Abstract

In this research paper a comparative study has been carried out for the removal of methyl violet dye using unfunctionalized and functionalized cellulose. The functionalization was achieved through esterification of cellulose with furan-2,5-dione. The functionalization of the cellulose was evidenced using BET, FT-IR, SEM and TGA. The adsorption isotherm data was fitted using different isotherm models like Langmuir, Freundlich, Temkin, Flory–Huggins and Dubinin–Kaganer–Radushkevich models and found to follow Langmuir and Temkin isotherm models with high value of correlation coefficients. Functionalized cellulose (106.38 mg g^{-1}) showed higher dye removal capability than unfunctionalized cellulose (43.668 mg g^{-1}). The kinetics of adsorption was investigated using pseudo first order, second order, Elovich, liquid film diffusion and intra-particle diffusion models. The mechanism of adsorption was found to follow pseudo second order rate equation. Thermodynamic studies showed that the adsorption process was endothermic and spontaneous.