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COMPARISON OF TREATMENT OF TEXTILE WASTEWATER WITH ADSORPTION PROCESS, SULFATE AND HYDROXYL RADICAL-BASED OXIDATION PROCESSES

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Abstract

In this study, the treatment of textile wastewater by adsorption, sulfate radical-based oxidation (UV/S₂O₈), and hydroxyl radical-based (UV/H₂O₂) oxidation methods was investigated. The effects of pH and Powdered Activated Carbon (PAC) dose on the adsorption process were assessed, and advanced oxidation processes by UV/S₂O₈ and UV/H₂O₂ in wastewater after the adsorption were also investigated. In addition, the treatment of textile wastewater by UV/S₂O₈ and UV/H₂O₂ oxidation processes as a single process was examined and optimum pH and oxidant dose were determined in these treatments. In the adsorption process, 81.3% Chemical Oxygen Demand (COD), 83.6% Total Organic Carbon (TOC) and 97.0% color removal were achieved at pH 5 and 20 g/L PAC dose. In addition, 98% COD and 94% TOC removal has been achieved with UV/S₂O₈ or UV/H₂O₂ oxidation processes after adsorption. While 76% COD removal can be achieved with UV/S₂O₈ as a single process, COD removal can increase to 90% in the UV/H₂O₂ oxidation as a single process. As a result, COD and TOC removal with UV/S₂O₈ or UV/H₂O₂ processes increased if applied after the adsorption process. According to the results of this study, these methods seem to be promising in terms of recycling and reuse of textile wastewater. However, there is a need to investigate the removal of other pollutants expresses as Total Dissolved Solids (TDS), or salts for water recovery and reuse.

Key words: adsorption, hydroxyl radicals, kinetic, sulfate radicals, textile wastewater

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