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THIPAPORN SIRINUKULWATTANA : LOW COD CONCENTRATION WASTEWATER TREATMENT BY ANAEROBIC FLUIDIZED BED REACTOR USING RUBBER GRANULE AS A MEDIA WITHOUT INTERNAL RECIRCULATION. ADVISOR : ASSIST. PROF. CHAIYAPORN PUPRASERT, Ph.D., CO-ADVISOR : ASSIST. PROF. WIBOONLUK PUNGRASMI, Ph.D., 184 pp.

In this research, the efficiency of wastewater treatment and biogas production by the Anaerobic Fluidized Bed (AFB) reactors using rubber granule as a media were performed under condition of no internal recirculation. A low density rubber granule is easy to form a fluidization state which beneficial conserves more energy for the process. The experiment was divided into two parts, first is a system startup, which the synthetic wastewater with a COD of 1,045 mg/L (equivalent to Organic Loading Rate (OLR) of 30 kg COD/m^3-d) was continuously feed into two AFB reactors at a constant rate of 46.8 L/day and hydraulic retention time as 0.84 hrs. The result showed that the COD removal efficiency was 81.45% and 96.49%, whereas the biogas production was about 0.17 and 0.08 L/g COD removed, respectively. After those two reactors reached steady state, the step up OLR variation was performed. The OLR loading for the 1st reactor was changed to 15 and 2 kg COD/m^3-d (equivalent to COD of 522 and 70 mg/L), whereas the OLR loading for the 2nd reactor was changed to 5 and 2 kg COD/m^3-d (equivalent to COD of 174 and 70 mg/L), respectively. The result showed that COD removal efficiency of the 1st reactor was achieved to 88.44% and 81.18%, while the amount of biogas was 0.28 and 0.18 L/g COD removed. Besides for the 2nd reactor, the efficiency for COD removal was 91.40% and 91.02%, together with 0.18 and 0.05 L/g COD removed for biogas production. It could be clearly concluded that the AFB without internal recirculation in this research has the comparable efficiency to other general AFB reactors with internal recirculation. Moreover, the results of Fluorescent In Situ Hybridization (FISH) analysis indicated that the amount of bacteria and archaea on the rubber granule media were close together. While the methanogens found in the reactors were *Methanosarcina*-like cells and *Methanosaeta*-like cells.

Department : Environmental Engineering Student's Signature .....

Field of Study : Environmental Engineering Advisor's Signature .....

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