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Removal of basic violet 16 (BV16) dye from aqueous solution using adsorption on Fe₃O₄ Nano sized magnetic zeolite

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Abstract

Aim of study: At the present time, increasing of industrial activities and subsequently discharging the effluent of industrial wastewater into aquatic environments can cause several problems. Adsorption is one of the most effective methods for removal of dye. The aim of this study was to remove the violet 16 (BV16) dye from aqueous solution using adsorption on Fe₃O₄ Nano sized magnetic zeolite.

Methodology: In this study, the effect of several parameters such as initial concentration of dye, initial pH of the solution, adsorption dose and contact time were investigated on the adsorption process. The remaining dye concentration was detected using a spectrophotometer device at wavelength of 545 nm. Physical, surface and magnetic properties of the adsorbent were analyzed using the VSM technique. Adsorption data were described using Langmuir and Freundlich isotherm and reaction kinetics models.

Results: The results showed that by increasing the contact time and the adsorbent dose the removal of dye increased. According to the results, with decreasing the initial concentration of dye the efficiency of removal increased. The results also showed that, with increasing pH, the efficiency of removal process was linearly increased and optimum pH for removal of BV16 was determined (pH 7). The results showed that the adsorption of dye on this adsorbent followed the Freundlich isotherm (R=0.99).

Conclusion: The results of this study showed that magnetite zeolite can be used as an effective adsorbent for removal of the violet 16 dye in aqueous solutions.

Keyword: Basic violet 16, Zeolite, Fe₃O₄ nanoparticle, Kinetics

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