

Optimization of Instant Controlled Pressure Drop Dic-Assisted-Solvent Extraction of Total Phenols of Green Coffee Beans

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Abstract:

The present work deals with optimization of Instant Controlled Pressure Drop (DIC) assisted solvent extraction of total phenols (TP) from green coffee beans (GCBs). DIC has been used as a specific unit operation for decontamination and texturing with specific impacts on water extraction of bioactive molecules from plant materials. Reflux solvent system up to 97°C, was used to extract TP from raw and DIC treated GCBs. TP were determined using spectrophotometric Folin–Ciocalteu method. Response surface methodology (RSM) was used to optimize DIC processing conditions P (saturated steam pressure), t (heating time t) and W (initial water content of GCBs). A comparative study confirmed that between various solvent types (water, methanol, ethanol, isopropanol and acetone), methanol was the best solvent for both DIC-treated and untreated GCBs. RSM was used also to optimize the extraction variables (methanol proportion 43-77%, extraction temperature 26.5-68.5°C, and extraction time 20-120 min). The overall results revealed that DIC treatment showed obvious advantages in term of high yield and efficiency to recover polyphenols from GCBs. The optimum of DIC assisted solvent extraction of TP was estimated from RS analysis as ranged up to 20.3% dry basis from beans DIC-treated at (P=0.6 MPa, W = 33% db, and t = 84 s) compared to 7.8% from untreated raw material. Methanol concentration at 43%, extraction temperature at 69°C, and extraction time 120 min were found to be the optimum parameters for TP extraction from the DIC treated GCBs. The remarkable enhanced extraction of TP may be related partly to a greater extent of cell rupture and expansion of the plant material by DIC.