利用旋轉盤生物反應器去除廢水中之有機物並同時生產細菌纖維以及利用改質細菌纖維吸附銅離子 = Simultaneous Removal of Organic

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摘 要

由Gluconacetobacter sp. Wu1-1 生產的細菌纖維薄膜，具有獨特的物理與化學特性，包括有良好的表面積、高機械強度與由微纖維組成之3D 網狀結構。本研究主要是探討影響Gluconacetobacter sp. Wu1-1於旋轉盤生物反應器(Rotating Disks Reactor, RDR)中生產細菌纖維薄膜之因子。初步研究顯示，利用聚碳酸酯為材料的轉盤，並在轉盤表面貼上400C的砂紙進行RDR操作，結果顯示其產量較其他粗糙度之砂紙高。而RDR操作最佳轉盤數目及轉盤轉速分別為8盤及 8 rpm，並在HRT為16小時且曝氣條件下，可獲得最大細菌纖維產量與COD去除率分別為0.99 g/L及67.7%。另一方面，利用細菌纖維在廢水處理，主要著重水體中銅離子之吸附，並計算吸附動力學與等溫線模式。結果顯示吸附過程屬於pseudo second-order kinetics，且實驗數據最符合Langmuir model。熱力學參數(ΔG, ΔH?, ΔS?)主要推測吸附過程屬於吸熱或放熱，結果顯示本研究細菌纖維之吸附為吸熱過程。另外，在細菌纖維之膜壓耐受性顯示，細菌纖維薄膜膜壓會隨著膜厚度增加而增加，而厚度較薄之薄膜其對於水的通透性會較厚薄膜來的好。對水溶液中銅離子去除效果初步結果顯示，若利用經乾燥之細菌纖維薄膜會較濕膜要來的有效果。然而，當細菌纖維薄膜經過手動壓膜機施壓後，反而會降低銅離子之吸附率。此外，利用傅立葉轉換紅外線光譜儀及電子顯微鏡觀察改質/未改質細菌纖維特性。

關鍵詞 : 細菌纖維薄膜、Gluconacetobacter sp. Wu1-1、旋轉盤生物反應器、化學改質、膜壓

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