

GREEN “GRAPE STEMS” BIOREFINERY: POLYPHENOLS AND HEMICELLULOSE EXTRACTION

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Grape stems (GS) are winery wastes that belong to the vinification process. They could represent an environmental problem if they are not treated in a correctly way. Due to its high content on stilbenes and flavonoids, GS can be considered as a polyphenolic-rich by-product. The attraction paid to these type of compounds has widely increased as a result of their antioxidant, antimicrobial and/or anticarcinogenic properties.

In a first approach, GS were valorized in terms of polyphenols extraction using, two different methodologies. Firstly, solid-liquid extraction parameters of polyphenols from GS have been studied: solid-liquid ratio (R_{S-L}), type of solvent (variation of the percentage of ethanol in the hydroalcoholic mixture) and temperature (T). Parameter values selected as the best for conventional polyphenol extraction were: a R_{S-L} of 0.10 g/mL, a T of 75°C and a hydroalcoholic mixture of 50% vol. ethanol. Secondly, microwaves were applied to GS as a pre-treatment of conventional extraction. In this case, the varied parameters were R_{S-L} , type of solvent and the time of the pre-treatment. For this purpose, a statistical surface design was applied to get the optimum conditions which maximize the final TPC of the extracts. Extracts were characterized in terms of total polyphenol content (TPC) and total flavonoid content (TFC). Stilbenes were quantified by HPLC-DAD analysis. Antioxidant capacity of the extracts was measured via Oxygen Radical Absorbance Capacity (ORAC).

Furthermore, TPC and TFC extraction yields from GS were fitted by a linear driving force model in order to obtain mass transfer parameters (deviation lower than 10%) to analyse the process from a theoretical point of view.

In a second approach, since GS is a residual woody material, the co-extraction of hemicelluloses and polyphenols with pressurized water was studied. Hemicelluloses are branched polymers of different monosaccharides, being xylan the most abundant, in this case. This biopolymer has potential applications in drug delivery and active packing, among others. The influence of temperature (120 – 160°C) in the extraction yield was analysed.

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