عنوان مقاله:

Application of heterogeneous catalytic ozonation process for treatment of high toxic effluent from a pesticide manufacturing plant

محل انتشار:

مجله مدیریت ومهندسی بهداشت محیط, دوره 7, شماره 2 (سال: 1399)

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خلاصه مقاله:

Background: The discharge of untreated wastewater containing toxic and resistant compounds into the environment is a serious threat for ecosystems. Therefore, this study was conducted to evaluate the treatment of poison production factory wastewater using heterogeneous catalytic ozonation process (COP). Methods: Magnetic carbon nanocomposite was used as a catalyst at concentrations of 1, 2, and 4 g/L. Its effect on improving the treatment process was evaluated at reaction time of 30, 60, 90, and 120 minutes. At the end of each experiment, parameters including total organic carbon (TOC), chemical oxygen demand (COD), biological oxygen demand (BOD5), pH, electrical conductivity (EC), and turbidity were measured. Results: It was revealed that in single ozonation process (SOP), the maximum removal efficiencies of TOC, COD, and BOD5 were achieved at reaction time of 120 minutes as 56%, 40%, and 11.7%, respectively. By adding the catalyst to the wastewater, the treatment process was improved, so that the maximum removal efficiencies of COD (91%), TOC (73%), and BOD5 (74%) were obtained at catalyst concentration of 4 g/L. Under this condition, BOD5/COD ratio increased from 0.22 to 0.64. Also, the results of analysis of ozone consumption per each mg of reduced COD showed that its amount sharply decreased from 2.1 mgO3/mg COD removal in the SOP, to 0.34 mgO3/mg COD removal in the COP. The results of kinetic reaction analysis also revealed that the rate constant increased from 0.007 to 0.02 min-1. Conclusion: According to the results, it can be concluded that the COP at a catalyst concentration of 4 g/L, by decomposing resistant compounds and increasing the biodegradability, can be used as a suitable pre-treatment method for biological processes.

کلمات کلیدی:

Wastewater, Treatment, Nanocomposite, Catalytic ozonation, Kinetics