



CLIMATE CHANGE:

SCIENCE AND TECHNOLOGY IN
MITIGATING ANTHROPOGENIC ACTIONS

NOVEMBER 6 TO 8, 2024
ERECHIM, RS, BRAZIL

WORK WITH RESULTS

APPLICATION OF ELECTROCOAGULATION IN THE TREATMENT OF SYNTHETIC TEXTILE WASTEWATER

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The release of dyes into the aquatic environment, originating from textile industry effluents, reduces light penetration, affecting the development of photosynthetic organisms and interfering with the base of the food chain. In view of this, it becomes essential to evaluate techniques for removing these contaminants. The present study evaluated electrocoagulation treatment for the removal of the dye (Navy Blue-AM-16) in synthetic effluents, using aluminum electrodes (3 cm x 5 cm x 2 mm). A (1L) reactor with a working volume of 800 mL was used. The tests were conducted at unadjusted pH (6.17-8.85) and ambient temperature (20°C-25°C). The independent variables were electric current (0.3, 0.45, 0.6, 0.75, 0.9 A) and dye concentration (150, 200, 250, 300, and 350 mg L⁻¹), using NaCl (1 g L⁻¹) as electrolyte. The reaction time was 10 minutes for each assay. A Rotated Central Composite Design (RCCD) was used, and ANOVA was employed for statistical analysis. Results showed significant color removal in all assays, suggesting that in addition to physical removal, alteration of the dye's chromophore groups occurred. Regarding efficiency, an average of 83.68% was obtained for dye concentration removal, 80.3% for Total Organic Carbon (TOC), 95.31% for color, and 29.3% for Chemical Oxygen Demand (COD). The process exhibited residual toxicity, with the average mortality rate of organisms (*Artemia salina*) increasing from 42% before treatment to 60% after treatment. This effect may be associated with the formation of more toxic intermediate compounds than the original molecule, as well as the increase in pH, which is typical in electrocoagulation processes. Based on the results obtained in this study, it was concluded that electrocoagulation exhibited a reasonable performance. Although good removals of AM-16, color, TOC, and COD were achieved, residual toxicity persisted after its application.

Keywords: Dye; Electrochemical, Textile wastewater, Water resources.

