Diagnosis of the acidification and recovery of anaerobic sequencing batch reactors

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\textbf{ABSTRACT}

This study aims to investigate the diagnosis of acidification and efficient recovery of a laboratory-scale anaerobic sequencing batch reactor (ASBR) which treats synthetic glucose wastewater under mesophilic conditions (35°C). The diagnosis of the ASBR showed that acidification occurred on the seventh day after adding 20 mmol/L of sodium 2-bromoethanesulfonate into the reactor. A three-step recovery strategy was employed to recover the acidified reactor efficiently and to study its restoration process. Results indicated that the acidified ASBR can be revived in approximately 50 d. The specific methanogenic activities of the sludge, which were based on the substrate of acetate, propionate, and butyrate, were restored at 0.85, 0.67, and 0.51 (gCOD-CH\textsubscript{4})/(gVSS \cdot d), respectively. The fluorescent observation images revealed large amounts of Methanosarcina-like and rod-shaped methanogens distributed in the sludge flocs after reactor restoration, thus ensuring that the fermentative, acidogenic, and methanogenic processes proceeded effectively in the anaerobic system.

\textbf{Keywords:} Anaerobic sequencing batch reactor; Methanogenic inhibitor; Acidification; Three-step recovery strategy; Specific methanogenic activities