

عنوان مقاله:

Kinetic study of the photocatalytic degradation of the acid blue 113 dye in aqueous solutions using zinc oxide nanoparticles immobilized on synthetic activated carbon

محل انتشار:

مجله پیشرفت در تحقیقات بهداشت محیط (سال:2:7)

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خلاصه مقاله:

Approximately ۱۰-۲۰% of the total dyes in the world is consumed in the textile industry. The present study aimed to investigate the photocatalytic activity of zinc oxide nanoparticles (ZnO) immobilized on synthetic activated carbon in the removal of the acid blue ۱۱۳ dye from aqueous solutions. This experimental study was conducted in a photo-reactor with the useful volume of one liter. The effects of pH (۳, ۷, and ۹), zinc oxide nanoparticle concentrations (۰.۱-۰.۴ mmol/l), concentration of activated carbon modified by zinc oxide nanoparticles (۲۰, ۴۰, ۶۰, ۸۰, and ۱۰۰ mg/l), and the initial concentration of the dye (۲۰, ۴۰, ۶۰, ۸۰, ۱۰۰, and ۲۰۰ mg/l) were assessed. In addition, the kinetics of the reaction were investigated. The results indicated that the optimal conditions for the process were the pH of ۳, activated carbon modified by zinc oxide nanoparticle concentration of ۱۰۰ mg/l, ratio of ۰.۴ millimole of zinc oxide per gram of activated carbon, and acid blue ۱۱۳ dye concentration of ۱۰۰ mg/l, which resulted in the maximum efficacy of ۹۶%.

Moreover, removal efficiency using zinc oxide was greater in all the stages compared to removal efficiency using activated carbon. The kinetic rate was also determined, demonstrating that the process followed the first-order kinetics. In addition, the findings indicated that the process had outstanding efficiency in the removal of the acid blue ۱۱۳ dye. The photocatalysis of nanoparticle oxidation on synthetic activated carbon could be used effectively as an advanced oxidation reaction to remove dyes.

کلمات کلیدی:

Photocatalytic Process, Zinc oxide, Synthetic Active Carbon, Acid Blue 113, Aqueous

solutions

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