咖啡渣吸附銅離子之研究

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摘 要

本研究以咖啡渣為吸附劑，吸附水中的重金屬銅離子，探討其特性，本研究分為三階段進行，第一階段以批次試驗探討影響吸附的參數，主要項目為pH 值、劑量、濃度、離子強度與溫度對銅金屬吸附之影響，再進行等溫吸附試驗，探討最大吸附量與吸附關係；第二階段為脫附試驗，探討其再生率，吸附劑表面銅離子殘存量；第三階段為藉由批次試驗實驗數據，推估出吸附動力學模式、吸附熱力學與等溫吸附模式，並探討關係數學模式模擬吸附結果。由實驗結果發現吸附動力學較符合Pseudo-second-order 動力模式，平衡吸附模式較符合Redlich-Paterson等溫吸附模式，Langmuir等溫吸附模式算出銅離子最大吸附量在25℃時為7.9 mg/g，結果顯示咖啡渣吸附銅離子為有利性的吸附。吸附熱力學算出ΔH0與ΔS0分別為20.681 kJ/mol、213.3 J/mol K，結果顯示咖啡渣吸附銅離子為自發性的吸熱反應。脫附最佳條件為脫附溶液0.5 N HNO3，咖啡渣劑量為1.5 g/L，溫度為25°C，轉速為100 rpm，儀器為恆溫震盪槽，反應時間48小時，所得脫附量為7.96 mg/L，再脫附試驗條件同脫附試驗，所得脫附量為4.07 mg/L，再生率為96.9%。吸附試驗條件pH 值為5，咖啡渣劑量為1.5 g/L，溫度為25℃，反應時間24小時之吸附率為40%，再吸附試驗條件同吸附試驗，再吸附試驗吸附率為20%，經由回收再利用之後，吸附效果減少一倍。

關鍵詞 : 吸附、咖啡渣、銅、動力學、熱力學

目錄

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