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Treatment of modified starch wastewater with high sodium chloride (NaCl) concentration using an anaerobic hybrid reactor

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ABSTRACT

This work was designed to investigate the potential of an anaerobic hybrid reactor (AHR) in treating modified starch wastewater (MSW) containing high salt concentration. The AHR was started up by feeding native starch wastewater (NSW) until reaching a steady state at an organic loading rate of 4 kg COD/m^3/d and hydraulic retention time of 3 d. After that the MSW, to which was added a NaCl concentration of 2.5, 5.0 and 7.5 g/l, was fed into the AHR. The result was that the AHR yielded a high efficiency in treating the SMSW containing 5.0 g/l of NaCl. After increasing the NaCl to 7.5 g/l, the total volatile acid (TVA) was increased from 1,070 mg/l to 2,620 mg/l, whereas the alkalinity decreased from 1,950 mg/l to 705 mg/l. The TVA/alkalinity ratio was increased from 0.5 to 3.7, whereas the pH was reduced to 4.45. The amount of attached biomass and suspended biomass in the AHR was reduced from 71.1 and 90.7 g/reactor to 67.4 and 60.4 g/reactor, respectively. Moreover, the NaCl negatively affected the microbial activities inside the reactor, especially methanogenic activity. Contrarily, no inhibition was found when the 5.0 g/l of NaCl added. These results showed that the AHR was able to treat the modified starch wastewater containing 5.0 g/l of NaCl.

Keywords: Anaerobic hybrid reactor; Methanogens; Microbial activity; Modified starch wastewater; Sodium chloride

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