The Potential of Ultrasonic Membrane Anaerobic Systems in Treating Slaughterhouse Wastewater

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ABSTRACT

Direct discharge of slaughterhouse wastewater causes serious environmental pollution due to its high chemical oxygen demand (COD), total suspended solids and biochemical oxygen demand. In this study, an ultrasonic-assisted membrane anaerobic system was used as a novel method for treating slaughterhouse wastewater. Six steady states were achieved, using concentrations of 7,800–13,620 mg/l for mixed liquor suspended solids and 5,359–11,424 mg/l for mixed liquor volatile suspended solids. Kinetic equations were used to describe the kinetics of treatment at organic loading rates of 3–11 kg COD/m^3/d. The removal efficiency of COD was 94.8–96.5% with hydraulic retention times of 308.6–8.7 days. The growth yield coefficient was found to be 0.52 g VSS/g. COD was 0.21 d^{-1} and methane gas production rate was 0.24–0.56 l/g COD/d. Steady-state influent COD concentrations increased from 8,000 mg/l in the first steady state to 25,400 mg/l in the sixth steady state. The minimum solids retention time, ϑ_c^{min} obtained from the three kinetic models was 6–14.4 days. The *k* values were 0.35–0.519 g COD/g VSS.d and μ_{max} values were between 0.26 and 0.379 d^{-1}. The solids retention time decreased from 600 to 14.3 days. The complete treatment reduced the COD content and its removal efficiency reached to 94.8%

KEYWORDS: Flow battery; Cerium; Vanadium; Zero gap architecture; Mixed acid

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