以紫外線/臭氧程序處理染料廢水之光反應器設計研究

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摘 要

本研究旨在發展與建立以高級氧化程序處理染料廢水之連續環狀雙套管式光反應器設計方程式， 探討模式係藉由結合光氧化系統中之反應機制、各反應成份之質量平衡方程式，以及紫外線光強 度分佈模式，並經由不同反應條件(如水力停留時間、光反應器幾何尺寸、水溶液PH值、紫外線光 強度等)及染料物種(如反應性染料 REACTIVE RED 141、酸性染料ACID BLUE 62、直接染料DIRECT YELLOW 86等)之實驗驗證，以評估光反應器設計方程式之合理性與可行性。研究重點係以UV/O3及 UV/H2O2/O3程序處理染料廢水為主題，架構整體反應系統，經由染料污染物及氧化劑質量平衡之計算，評估氧化劑及紫外線之使用效率，以做為高級氧化程序效能及操作條件之取決依據，並比較不同 類型之染料污染物在各光氧化系統中反應特性的差異，從而建立光氧化程序處理染料廢水之光反應 器設計方程式，以做為以光為主體之高級氧化程序未來實際商業應用研究之基礎及參考。 在UV/O3及UV/H2O2/O3程序中，染料去除效率主要受到染料本身之初始濃度之降低、染料溶液 PH值之降低、紫外線光強度之提高、氧化劑添加劑量之增加及光反應器內外半徑比之降低而升高。 在該兩種程序下，三種染料之去除率順序為，UV/O3程序下BLUE 62＞RED 141＞YELLOW 86； UV/H2O2/O3程序下RED 141＞BLUE 62＞YELLOW 86。各種AOPS程序處理染料分別去除率順序為 UV/H2O2/O3＞UV/O3＞H2O2/O3＞O3。 結合各反應成分之質量平衡方程式與無限線光源分佈模式，所推導與建立之光反應器設計方程式， 可合理描述以UV/O3及UV/H2O2/O3程序處理染料在各操作條件下之反應行為。

關鍵詞 : 高級氧化程序、染料廢水、環狀光反應器、設計方程式

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