

## Determinaton of Processing Parameters of Decaffeinated Black Tea by Using Pilot-Scale Supercritical CO<sub>2</sub> Extraction

**Authors :** Saziye Ilgaz, Atilla Polat

**Abstract :** There is a need for development of new processing techniques to ensure safety and quality of final product while minimizing the adverse impact of extraction solvents on environment and residue levels of these solvents in final product, decaffeinated black tea. In this study pilot scale supercritical carbon dioxide (SCCO<sub>2</sub>) extraction was used to produce decaffeinated black tea in place of solvent extraction. Pressure (250, 375, 500 bar), extraction time (60, 180, 300 min), temperature (55, 62.5, 70 °C), CO<sub>2</sub> flow rate (1, 2, 3 LPM) and co-solvent quantity (0, 2.5, 5 %mol) were selected as extraction parameters. The five factors BoxBehnken experimental design with three center points was performed to generate 46 different processing conditions for caffeine removal from black tea samples. As a result of these 46 experiments caffeine content of black tea samples were reduced from 2.16 % to 0 - 1.81 %. The experiments showed that extraction time, pressure, CO<sub>2</sub> flow rate and co-solvent quantity had great impact on decaffeination yield. Response surface methodology (RSM) was used to optimize the parameters of the supercritical carbon dioxide extraction. Optimum extraction parameters obtained of decaffeinated black tea were as follows: extraction temperature of 62,5 °C, extraction pressure of 375 bar, CO<sub>2</sub> flow rate of 3 LPM, extraction time of 176.5 min and co-solvent quantity of 5 %mol.

**Keywords :** supercritical carbon dioxide, decaffeination, black tea, extraction

**Conference Title :** ICFPC 2016 : International Conference on Advanced Food Processing and Components

**Conference Location :** Paris, France

**Conference Dates :** December 29-30, 2016