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Process Waste Water Treatment in A High Rate Anaerobic Digestion Reactor (EGSB) Under Various Hydraulic Retention Times (HRTs)

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Process wastewater is generated with a high strength organic and inorganic compounds, which made them stand among one of the top pollution generating industries. In USA, Environmental Protection Agencies issued regulations that charge for discharging wastes into water bodies. Industrial wastewater with a very high COD strength (1, 10,000–1, 90,000 mg/L), BOD strength (50,000–60,000 mg/L), were studied in most developed high-rate anaerobic digestion process called 'Expanded Granular Sludge Bed' (EGSB). COD removal efficiency had been studied at different organic loading rates (OLR) and hydraulic retention times (HRTs). For a specific OLR of 6 g COD/l.d and HRT of 5 days, the removal efficiency was more than 95% and for the volatile fatty acids was about 87.2%. An EGSB reactor had been built and used for investigating different variables that have an essential contribution to the wastewater treatment. HRT, pH, Temperature and COD strength are the most effective process variables. Low energy consumption combined with energy production can be accomplished at very low costs. The anaerobic digestion process consist of four steps, Hydrolysis, Acidogensis, Acetogensis and Methanogensis. The experimental setup is consist of two stages, the first two steps will occur in the first stage while the last two will be in the second stage. Building two-step anaerobic process will enhance the stability of the reactor. Actual process waste water had been used for the investigation and various analysis was implemented before introduce the feed to the reactor. The high rate reactors are using biomass granular particles which contain the microorganisms that fed on the waste water that diffuses in to the particles. The pH of the effluent was almost about 7.2 which is safer for the environment than before the treatment. Mesophilic temperature range (T=36 ^{o}C) was used as operating temperature, temperature monitored and controlled by data acquisition system and temperature controller.

Keywords: Anaerobic Digestion, Hydraulic Retention Time, Organic Loading Rate, Chemical Oxygen Demand

Biography:

Haider Al-Rubaye is currently associated with Missouri University of Science and Technology, USA in the department of Chemical Engineering.