

Dairy wastewater remediation using electrochemical oxidation on boron doped diamond anode (BDD)

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ABSTRACT

Treated wastewater reuse has been considered recently as one of the successful management strategies to overcome water shortage in many countries suffering from water scarcity. The non-readily biodegradable and recalcitrant pollutants in wastewater cannot be destructed by conventional treatment methods. This paper deals with the electrochemical treatment of dairy wastewater using a promising non-conventional boron doped diamond anode. During the electrochemical process, different operating parameters were investigated, such as electrolysis time, current density, supporting electrolyte, chemical oxygen demand (COD), turbidity as well as absorbance/color. The experimental work revealed that electrochemical oxidation carried out with no added electrolyte has significantly reduced the COD, turbidity and color (absorbance) by 72%, 76% and 78%, respectively. Results also showed that raising the current density from 5.1 to 7.7 mA/cm² has boosted COD, and color removal to 82.5% and 83%, respectively. However, the current density did not show any significant effect on the turbidity. Interestingly, it was observed that adding Na₂SO₄ and FeCl₃ as supporting electrolytes brought the COD removal to 91% and 97% respectively. Likewise, turbidity and color removal have been enhanced by the addition of the same supporting electrolytes.

Keywords: Boron doped-diamond anode; Dairy wastewater; Electrochemical oxidation; Supporting electrolytes

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