عنوان مقاله:

Photocatalytic Degradation of Azo Dye Acid Red 14 from Aqueous Solutions Using MWCNTs Nanocatalyst

محل انتشار:

مجله آرشیو علوم بهداشتی, دوره 7, شماره 2 (سال: 1397)

تعداد صفحات اصل مقاله: 10

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خلاصه مقاله:

Background & Aims of the Study: Azo Dyes are the most hazardous materials in differentindustries. Dyes and pigments used in industries for applications such as textiles, leathers, papers,foodstuffs, additives, etc. Application amounts of azo dyes in industries which can cause severehealth problems in human and environmental pollutant problems. So, color wastewatersdecomposition plan are necessary. The purpose of this study is the application statisticalexperimental design in photocatalytic decomposition of azo dye Acid Red 14 (AR14) fromaqueous solutions using multi walled carbon nanotubes (MWCNTs) particles which was usedUV/H2O2 process in photoreactor.Materials & Methods: MWCNTs particles as a catalyst used for the degradation of dye inaqueous solution. MWCNTs particles have been characterized by scanning electron microscopy(SEM), Transmission Electron Microscopy (TEM) and Fourier transform infrared (FT-IR).Design of experimental (DOE) based design matrix was exerted for measure the effect of thesethree factors such as: A) pH, B) catalyst amount and C) H2O2 concentration at two levels. Thefull factorial experimental design was utilized in this process. The significant effects of eachfactor and interactions determined using analysis of variance (ANOVA) method. Thedecomposition kinetic of dye was studied.Results: The maximum photocatalytic degradation efficiency of dye obtained in this study wasfound 90.65%, corresponding to the optimal conditions of 3, 30 mg L-1 and 20 ppm respectively,for the pH, catalyst amount and H2O2 concentration. The most effective factor in thephotocatalytic degradation efficiency was H2O2 concentration. The interaction betweenpH×H2O2 concentrations was the most effective interaction. A pseudo first order reaction with arate constant (k=0.0696 min−1) was observed for the photocatalytic degradation of dye.Conclusions: The results showed that photodegradation process can be suitable alternative todegradation dyes in aqueous solutions.

کلمات کلیدی:

Dye,Acid Red 14,Experimental design,Photocatalytic Degradation,Carbon nanotubes,Iran