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COD Removal from Artificial Wastewater by Electrocoagulation Using Aluminum Electrodes

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This study investigates the effects of pH, treatment time, distance between electrodes, and voltage on the efficiency of chemical oxygen demand (COD) removal from artificial wastewater through an electrocoagulation (EC) process. Anode and cathode electrodes were fabricated using commercial Al plates. The results demonstrate that the COD removal efficiency can be increased to 51% when the initial pH is 4.1. Moreover, pH had the largest impact on the COD removal efficiency compared to the other parameters. At low initial pH, insoluble compounds were formed, increasing the COD removal efficiency. Whereas at high initial pH, the formation of soluble compounds was favored, resulting in a net reduction of COD removal efficiency. Furthermore, a correlation between the varying sizes of hydrogen bubbles and COD removal efficiency was observed at different pH values. The results suggest that a narrow hydrogen bubble-size distribution of approximately 42 µm can increase the COD removal efficiency because of the enhancement of the flotation mechanism during EC. Finally, the results from X-ray diffraction and energy dispersive spectroscopy suggest that flotation provides better adsorption than precipitation during EC.

Keywords: Electrocoagulation, aluminum electrodes, COD, pH, hydrogen bubble size.

FULL TEXT