

Fractionation of Polyphenols and Flavonoids from a Grape Cane Using High-Pressure Extraction Techniques

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The Czech Republic belongs among countries with a long winemaking tradition. Unfortunately, the wine-processing industry produces large amounts of waste, which is usually burnt, or it is used in compost [1], even though it still contains a significant amount of biologically active substances. This work is focused on the extraction and fractionation of grape cane, a wooden material containing a significant amount of polyphenols (e.g. resveratrol or viniferine) and flavonoids. These compounds which exhibit, among the others, antioxidant, anti-inflammatory or antibacterial properties [2, 3] are often used as active ingredients of many dietary supplements.

Our work compares the efficiency of pressurized solvent extraction (PSE), supercritical fluid extraction (SFE) and their mutual combination on the content of polyphenols and flavonoids in the grape cane isolates. Fractionation of isolates was performed by sequential extraction using previously mentioned methods at different experimental conditions (pressures 10-60 MPa, temperatures 40-100 °C). Traditional extraction methods (maceration, Soxhlet extraction) were used to compare the results with the results obtained by high-pressure methods. The content of polyphenols in plant isolates was determined by UV/VIS spectrophotometry technique adopting the Folin-Ciocalteu method while the aluminium chloride colorimetric method was used for the determination of the total flavonoid content.

The chemical composition of isolates varied based on the extraction method and process conditions. Adopting high-pressure extraction techniques led to a decrease in processing times from days in terms of maceration and hours for Soxhlet extraction to several minutes with preservation of high concentration of polyphenols and flavonoids in the obtained isolates. Supercritical fluid extraction with pure CO₂ was used for removal of non-polar substances from the plant matrix. The SFE of polyphenols and flavonoids was enabled by adding the ethanol as entrainer. Highly polar substances which were not able to isolate by SFE were extracted using PSE as the final fraction. The combination of SFE, SFE with polar entrainer and PSE is a suitable method for obtaining extracts with a tailored mutual ratio of polyphenols and flavonoids with different polarity.

References:

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