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Influence of conductive material on the bioelectrochemical removal of organic matter and nitrogen from low strength wastewater

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Abstract

The treatment of low strength wastewater that has the level of discharge standard for wastewater treatment plant was studied using an upflow bioelectrochemical reactor with an applied voltage of 0.6V. The direct interspecies electron transfer (DIET) between electroactive bacteria was activated in the upflow bioelectrochemical reactor, which improved the substrate affinity of bacteria. The effluent qualities in COD and ammonia nitrogen was stable at less than 3.5mg/L and 7.46mg/L at 1 hour of hydraulic retention time, respectively. The conductive materials, including conductive sheets and conductive particles, further increased the biomass retention and the DIET by altering the abundance of dominant bacterial groups. The effluent qualities in COD and ammonia nitrogen was improved up to 1.98 mg/L and 2.65 mg/L, respectively, by the conductive sheets. The upflow bioelectrochemical reactor with conductive materials is a good tertiary treatment process for improving the quality of the final effluent discharged from wastewater treatment plant.

Keywords: Bioelectrochemical, conductive material, low strength wastewater, Organics and nitrogen, tertiary treatment

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