



Treatability of raw textile wastewater using Fenton process and its comparison with chemical coagulation

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ABSTRACT

The textile industry has significant effects on the environment due to the intensive water consumption and the use of toxic raw materials. Every succeeding day, water quality to receive water environments is deteriorating due to the high amount of wastewater generated by the textile sector. In this study, the performance of the Fenton Process has been optimized to minimize the damage of acrylic yarn dye-house wastewater to the environment regarding operating conditions, Fe(II) and H₂O₂ dosages, pH and reaction time using the response surface methodology method over chemical oxygen demand (COD), colour and total organic carbon (TOC) measurement parameters. The results were compared with the results of chemical coagulation. The most effective parameter of the Fenton Process was determined as Fe(II) dosage for this kind of wastewater sample. As a result of the optimization, efficiencies by 82.8%, 96.2%, and 75.6% were obtained for COD, colour and TOC removal, respectively, by means of the Fenton process. The total treatment cost was determined as 1.216 € per 1 m³ textile wastewater. According to the experimental results, both processes were found to be effective for colour removal, whereas chemical coagulation was found to be insufficient for COD removal. When the two processes were compared in terms of sludge amount, the Fenton process was found to produce less sludge by 1.60 kg sludge/kg COD.

Keywords: Textile wastewater; Acrylic yarn dye; Fenton process; Chemical coagulation

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