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Abstract

This work studied oxygen production and nutrient utilization by *Chlorella Vulgaris* at different organic/inorganic carbon (OC/IC) and ammonium/nitrate (NH_4^+-N/NO_3^--N) ratios to design a hybrid aerobic membrane bioreactor (MBR) and membrane photobioreactor (MPBR) system. Specific oxygen production by *C. vulgaris* was enough to support the MBR if high growth is accomplished. Nearly 100% removal (or utilization) of PO_4^{3-}-P and IC was achieved under all conditions tested. Optimal growth was achieved at mixotrophic carbon conditions (0.353 d^{-1}) and the highest NH_4^+-N concentration (0.357 d^{-1}), with preferable NH_4^+-N utilization rather than NO_3^--N. The results indicate the potential of alternative process designs to treat domestic wastewater by coupling the hybrid MBR - MPBR systems.

Keywords: Algae; Membrane bioreactor; Membrane photobioreactor; Nutrients; Specific oxygen production

1. Introduction

An imbalanced relationship between urban growth and available fresh water supply is creating a worldwide demand for sustainable technologies involving the reuse of treated wastewater. Membrane bioreactor (MBR) process, which combines microfiltration (MF) or ultrafiltration (UF) membrane