

A comparative study on cell disruption of the microalga *Neochloris oleoabundans*: lipid extraction efficacy and biodiesel characterization

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Abstract

This study was conducted to determine the most effective cell disruption method and oil extraction solvent on the microalgae *Neochloris oleoabundans*. The three methods, either individually or combinatorial, were as integrated enzymatic hydrolysis (E) by cellulase (1, 2, 3 and 4%, v/w) and Flavourzyme (0.5, 1, 1.5 and 2% v/w); ultrasonication (U) (20 KHz and 100% spin with 20 and 40 amplitudes for 3, 8 and 13 min); and homogenization (H) (7200, 11200 and 15600 rpm for 3 min). For oil extraction, the three solvents tested were water, ethanol and methanol. The most effective method for cell disruption (as judged by quantity of subsequently extracted oil) was the integrated E+H method, followed by the integrated E+U, respectively. The fatty acids C16:0, C18:1 and C18:2 were the main constituents of extracted oil. Methanol was the most effective solvent, extracting 6.44%, 19.66% and 20.54% of fatty acids. Furthermore, in terms of biodiesel characterization, the iodine index and cetane number of the extracted oil were as 63.15 and 73.84 in ethanol, 95.33 and 62.59 in methanol and 67.66 and 76.31 in water. Therefore, the most effective method was to use the E+H method for cell disruption followed by methanol as the suitable solvent for oil extraction.

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