

Sub-critical water technology for enhanced extraction of bioactive compounds from microalgae

ABSTRACT

Current extraction technologies, including chemical, mechanical, and biological based methods, routinely used to extract biochemical compounds from microalgal biomass are disadvantaged with lengthy processing steps, energy intensive operations, high operational cost, lower product yields and environmentally unfriendly processes. Hence, the search for a sustainable low-cost technology for high throughput extraction of biochemicals from microalgal biomass is major research endeavour. Sub-critical water extraction (SWE) technology has been used for the extraction of active compounds from different biomass materials with low process cost, mild operating conditions, short process times, and environmental sustainability. With the limited application of the technology to microalgal biomass, this work investigates the factors that affect the production yield of bioactive compounds during SWE of microalgal biomass. The SWE process was investigated under different process conditions include temperature (180-374 C), extraction time (1-20min) and biomass loading (5-40 wt%). The results showed that the highest carbohydrate and protein yields of 14.2 g/100g and 31.2 g/100g, respectively, were achieved at 277°C, 5 min with 5% of biomass loading. This productivity level which is in keeping or higher than that of current production systems endorses SWE as a promising technique for extracting bioactive compounds from microalgae.

Keyword: Sub-critical water extraction; Microalgae; Bioactive compounds; Biomass; Biochemical; Carbohydrate; Protein