Abstract

The processes of the textile industry are causing detrimental effects on the environment due to the presence of dyes in wastewater effluents that strongly contaminate aquatic ecosystems. In addition, dyes are considered micro pollutants, and can be visible in very low concentrations (1 mg L−1) and affect people's health; current removal methods are often expensive and complex to apply. Therefore, the present research work proposed a low-cost, environmentally friendly and easy to apply material that is capable to remove dyes. In this regard, the coir pith was activated using NaOH, HCl and NaCl (0.1 M) for the preparation of ternary and binary composites using polymers as matrices (pectin, alginate and Carboxymethylcellulose) and FeCl3.6H2O, 24 composites were obtained, from which 9 binary composites were discarded due to the heterogeneity of the material. The objective was to evaluate and apply the composite based on biopolymer/activated coir pith/ FeCl3.6H2O; and as a result, determine the removal efficiency of cationic dyes through a spectrophotometer UV-vis (Yocke). In conclusion, this research showed, through ANOVA one-way and Tukey's test, at 95% confidence level, the possibility of using composites based on coir pith as a promising alternative for the removal of cationic dyes commonly used in the textile industry. The main results showed a maximum removal efficiency of the Brilliant Green cationic dye by HCl-coir pith/FeCl3.6H2O that reached 91.2 ± 1.35%; for Crystal Violet, by NaCl-coir pith/ FeCl3.6H2O, which reached 96.8 ± 0.89%; for methylene blue by HCl-coir pith/ FeCl3.6H2O, which reached 92.5 ± 0.29%; finally, Rhodamine B by HCl-coir pith 0.1 M, which reached 54.1 ± 0.51%. In this way, coir pith should be considered an agro-industrial waste potentially used in the circular economy for effluent treatment with dyes. Keywords: Dye removal, agro-industrial waste, spectrophotometry.