

Membrane processes for microalgae in carbonation and wastewater treatment

Abstract

The objective of this work is to present the integration of membrane processes in the field of bioenergy resource and wastewater treatment using microalgae. There are two main processes involved: carbonation and separation, which were conducted and reported as a separated work within this chapter. The chapter begins with the introduction of membrane processes, followed by carbonation of microalgae and separation of biomass from the wastewater effluent. The experimental work on the carbonation aims to evaluate the effectiveness of hydrophobic hollow fibre membrane in transporting CO₂ into microalgae culture and microalgae accumulation within the membrane. The experimental work on the separation process of microalgae biomass from the wastewater effluent on the other hand, aims to evaluate Ultrafiltration (UF) membrane capability in removing BOD and COD as well as its ability to retain microalgae biomass which were used by the turbidity reading of the membrane permeate. The application of hydrophobic membrane in the carbonation process has increased the carbonation efficiency up to 83% in comparison with the carbonation without membrane and only a small amount of mirage was accumulated within the membrane. The experimental result also shows that, the carbonised microalgae can be further used for wastewater treatment. Based on the result of separation process of microalgae biomass of wastewater effluent, the UF membrane utilization shows high separation efficiency in turbidity to lower than 5 Fau, and was able to facilitate in nutrient removal for less time required compared to the biological treatment without application of the membrane.