



Coagulation-Flocculation Treatment of Industrial Wastewater Using Tamarind Seed Powder

Ronke Ruth Ayangunna¹, Saidat Olanipekun Giwa^{2*},
Abdulwahab Giwa³

^{1,2}Chemical Engineering Department, Faculty of Engineering and Engineering Technology, Abubakar Tafawa Balewa University, Tafawa Balewa Way, Bauchi, Nigeria

³Chemical and Petroleum Engineering Department, College of Engineering, Afe Babalola University, KM. 8.5, Afe Babalola Way, Ado-Ekiti, Ekiti State, Nigeria

Abstract : In this study, the effectiveness of tamarind seed powder as a coagulant for treating detergent wastewater using coagulation-flocculation process has been evaluated by varying pH, mixing time and coagulant dosage, which were the selected operating parameters for the treatment process. The coagulant was prepared by drying, crushing and grinding the tamarind seeds to form medium fine powder. A conventional jar test apparatus was used to carry out the coagulation-flocculation of the sample of wastewater using the tamarind seed powder. The optimum pH of the process was found to be 7.25 with turbidity and COD removal of 97.01% and 24.86% respectively; the optimum mixing time was obtained to be 3 minutes of rapid mixing and 15 minutes of slow mixing with turbidity and COD removal of 97.78% and 43.50% respectively while the optimum dosage was given to be 400 mg/L with turbidity and COD removal of 97.72% and 39.55% respectively. The kinetics of the coagulation-flocculation process was found to obey the first order rate expression, the rate constant of which was estimated to be 0.044/min. The fitting of the rate equation to the kinetics data gave square of the correlation coefficient (R-squared) of 0.9983, which was an indication that the data was represented by the model very well. In conclusion, tamarind seed has been found to be effective in treating detergent industry wastewater. It is, therefore, recommended that local industries should consider using this material for wastewater treatment as an alternative to chemical coagulants because it is biological, cheap and readily available.