以 UV/TiO2 程序處理揮發性有機空氣污染物之光催化行為研究

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摘 要

中文摘要 本研究旨在以連續式光觸媒催化反應為主體之高級氧化處理程序處理氣相有機污染物，探討藉由不同光強度之UV燈及經由不同反應條件（如體積流率、紫外線光強度、有機物之初始濃度、溼度、及觸媒床放置型態及面積等）之實驗驗證，以及配合兩種常見之有機污染物（異丙醇、甲醛）之光觸媒分解結果，進而評估光催化系統之礦化與反應途徑。 本研究之反應控制是以質傳控制為主，而經Fluent 6.2版模擬流場後，發現本研究所使用之流速在反應器內均為層流，即無徑向對流效應，整體反應是以軸向剪應力及軸向滯留時間為主要反應控制。 當以400W光觸媒系統降解異丙醇及甲醛時，只有以軸向滯留時間為主要反應控制，故流率上升，反應速率下降，而以初始濃度為效應時，異丙醇及甲醛的初始濃度越高越受限於觸媒表面之活性位置固定，其降解率亦越低而礦化率也隨初始濃度之增高而降低 當以8W光觸媒系統降解異丙醇時，是以軸向剪應力與軸向滯留時間相互競爭的條件下，有其最佳降解率，而以礦化率而言，濃度越高礦化率越低。 當以8W光觸媒系統降解甲醛時，因為甲醛是採用低濃度，所以在流率越低越符合布朗寧擴散運動模式，降解率越高，而礦化率則沒有明顯改變，若以初始濃度為效應，則初始濃度越高， 若將400W及8W系統以單位面積單位光強度之反應速率常數比較可發現，8W系統的觸媒床面積較大又與流體流動方向呈平行，故接觸反應機會較多，所以單位面積單位光強度之反應速率常數均較大。 關鍵字：高級氧化、光觸媒、異丙醇、甲醛、礦化

關鍵詞 : 高級氧化 ; 光觸媒 ; 異丙醇 ; 甲醛 ; 礦化

目錄

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