

One-step microalgal biodiesel production from *Chlorella pyrenoidosa* using subcritical methanol extraction (SCM) technology

ABSTRACT

In this work, we propose a one-step subcritical methanol extraction (SCM) process for biodiesel production from *Chlorella pyrenoidosa*. Therefore, the present study attempts to establish and determine the optimum operating conditions for maximum biodiesel yield from SCM of *C. pyrenoidosa*. A statistical approach, i.e. response surface methodology is employed in this study. The effects of three operational factors: reaction temperature (140–220 °C), reaction time (1–15 min) and methanol to algae ratio (1–9 wt.%) were investigated using a central composite design. A maximum yield of crude biodiesel of 7.1 wt.% was obtained at 160 °C, 3 min reaction time and 7 wt.% methanol to algae ratio. The analysis of variance revealed that methanol to algae ratio is the most significant factor for maximizing biodiesel yield. Regression analysis showed a good fit of the experimental data to the second-order polynomial model. With no requirement of catalyst nor any pretreatment step, SCM process is economically feasible to scale up the commercial biodiesel production from algae.

Keyword: Low-lipid algae; Reaction temperature; Reaction time; Methanol to algae ratio; Central composite design; Response surface methodology