

Characterization on phenolic acids and antioxidant activity of *Chlorella* sp. microalgae using subcritical water extraction

ABSTRACT

Chlorella sp. microalgae contain phenolic compounds with good functional properties. In this study, two extraction methods, soxhlet and subcritical water extraction (SWE) were applied and compared in terms of phenolic compounds recovery from *Chlorella* sp. microalgae and characterization of the phenolic acid components. Phenolic acid analysis demonstrated that the main components of the *Chlorella* sp. extracts were ferulic, caffeic and p-coumaric acids. The comparative study indicated that SWE gave higher extraction yield compared to conventional soxhlet method. High recoveries of phenolic acids were obtained at 175 °C with 3.20, 3.05 and 3.33 mg/100 g of ferulic, p-coumaric and caffeic acid, respectively, compared to soxhlet extraction using methanol with 2.10, 2.29 and 2.37 mg/100 g of ferulic, p-coumaric and caffeic acid, respectively. This proved that subcritical water treatment could effectively be used for the release of phenolic acids from *Chlorella* sp. using safe and green solvent. Analysis by Fourier transform infrared spectroscopy (FTIR) was also performed to observe the effect of subcritical water on the functional groups of the extracts. The current study demonstrated that SWE provided a better way of utilising *Chlorella* sp. as a source of phenolic acids and natural antioxidants.

Keyword: Extraction; Microalgae; Phenolic; Subcritical; Water