Bioelectrochemical cell (BeCC) integrated with granular activated carbon (GAC) in treating spent caustic wastewater

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ABSTRACT

The study is to treat spent caustic wastewater by using bioelectrochemical cell (BeCC) integrated with Granular Activated Carbon (GAC) as the bacterial attachment medium. BeCC is a bioelectrochemical reactor which employed microorganisms for substrate degradation, while also capable in producing energy. The study investigated the optimum GAC dosage in BeCC whereby it was tested at 0 g (blank) to 25 g of GAC and its performance in terms of Chemical Oxygen Demand (COD) and sulfide removal and open circuit voltage (OCV) were assessed throughout 30 days of operation. From the study, GAC dosage of 10 g was the optimum GAC dosage with the highest COD and sulfide removal of 97.56% and 96.25%, respectively and highest voltage of 583 mV. Comparing the optimum BeCC performance with the blank, the result demonstrated 16% and 25% higher in COD and sulfide removal, respectively with increment of OCV from 115.7 mV to 583 mV. The biomass characteristics at different GAC dosage were indicated by the mixed liquor suspended solid (MLSS), mixed liquor volatile suspended solid (MLVSS), biomass extracellular polymeric substance (EPS) and sludge volume index (SVI). It is found that the dominant bacteria attached on the GAC was *Klebsiella oxytoca* identified by biochemical identification method.

KEYWORDS

Bioelectrochemical cell; Granular activated carbon; Spent caustic wastewater; Chemical oxygen demand; Open circuit voltage

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