在可見光照射下以鐵、硫改質之二氧化鈦光觸媒進行亞甲基藍溶液的光催化降解研究

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摘 要

本研究以溶膠凝膠法(sol-gel)製備不同的二氧化鈦光觸媒，以鑲嵌Fe與S的方式進行改質二氧化鈦光觸媒，包括FeT-S、FeT-SL、ST-S，在可見光下進行MB染料的降解實驗；並探討其最佳的改質條件(鑲嵌量與鍛燒溫度)與最佳的操作條件(pH值與MB初始濃度)。

本實驗使用BET、SEM/EDX、XRD與UV-vis等儀器鑑定光觸媒之物化特性。實驗結果顯示，以本實驗的改質方法確實能成功將金屬Fe與非金屬S鑲嵌於TiO2上，比表面積大約為38.7~79.4 m2/g；XRD分析結果顯示其多為銳鈦礦晶相；UV-vis分析顯示改質過後的光觸媒其可見光吸收能力增強，並有明顯的紅位移現象。若觀察MB染料濃度的降解情形，與以擬一階反應速率方程式來描述實驗結果，可以發現改質過後的二氧化鈦光觸媒，在可見光下可具有較佳的光降解效果；最佳的改質觸媒為ST-S在鑲嵌劑量為硫?0.15 mole和鍛燒溫度為500℃；最佳的操作條件為pH=11、初始濃度=10ppm。綜合實驗結果，本研究在反應60分鐘後MB的降解率最高可達88%。

關鍵詞 : 溶膠凝膠法、光觸媒、可見光、Fe、S、TiO2、MB染料

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