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Feasibility of Combined UASB-MBR System in Treating PTA Wastewater and Polyimide Membrane for Biogas Purification

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ABSTRACT

Anaerobic processes have become actively practiced for waste and wastewater treatment during the recent years because it can apply for high organic loading whereas the producing biogas can be recovered as a new energy souce. This study prompted to look on the feasibility of a combined UASB and aerated MBR system for the treatment of Purified Terephthalic Acid (PTA) wastewater and the usage of Polyimide membranes for biogas separation. The results revealed that the combined system is robust and flexible in relation to the change in Hydraulic Retention Times (HRTs) and organic loading rates. The overall COD removal of 97% with the maximum loading rate of 20 g L-1 per day was achieved at 12 h HRT. The biogas from the UASB reactor was mainly methane (> 62%). The separation between CO2 and CH4 was explored using different concentrations of dense polyimide (PIs) membranes and feed pressure. The results showed the PI-based membrane has high potential for CH4 purification with high selectivity and permeability toward CO2 than CH4. The expediency of the proposed treatment system and gas-separating module was seen and thus purified biomethane could be mustered continuously.