

A Feasibility Study Using Electrolysis Treatment (ET) As the Pre-treatment Method to Extract Lipid from *Chlorella* sp. for Biodiesel Production

ABSTRACT

The feasibility study on *Chlorella* sp. lipid extraction using an electrolysis treatment (ET) as pre-treatment was investigated. Stainless steel was used as the anode and cathode material. The ET method was conducted in a batch or continuous system with or without air aeration and recycling flow. The total lipid in *Chlorella* sp. AWET and AWET were not analysed due to small sample volume. Approximately same amount of lipids were attained from *Chlorella* sp. BWOET ($7.97 \pm 0.43\%$ lipid/gdry wt) and BWET ($7.95 \pm 0.37\%$ lipid/gdry wt) if treated at 5 V/cm and aerated at $16.7 \mu\text{m}^3/\text{s}$ for 1800s. Whereas, if *Chlorella* sp. was treated at 13 V/cm and aerated at $16.7 \mu\text{m}^3/\text{s}$ for 1800 s, the total lipid obtained in *Chlorella* sp. CWOET ($8.18 \pm 0.49\%$ lipid/gdry wt) was 1.13-fold higher than CWET ($7.22 \pm 0.47\%$ lipid/gdry wt). Meanwhile under semi-continuous system, similar pattern of result was achieved in *Chlorella* sp. DWOET ($8.58 \pm 0.49\%$ lipid/gdry wt) with 1.11-fold higher than DWET ($7.72 \pm 0.54\%$ lipid/gdry wt), if treated at 14 V/cm and recycled at $2.3 \mu\text{m}^3/\text{s}$ for 3000s. This corresponded to lipid oxidation that might have occurred during the ET method. The fatty acid methyl ester (FAME) composition of *Chlorella* sp. DWOET and DWET contained predominantly methyl linolenate (C18:3) and methyl palmitate (C16:0). The concentrations of methyl palmitate attained in *Chlorella* sp. DWOET and DWET were $0.049 \pm 0.005 \text{ g/m}^3$ and $0.045 \pm 0.005 \text{ g/m}^3$, respectively.