IJARSCT



International Journal of Advanced Research in Science, Communication and Technology

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 10, March 2025



To Study Fenton and Photo Fenton Reaction for the Degradation of Water Pollutants

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Abstract: Fenton and photo-Fenton reactions have emerged as effective Advanced Oxidation Processes (AOPs) for the degradation of organic pollutants in wastewater treatment. The Fenton process utilizes ferrous ions (Fe^{2+}) and hydrogen peroxide (H_2O_2) to generate hydroxyl radicals (•OH), which play a crucial role in breaking down contaminants. The photo-Fenton process, an enhanced version of the Fenton reaction, involves the application of ultraviolet (UV) light to further accelerate hydroxyl radical formation, leading to improved degradation efficiency, particularly for recalcitrant pollutants. This study aims to optimize key parameters influencing the Fenton and photo-Fenton processes, such as pH, Fe^{2+}/H_2O_2 concentration, reaction time, and UV light intensity, to achieve maximum pollutant removal. Experimental investigations involve UVVis spectrophotometry, Chemical Oxygen Demand (COD) reduction, and Total Organic Carbon (TOC) measurements to assess treatment performance. The study highlights the potential of these methods as cost-effective and environmentally friendly alternatives for wastewater treatment. However, challenges such as iron sludge formation, high hydrogen peroxide consumption, and acidic operating conditions require further optimization. Future research should focus on catalyst stabilization, solar-assisted photo-Fenton systems, and integration with other treatment technologies to enhance practical applications [1].

Keywords: Fenton Process, Photo-Fenton Process, Advanced Oxidation Processes (AOPs), Hydroxyl Radicals (OH), Water Pollutants, Wastewater Treatment, Hydrogen Peroxide (H_2O_2) , Ferrous Ions (Fe²⁺), UV Light, Pollutant Degradation, Environmental Remediation, Industrial Wastewater, Sustainability in Water Treatment [1].



DOI: 10.48175/IJARSCT-24764

