Investigating Effects of Sodium Bicarbonate Concentration on Growth of Microalga Nannochloropsis sp.

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ABSTRACT

Nannochloropsis sp. is a marine microalga that has high oil content on the top of a large biomass production. The purpose of this study was to find the optimum bicarbonate concentration that is suitable for the production of the largest amount of microalgae Nannochloropsis sp. The major variable of this study was the feed concentration of carbon source, for which NaHCO3 was used at concentration ranging from 1 to 30 g-HCO3- L-1. Batch type reactors containing the modified Walne medium were operated under growth conditions within favorable ranges. These conditions included: 2.5% NaCl, 50 mg L-1 NO3-N, initial pH of 8.0, and continuous illumination of approximately 12000 lux. Test results showed that Nannochloropsis sp. grew to a biomass concentration higher than 0.8 g-dry-wt L-1 under the bicarbonate feed concentration around 14 g-HCO3- L-1; biomass productivity reached an observed maximum of 0.56 g-dry-wt L-1 d-1, and the concomitant CO2 fixation was approximately 85% in a stationary phase attained in about 8 days. Productivity declined from this maximum, most probably due to (1) rise of pH, which was measured to be 9.5 at the stationary phase, from consumption of CO2 and (2) increased ionic strength in addition to that from NaCl salinity. From the series of growth tests with varying initial feed concentrations of HCO3- (Cs), changes in specific growth rate (μ), were determined. Specific growth rate versus HCO3- feed concentrations were fitted to the Haldane model as if the feed was inhibitory. The resulting Haldane equation showed that the bicarbonate concentration for optimal production of this algal species was approximately 15 g L-1 with 3 parameters KI, KS and μ .

Keywords : Nannochloropsis sp.、Sodium bicarbonate、Haldane equation

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