Removal of a common textile dye, navy blue (NB), from aqueous solutions by combined process of coagulation–flocculation followed by adsorption

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\textbf{ABSTRACT}

The decolorization and removal of chemical oxygen demand (COD) of a textile dye, Navy blue CE-RN (NB), were investigated from aqueous solutions by combined process of coagulation–flocculation (C–F) and adsorption. Common coagulants (alum, lime, poly aluminum chloride (PACl), and ferric chloride) and clay (montmorillonite (Mt) and nano-montmorillonite (NMt)) were used in C–F and adsorption steps, respectively. The maximum COD and dye removal was observed by coagulant of PACl in the C–F process. The optimum conditions for dye removal by PACl were occurred by coagulant dose of 0.1 g/L at pH 6. In the adsorption process, the optimum contact times of 120 and 20 min were obtained for Mt and NMt, respectively. The findings indicated that the optimum conditions for the dye sorption were observed at pH 2 and the adsorbent dose 1.8 g/L. The sorption data also showed that the adsorption of NB onto the sorbents was better followed the pseudo-second order kinetic models. The dye and COD concentrations during the combined treatment process were decreased from 300 to 2–4.5 mg/L and from 732 to 2–35 mg/L, respectively. This indicates that the combined process of C–F followed by adsorption can be used as a proper alternative for the treatment of NB dye-containing wastewaters.

\textbf{Keywords:} Aqueous solution; Dye; Coagulation; Flocculation; Adsorption

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