Removal of nitrogen and phosphorus from municipal wastewater effluent using *Chlorella vulgaris* and its growth kinetics

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**ABSTRACT**

*Chlorella vulgaris* was used for the removal of residual ammonia/ammonium ion (NH\(_3\)/NH\(_4^+\)) and orthophosphate ion (PO\(_4^{3-}\)) from secondary wastewater effluent collected from a municipal wastewater treatment plant. The uptake rates for nitrogen and phosphorus were studied with different initial algal cell densities and the addition of CO\(_2\) gas for pH control and supply of inorganic carbon. Our result showed that typical NH\(_3\)/NH\(_4^+\) and PO\(_4^{3-}\) concentrations could be readily removed within 48 h. It was found that the culture with an initial algal cell density of \(~350\) mg/L and CO\(_2\) gas supply could significantly enhance both the rates of cell growth and nutrient uptake. The Monod equation well described the algal cell growth under substrate-limiting conditions, and could be used for the design and operation of photobioreactors for potential tertiary wastewater treatment.

**Keywords:** *Chlorella vulgaris*; Wastewater effluent; Nitrogen and phosphorus removal; Growth kinetics