Exploring alkaline pre-treatment of microalgal biomass for bioethanol production

ABSTRACT

We have investigated, for the first time, the alkaline pre-treatment of microalgal biomass, from the species Chlorococcum infusionum, using NaOH for bioethanol production. This pre-treatment step aims to release and breakdown entrapped polysaccharides in the microalgae cell walls into fermentable subunits. Three parameters were examined here; the concentration of NaOH, temperature and the pre-treatment time. The bioethanol concentration, glucose concentration and the cell size were studied in order to determine the effectiveness of the pre-treatment process. Microscopic analysis was performed to confirm cell rupturing, the highest glucose yield was determined to be 350 mg/g, and the maximum bioethanol yield obtained was 0.26 g ethanol/g algae using 0.75% (w/v) of NaOH and 120 °C for 30 min. Overall, the alkaline pre-treatment method proved to be promising option to pre-treat microalgal biomass for bioethanol production.

Keyword: Alkaline pre-treatment; Microalgae; Biomass; Fermentation; Bioethanol