

Phenol degradation in wastewater with a contact glow discharge electrolysis reactor using a sodium sulfate

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Abstrak

This present study is aimed at removing phenol compounds in wastewater by using a Contact Glow Discharge Electrolysis (CGDE) reactor. To start with, the effect of voltage to direct current connections in a CGDE reactor was investigated in order to estimate several possibilities for optimum voltage for phenol degradation. Several parameters were studied for phenol treatment including the effects of voltage, electrolyte concentration, anode depth, and the presence of Fe²⁺ ions. Production of hydrogen peroxide, the percentage of phenol degradation, and energy consumption were used as main research indicators. The optimum condition was found at 700 V, in 0.03 M Na₂SO₄, and an anode depth of 5mm. The phenol degradation was valued at 40.83% after the first 15 minutes in the process, with an energy consumption of 278 kJ/mmol of phenol. Under the same conditions, with an addition of 20 mg/L of Fe²⁺ ions, the phenol degradation shot up to 92.57% and energy consumption significantly decreased to 127 kJ/mmol. The largest phenol degradation was obtained at 99.6% after 90 minutes during the experiment. The results pointed out a promising path for phenol treatment in wastewater by utilizing a CDGE reactor with recommended operating conditions which were obtained during this study.