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Modification of municipal wastewater for improved biogas recovery

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Modification of municipal wastewater for improved biogas recovery

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Abstract

The energy demand which is expected to increase more worldwide has sparked the interest of researchers to find sustainable and inexpensive sources of energy. This study aims to integrate energy recovering step into municipal wastewater treatment plants (MWWTPS) through anaerobic digestion. The anaerobic digestion of municipal wastewater (MWW) and then co-digestion with sugar cane molasses (SCM) to improve its organic content was conducted at 25 °C and 37 °C. The results showed substrate mixture containing 6% of SCM and total solids (TS) of 7.52% yielded higher amount of biogas (9.73 L/L of modified substrate). However, chemical oxygen demand (COD) of the resulting digestate was high (10.1 g/L) and pH was not stable hence needed careful adjustment using 2 M of NaOH solution. This study recommends substrate mixture containing SCM (2%) and TS (4.34%) having biogas production (4.97 L/L of modified substrate) for energy recovering from MWWTPS, since is found to have more stable pH and low COD residue (1.8 g/L) which will not hold back the MWW treatment process. The annual generation of modified substrate (662,973 m³) is anticipated to generate about 16,241 m³ of methane which produce up to 1.8 GWh and 8,193 GJ per annum.

Keywords

Anaerobic digestion, biogas, municipal wastewater, sugarcane molasses