



Improved Advanced Oxidation Process for the Removal of Crystal Violet Dye in Wastewater

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ABSTRACT

Along with the modern lifestyles of the developing society, the contamination of the domestic water reservoirs is being a growing threat. Advanced oxidation processes (AOP) involve a highly competitive and promising technology for the treatment of wastewaters containing non-easily removable compounds such as persistent organic pollutants (POP) that are known for their bio-accumulative and recalcitrant natures that require more effective treatment methods. Crystal Violet is a mutagen and a potent carcinogen. It can prevent light penetration and hinder the photosynthesis process in the aquatic environment. The main objective of this research is to investigate the treatment of wastewater containing Crystal Violet dye by heterogeneous Fenton oxidation process using Fe(II) impregnated sawdust as a catalyst. Fe-sawdust catalyst was prepared and successfully used in the removal of Crystal Violet in synthetic wastewater. The optimum heterogeneous Fenton reaction conditions for the decolorization of Crystal Violet were found as 0.3 g of catalytic amount with an initial pH value of 3.0 at 3 mM concentration of H₂O₂, 50 ppm initial concentration of Crystal Violet, and at a stirring rate of 600 rpm. A 96% decoloration efficiency was achieved under these reaction conditions. An iron loading percentage of 0.81% on sawdust was achieved in the catalytic preparation. The re-usage study revealed productive decoloration efficiency up to five cycles. In conclusion, cost-effective Fe-sawdust catalyst can potentially be an effective catalyst for the treatment of Crystal Violet in wastewater.

Keywords: *Crystal Violet, Wastewater, Fenton oxidation*