

Evaluation of factors for cells growth of immobilized *Chlorella vulgaris* via factorial design approach

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ABSTRACT

Immobilization technique is used to simplify the separation process of microalgae from the culture medium. Statistical design of factors influencing the number of cells growth and cells loss of immobilized *Chlorella vulgaris* for lipid production was attempted by using factorial design approach. Five factors including photoperiod, cultivation period, concentration of glucose, concentration of NaNO₃, and concentration of CaCl₂ were selected and screened using fractional factorial design (FFD). Based on the 16 experiments generated in FFD, photoperiod and cultivation days were identified as the significant factors for both responses. The maximum number of cells growth (2.32_10⁹ cells/mL) and minimum number of cells loss (1.52_10⁴ cells/mL) were obtained from the suggested conditions of 0.01 g/L of CaCl₂, 5.03 g/L of NaNO₃, 24 h of photoperiod, 8 cultivation days, and 23.97 g/L of glucose. The results indicate that FFD is a useful tool to determine the significant factors for immobilized cells growth by considering all the factors involved and increased the lipid production by 17.27%. Furthermore, this study revealed the important factors for successful immobilization of microalgae which is useful for biofuel application.

KEYWORDS: *Chlorella vulgaris*; Fractional factorial design; Immobilization; Lipid

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