lignin was studied using thermogravimetry and differential scanning calorimetry; gel permeation chromatography (to acetylated samples), Fourier-transform infrared spectroscopy, and phenolic content determination (%). The results obtained showed differences in lignin properties depending on the pre-treatment of the grape stem, such as phenolic content and molecular weight. In addition, alkali hydrolysis combined with alternative technologies pre-treatment provided similar results of characterized lignin with high alkali molarity pre-treatment, being a more sustainable treatment.

FIGURES

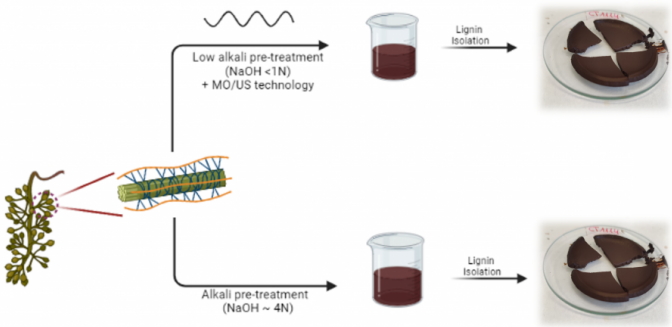

FIGURE 1

Figure 1

Procedure scheme

FIGURE 2

KEYWORDS

grape | lignin | microwaves | ultrasound

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