

Microwave-assisted brine extraction for enhancement of the quantity and quality of lipid production from microalgae *Nannochloropsis* sp

ABSTRACT

Toward attaining a sustainability and eco-friendly process, a green and low-cost solvent-brine (NaCl solution) is proposed, as microwave-assisted extraction (MAE) technique solvent to extract lipids from microalgae *Nannochloropsis* sp. The effect of NaCl concentration on the quantity and quality of the extracted lipid was assessed, while MAE parameters were optimized using response surface methodology (RSM). The content of fatty acid methyl esters (FAMES) in the lipid was analyzed by using a gas chromatography-flame ionization detector (GC/FID). The highest lipid yield (16.1%) was obtained using 10% (w/v) brine at optimum extraction parameters of 5% (w/v) solid loading, 100 °C, and 30 min. The lipid extraction yield via optimized MAE-brine technique was thrice better than that Soxhlet extraction did and only 2% less than Bligh and Dyer (B&D) lipid extraction, which utilized harmful solvents. The proposed MAE-brine technique offered better quality lipids containing the highest amount of polyunsaturated fatty acids (PUFA) (44.5%) and omega-3 fatty acids (FAs) (43%). Hence, the MAE-brine solvent technique appears to be a promising extraction method for cheaper, greener, and faster extraction of a high-quality lipid for specialty food applications.

Keyword: Microwave-assisted Extraction; Brine; Lipid; Microalgae; Polyunsaturated fatty acids