

Comparison Electrocoagulation Between Electrodes (Ferum, Aluminium, and Copper)

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Structured Abstract

Background: Electrocoagulation (EC) is a promising water treatment method that eliminates contaminants using metal electrodes and electric current. This method is well-known for its effectiveness in reducing pollutants such as suspended solids (SS), chemical oxygen demand (COD), biochemical oxygen demand (BOD), and organic chemicals. However, the type of electrode that is utilized has a big impact on how effective EC is. In this study, the effectiveness of three distinct anode materials such as copper (Cu), aluminium (Al), and ferum (Fe) in treating polluted lake water using the EC process is compared.

Methods: Fe, Al, and Cu were utilized as anodes in a batch-type electrocoagulation system, each paired with a fixed carbon cathode. Lake water samples taken from Tasik Seksyen 7, Shah Alam, were used for the treatment. For five minutes, each pair of electrodes was tested at different voltages (1.0 V to 5.0 V). By comparing the levels of BOD, COD, suspended particles, pH, and UV-Vis absorbance at 204 nm before and after treatment, the efficacy of each electrode was assessed. Replicated spectrophotometric measurements were used to compute removal efficiency and statistical variance.

Results: Aluminium performed the best among the investigated electrodes at 3.0 V, obtaining the lowest BOD (0.70 mg/L), COD (79 mg/L), and suspended particles (7 mg/L). At 5.0 V, it also demonstrated a slight positive removal efficiency in UV-Vis absorbance (+2.67%). At 5.0 V, iron performed moderately, with BOD of 0.78 mg/L and COD of 98 mg/L; nonetheless, removal efficiency was consistently negative. Copper constantly had the lowest performance, with little decrease in all metrics and no obvious ideal voltage.

Conclusion: In conclusion, the findings of this study indicated that for the electrocoagulation treatment of lake water. Aluminium was shown to be the most efficient and energy-efficient electrode, providing better pollutant removal at a lower voltage. Copper performed poorly, but iron required more energy despite operating at greater voltages. According to the study, under the evaluated circumstances, aluminium is the best anode material for EC applications.

Keywords: Electrocoagulation, Aluminium Electrode, Iron Electrode, Copper Electrode, Water Treatment

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