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EVOLUTION OF REAL MUNICIPAL WASTEWATER TREATMENT IN PHOTOBIOREACTORS AND MICROALGAE-BACTERIA CONSORTIA USING REAL-TIME PARAMETERS

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Abstract

In the treatment of real municipal wastewater with photo-sequencing batch reactors (PSBR), operating strategies able to achieve high levels of pollutant removal, but reduce the hydraulic retention time (HRT), are imperative for making microalgae-bacteria consortia more competitive than conventional activated sludge systems. In regard to real-time monitoring, on-line probes like Dissolved Oxygen (DO), pH and oxidation-reduction potential (ORP) are cheap and reliable, but their exploitation has been largely overlooked in PSBRs. This paper proposes the use of DO, pH and ORP profiles to reveal the evolution of wastewater treatment in a PSBR treating real municipal wastewater with a mixed consortium of microalgae and bacteria. The PSBR ensured removal efficiency of 87±5% for COD and 98±2% for TKN without external aeration; indeed, photosynthesis was the only driver of the oxygen production. Considering the combined effects of photosynthetic oxygenation and microbial oxygen consumption, some practical information was gathered to understand the complex profiles of the on-line parameters. During dark and light phases, Zero-DO values, DO and pH raises, and their relative peaks were discussed to evaluate correctly