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The effect of aeration on advanced coagulation, flotation and advanced oxidation processes for color removal from wastewater

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Abstract

A colored effluent entry into the environment gives rise to disruption of the environment and the production of hazardous and toxic byproducts. In order to improve the color removal of methyl orange and methylene blue, a flotation method with PAC, GFA coagulants, alum, ferrous sulfate and also simultaneous application of an advanced oxidation method UV/TiO₂/H₂O₂ was used. A reactor with a useful volume of 6 liters and an inlet flow of 100mL/min along with two UV-C (15W) lamps were applied as a flotation tank. The effect of concentration of PAC, GFA coagulants, alum, and ferrous sulfate in 0.5, 1, 1.5, and 2mg/L concentrations, TiO₂ in 0.5-2g/L concentrations, and also H₂O₂ in 150-400mL concentrations on the flotation process were put into account. Alum was obtained in the concentration of 1.5mg/L with an efficiency of 84.6% and also in concentrations of 0.5, 1, and 2mg/l with efficiencies of 66%, 82%, and 75%. In a flow of 150mL/min, the color removal efficiency was obtained between 54-86.5% and in pH 10; the most removal efficiency was (89%). In the best condition, the removal efficiency of methyl orange and methylene blue in AOP/flotation process in pH 10, the alum concentration of 5mg/L, air flow of 100mL/min, TiO₂ concentration of 1g/L, H₂O₂ concentration of 200mL were obtained 96-98% and 90-95%, respectively. Results of the present study indicate the effect of flotation method well with coagulants in combination with advanced oxidation methods on removing and reducing the concentration of soluble compounds in water like a color.

Key words: flotation, coagulation, advanced oxidation, color removal

Introduction

Textile colors are regarded as one of the largest groups of organic compounds produced yearly about 700,000 tons, and also around 1-20 percent of total colors world productions get into textile effluents during dyeing processes[1]. The release of these colored effluents into the environment will lead to disruption of the environment, Eutrophication, the production of hazardous and toxic byproducts through chemical reactions like oxidation, hydrolysis, and an adverse effect aesthetically, an acceptor water quality drop, and the effect on light

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