以層流沈降薄膜式真空紫外線光解程序處理含有機水溶液之反應器最佳化設計研究

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摘 要

本研究旨在以真空紫外光(VUV)為主體之高級氧化處理程序處理含有有機污染物之水溶液，探討模式係藉由結合光氧化系統中之反應動力、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(如體積流率、氧化劑、催化劑、水溶液pH值、紫外線光強度及污染物起始濃度等)之實驗驗證，以及配合數學軟體模擬污染物（異丙醇、染料Acid Red 4）分解的結果，進而評估光反應器設計方程式之合理性與可行性。 實驗結果顯示，以VUV 直接程序處理含染料、異丙醇水溶液時，異丙醇水溶液與染料去除率隨體積流率之增加、紫外線光強度之提高、H2O2添加劑量之提高、TiO2劑量之增加而升高，其中TiO2劑量與H2O2添加劑量為主要影響染料光氧化速率之反應因子。在對IPA與Acid Red 4之去除率探討中，各光氧化程序處理效率順序為:VUV/H2O2＞VUV/TiO2/H2O2＞VUV/TiO2＞VUV only，實驗並發現染料在光氧化程序中之去除率效果較IPA為佳。 在VUV only、VUV/H2O2、VUV/TiO2/H2O2程序中，結合程序中染料及異丙醇之反應動力式、質量守恆方程式及紫外線無限線光源模式，所推導與建立之光反應器設計方程式，可合理模擬染料及異丙醇溶液在各操作條件下之分解行為及濃度分佈情形，可做未來為光反應器設計之基礎。

關鍵詞 : 染料、異丙醇、光反應器設計、VUV、AOPs

目錄

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