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Anaerobic wastewater treatment to yield biogas

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Anaerobic treatment of industrial wastewater has become a viable technology in recent years due to the rapid development of high-rate reactors, such as anaerobic filter, upflow anaerobic sludge blanket, both upflow and downflow stationary packed beds and fluidised or expanded beds. This development is due to the fact that the method combines a number of significant advantages, including low energy consumption, low excess sludge production, and enclosure of odours. Biological cellulose recovery process was using banana stem waste as substrate. The high non-structural carbohydrates in the wastewater make it a good feedstock for biogas production. Preliminary studies were conducted to assess the biogas yield using biological cellulose recovery wastewater as feedstock. Anaerobic batch reactor (volume 10 l) was used in this study. The performance of the reactor was tested under the conditions of various temperatures (26°C - 40°C), organic loading rates (OLR) (7.2 kgSS/m³ day – 50 kgSS/m³ day), hydraulic retention times (HRT) (3 day – 20 day) and pH (4.5 to 9). The biogas yield was pronounced in term of chemical oxygen demand (COD). After about 30 days, biogas yield from preliminary studies reached maximum value of 3 l biogas/g COD. The general trend showed gradually increasing biogas yield with lowering of HRT and increasing of OLR. The best conditions for biogas production from biological cellulose recovery wastewater were as follows; temperature of 35°C, OLR of 50 kgSS/m³ day, HRT of 5 days and pH 8. The biogas yield was compared to other studies, and it was compatible to those reported for waste biomass of plant origin.