THE USE OF PRESSURIZED FLUIDS: FROM EXTRACTION TO SYNTHESIS

Marleny Saldaña

Department of Agricultural, Food and Nutritional Science, University of Alberta
Edmonton, Alberta, T6G 2P5, CANADA
Phone: (+1) 780 492-8018, Fax: (+1) 780 492-8914

Pressurized fluids, such as subcritical water and supercritical CO_2 (SC-CO_2) as green and environmentally friendly solvents, can be used for extraction of phenolic compounds from Canadian biomass as well as for enzymatic synthesis of phenolic compounds in oils. Phenolic acids are found in various biomasses as hydroxybenzoic and hydroxycinnamic acids. These compounds have antioxidant and antimicrobial activities and their consumption have been correlated with a lower incidence of cancer, heart disease, and diabetes. Research in my laboratory has focused on the use of pressurized fluids to remove these phenolic compounds to later be used in various applications. Experiments of phenolic compounds extraction of biomass using pressurized fluids were performed in stainless steel reactors at different temperatures ranging from 100 to 240˚C, pressure up to 20 MPa and times up to 180 min. Then, experiments of enzymatic synthesis of selected phenolic compounds in oil in SC-CO_2 media were performed in a laboratory-scale supercritical system at different temperatures ranging from 40 to 80˚C, pressures from 4 to 35 MPa and time up to 53 h. In addition, the use of selected phenolic compounds in milk was evaluated at temperatures of 60-120˚C, pressures of 100 – 600 MPa and times up to 30 min. Extracts and residues obtained after biomass treatment using pressurized fluids were evaluated for their individual concentrations of phenolic compounds, total phenolic content, and antioxidant activity. Results indicated that the total phenolic content and antioxidant activity increased with temperature. For the applications, results have shown that SC-CO_2 is a promising green solvent for the enzymatic synthesis of phenolic lipids. In addition, the use of selected phenolic compounds in milk retained valuable components using high pressure processing assisted by temperature.

*Corresponding author: marleny@ualberta.ca