Diagnosis and characteristics of water quality along the Wadi El Bey river (Tunisia). Coagulation/flocculation essays of textile effluents discharged into the Wadi

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\begin{abstract}
In the present investigation, Wadi El Bey river (Tunisia) was studied for water quality. Various physicochemical parameters (temperature, pH, conductivity, TSS, DO, COD, BOD\textsubscript{5}, ammonia, nitrate, phosphate, color, Pb, Zn, Ni, Cu, Cr, Fe, and Al) and microbiological (Fecal coliforms, Fecal streptococci, Escherichia coli (E. coli), Salmonella, Staphylococcus, and Pseudomonas) analysis of freshwater body were performed during 3 years (2012–2015) and compared to Tunisian standard (TN-106-02). Thirteen sampling sites were chosen to study the effect of industrial and domestic effluents on the river. Results revealed that almost all of the parameters exceed TN-106-02 standards indicating that the water quality of the river presents a high risk and it is urgent to control and to treat the wastewater discharged into Wadi El Bey. In this paper, several coagulation/flocculation essays are studied and evaluated on industrial wastewater effluents (site S1) discharged into the river. Using response surface methodology to evaluate the interactions between three factors (concentration of coagulant, flocculant dosage, and initial pH) on the treatment, the optimal conditions were reached by removing 87.87\% of COD and decolorization of the water to 99.82\%. This optimal treatment was obtained with 275 and 75 mg L\textsuperscript{-1} doses, respectively, for coagulant and flocculant.

\textit{Keywords:} Coagulation–flocculation; Tunisia; Decolorization; Industrial wastewater; Response surface methodology (RSM); Wadi
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