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Processing of plant wastes using traditional and sophisticated high-pressure extraction techniques

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Worldwide overproduction in the food and cosmetics industry creates an enormous amount of plant-based wastes which are combusted or landfilled without any additional use. Our project aims to utilize wastes from winemaking industry (i.e. grape cane, grape marc or grape seeds) for the extraction of valuable biologically active substances, which can be used as by-products in dietary supplements. Several extraction techniques including maceration, Soxhlet extraction, ultrasound-assisted extraction (UAE) and pressurized liquid extraction (PLE) were used to obtain trans-resveratrol and ϵ -viniferine from grape cane and grape marc, while grape seeds were treated by high-temperature pressing, hexane maceration and supercritical fluid extraction (SFE). The chemical composition of plant isolates was determined using HPLC/MS and Folin-Ciocalteu method. Experiments were performed via laboratory equipment and newly developed multipurpose extraction unit with vessels of volume 25 dm³ and 20 dm³. The chemical composition of isolates varied based on extraction technique and its process parameters. High concentrations of trans-resveratrol and ϵ -viniferine were identified in the

short-term maceration and Soxhlet isolates. Adopting of an ultrasound probe into the process of maceration and Soxhlet extraction led to a decrease in processing times from days in terms of maceration and hours for Soxhlet extraction to several minutes. On the top of that, concentrations of target compounds were comparable with those obtained at traditional maceration and Soxhlet extraction. Using of SFE has substantial benefits on quality of grape seed oil, because of low extraction temperatures (vs. high temperature pressing) and absence of traces of any organic solvents (vs. hexane extraction).

Speaker Biography

Martin Topiar has obtained his PhD degree at 2019 from the University of Chemistry and Technology Prague with cooperation of the Institute of Chemical Process Fundamentals of the CAS. He is focusing on the SFE from plants with particular interest in a study of different types of fractionation techniques. He has published 5 papers in reputed journals (h-index 2, more than 20 citations) and presented his work in many international conferences dealing with extraction techniques and supercritical fluids utilization.

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