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Performance of oxidation-reduction potential-based hydrolysis and acidification process for high-strength antibiotic wastewater treatment

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ABSTRACT

This study used hydrolysis and acidification process under appropriate oxidation-reduction potential (ORP) condition to treat high-strength antibiotic wastewater. ORP was controlled at approximately −100 mV through air-flow regulation. Results showed that the appropriate ORP condition enhanced the physiological metabolic function of facultative hydrolytic and acidogenic bacteria, and aerated stirring improved the hydraulic condition. Acidification degree (AD) and effluent volatile fatty acid (VFA) reached 58.64% and 4,825 mg/L, respectively, at the shortest hydraulic retention time of 10 h and the maximum organic loading rate (OLR) of 20 kg COD/(m^3 d). Wastewater biodegradability was improved by approximately 17%, thus providing good substrate for post-aerobic treatment. Relatively stable effluent was achieved with the fluctuant influent, and COD and SS removal efficiencies were 15–30% and 90–95%, respectively. The change in VFA lagged behind the AD in the effluent, indicating that AD could better represent the effects of hydrolysis and acidification process. The height of the reactor for stable VFA production increased as the OLR increased.

Keywords: Antibiotic wastewater; Hydrolysis and acidification; Oxidation-reduction potential; Biodegradability

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