



Effect of the dosage of ferrous oxide on batch anaerobic treatment of high strength synthetic wastewater

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ABSTRACT

Direct interspecies electron transfer (DIET) plays an important role in anaerobic wastewater treatment processes, and the dosage of conductive materials can enhance DIET. In this study, tryptone and starch were used to acclimate anaerobic sludge with different microbial communities. Then, the effect of ferrous oxide (Fe_3O_4) dosage on batch anaerobic treatment of synthetic wastewater was examined. During methanogenesis for the tryptone acclimated anaerobic sludge, the lag phase was shortened, and the maximum methane (CH_4) production rate was increased with the dosage of Fe_3O_4 . While for the starch acclimated anaerobic sludge, the CH_4 production was less affected by the dosage of Fe_3O_4 . Furthermore, the dosage of Fe_3O_4 had limited effects on both hydrolysis/acidification of tryptone and methanogenesis of acetate for the tryptone acclimated anaerobic sludge. *Methanosarcina* (66.28% of archaea) and *Methanoseta* (19.56% of archaea) were detected methanogens in the tryptone acclimated anaerobic sludge, which could accept electrons via DIET. While *Methanobacterium* (92.80% of archaea) was mainly detected in the starch acclimated anaerobic sludge. Therefore, the effect of Fe_3O_4 on anaerobic treatment performance was significantly dependent on the organic carbon acclimated microbial communities.

Keywords: Ferrous oxide; Methanogenesis; Hydrolysis/acidification; Direct interspecies electron transfer

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