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KEY WORD: COLOR REMOVAL / OXIDATION / DYE / FENTON / HYDROGEN PEROXIDE

WUT VIPHANPHONG : USING FENTON'S REAGENT FOR REMOVAL OF COLOR AND ORGANIC COMPOUNDS IN DYEING WASTEWATER. THESIS ADVISOR : ASSO. PROF. MUNSIN TUMTOOLLAVEST, Ph.D. 196 pp. ISBN 974-637-330-7

The objective of this research was to study the color and organic removal efficiency of Fenton's chemical (hydrogen peroxide + ferrous iron (Fe^{+2})) in treating a reactive dye wastewater from a cotton dyeing plant. There were two phases of experiment: the first was chemical treatment study, and the second was biodegradability study.

In the chemical treatment study, parameters being studied were hydrogen peroxide dosages of 5 levels, i.e., 0 (as control), 200, 500, 800 and 1200 mg/l, molar ratio (R) of hydrogen peroxide and ferrous iron (Fe^{+2}) of 3 levels, i.e., R=5:1, R=10:1, and R=20:1, and the reaction time of 3 levels, i.e., 60, 120, 180 minutes. Dye wastewater under investigation had 4 different colors, namely, black, red, light brown, and purple. All wastewaters were prepared to have constant COD concentration of approximately 600 mg/l.

From the experiment, it was found that a dosage of 200 mg/l of hydrogen peroxide at R=5:1 in treating black, red and light brown wastewaters, and the same quantity of hydrogen peroxide at R=10:1 in treating purple-colored wastewater, could remove more than 80% of the color. And one hour was sufficient for the reaction to get the mentioned efficiency.

Besides, it was found that color removal efficiency was directly related to the ORP of the reaction. In order to obtain the color removal efficiency of 80% or more, high ORP level was found to be in the range of 583-614 millivolts. Differences of the values within this range depended on the color of the wastewater being used. Nevertheless, the dosage of Fenton's Reagent used in this research had the COD removal efficiency of 12-42% only.

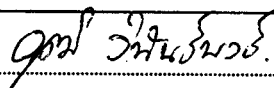
From the biodegradability study of chemically treated wastewater (with Fenton's Reagent) using an SBR system having cycle time of 24 hours and without sludge wastage, it was found that the treated wastewater produced no harmful effects to the SBR system. However, this SBR system could not significantly remove organic substances from the wastewater.

Conclusion could be drawn from experimental results that the dosage of hydrogen peroxide and molar ratio (R) between hydrogen peroxide and ferrous iron (Fe^{+2}) were important factors affecting the color and organic removal efficiency. Additionally, the experimental results showed that control of the chemical addition could be achieved by using proper ORP value. Costs of the chemicals used in the system were approximately 6.2, 6.5, 3.6 and 1.8 Baht/m³ for black, red, purple and light brown wastewaters, respectively.

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