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Treatment and recycling facilities of highly polluted water-based paint wastewater

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ABSTRACT

The study presented focuses on treatment and recycling facilities of highly polluted water-based paint wastewater from electronics industry, using coagulation-flocculation, Fenton's oxidation and membrane processes. The treated water is sought after for recycling purposes within the painting unit and the water quality is negligible except suspended solids. The wastewater used in this study was characterized as highly polluted wastewater with high concentrations of COD (55,000–144,000 mg/l) and SS (9500–32,000 mg/l), alkaline and blackish colored. Coagulation-flocculation using alum and $FeSO_4$ was investigated. 67% of COD removal was achieved at 1000 mg/l of alum dosage whereas coagulation with $FeSO_4$ obtained 45% removal efficiency at 750 mg/l dosage. The Fenton's oxidation process gave good results for the removals of COD and color. 81% of COD removal was achieved at a molar ratio of $[H_2O_2]/[Fe^{+2}] = 10$ with 2 m H_2O_2. Waste sludge produced during the Fenton's process was less than that of coagulation, but still required hazardous chemical sludge disposal. This study showed that the total flux decline for the FM UP005 ultrafiltration membrane was 73% and the flux decline due to membrane fouling was 9%. The use of membrane filtration causes no sludge disposal problems since the concentrate can be recycled or reused. Cost analysis involving investment, operation and maintenance, and waste sludge disposal should be made to decide the treatment and/or recycling process.

Keywords: Coagulation; Fenton's reaction; Membrane process; Recycling; Treatment; Water-based paint wastewater

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