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Slaughterhouse Wastewater Using Up Flow Anaerobic Sludge Blanket (UASB) Reactor: Evaluation of Net Energy

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Abstract

The Up flow Anaerobic Sludge Blanket (UASB) reactor is a potential solution for treating high-strength slaughterhouse wastewater, although it consumes more energy in the process. Present study investigated the energetic advantages of treating slaughterhouse wastewater using a UASB reactor. The major energy requirement for the operation of a UASB reactor includes the energy for heating the reactor and circulating the liquid inside the reactor. Methane production determines the energy benefits of a UASB reactor. In fact, net energy is the appropriate term to compare the performance of UASB rather than the rate of methane production. In this context, this study grasps a new look at evaluating the net energy from the UASB reactor. Based on the theoretical energy calculation, for an organic loading rate of 266.66 mg/l in terms of COD, the corresponding energy produced from methane is 1.03 kJ and the net energy is 2.14 kJ. Also, this approach was extended to evaluate the net energy of UASB systems that were previously reported in the literature. In most cases, heating energy seems to be the major energy demand compared to liquid pumping. Thus, the heating of wastewater and electricity to run the reactors can be managed using the energy produced from methane. In general, the study of alternatives for the energy use of sewage treatment byproducts must take into account the needs and the reality of the treatment plants. The mass and energy balances are essential for economic feasibility studies of energy use projects that can be considered technically viable for each sewage treatment plant.

Keywords: *Organic loading rate, Methane, UASB reactor*