

Degradation of synthetic dye wastewater by electrolysis

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A significant threat to humans and the environment is posed due to the contamination of freshwater resources and hence demand for clean drinking water is increasing. Crystal Violet is a triphenylmethane dye, a recalcitrant dye, which has been widely employed as a biological stain in veterinary and human medicine as well as a dye in the textile industry. Methylene blue is frequently used as a synthetic dye to color fabrics in the apparel and textile sectors, as well as to color papers and leathers. Both these dyes can last for a very long time in the environment and is hazardous to both aquatic and terrestrial species. Currently available dye treatment methods such as coagulation and oxidations have their own limitations such as high chemical consumption and the production of toxic sludge. The main objective of this research was to investigate the treatment of wastewater containing crystal violet and methylene blue- by electrolysis using a suitable electrode system. Effects of several experimental parameters, such as current, pH, different electrode systems, and supporting electrolytes were investigated. The optimum conditions for dye degradation were determined at pH = 3 in the presence of Na₂SO₄ as the supporting electrolyte with 300 mA current at a stirring rate of 600 rpm using stainless steel electrodes as the anode and the cathode. A decoloration efficiency of 99% was achieved for both crystal violet and methylene blue under the above optimum conditions after 2 hours of electrolysis. In conclusion, electrolysis with stainless-steel electrodes can be a potent treatment method for wastewater containing crystal violet and methylene blue dyes.

Key words: Textile dyes, Electrolysis, Wastewater,

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