MTBE污染地下水之生物復育影響因子及其生物相研究

吳志鴻、林啟文

E-mail: 9314394@mail.dyu.edu.tw

摘 要

本研究之目的為探討MTBE污染地下水之生物復育影響因子及其生物相研究，期能藉由研究結果進行分析比較，以瞭解在不同的環境因子參數下之污染物去除效率及微生物菌群結構變化情形。本研究主要以實驗室之密閉瓶進行批次試驗方式測試混合菌群對MTBE之降解效率，以及採用分子生物技術中之聚合?鏈鎖反應(polymerase chain reaction, PCR)與單股DNA構形多型性(single strand conformation polymorphism, SSCP)分析技術來鑑別混合菌群間之生物相結構。 研究結果顯示：⑴混合菌群於不同酸鹼度(pH 4.04?pH 10.05)條件下仍可降解MTBE，其分解能力以酸性環境(pH 4.04?pH 6.77)優於中至鹼性環境(pH 7.00?pH 10.05)，且菌群亦可區分為酸性與鹼性環境之兩大微生物結構；⑵單一基質(MTBE)之濃度添加範圍(3.6 ppm?1440 ppm)若在混合菌群可承受之濃度範圍內，其降解效率將隨基質之降解而使生質量增加，反之若高於菌種之忍受範圍，則菌群將無法降解MTBE；⑶雙基質與多重碳源共存下，醚類或芳香烴化合物均可被菌種降解完畢，而所呈現之菌群結構亦將隨基質種類之變動而有消長現象；⑷菌群結構之消長狀態隨溫度之變化而產生微小之差異；⑸進行SSCP跑膠時，將PCR產物濃度控制在15 ng/?l?24 ng/?l之間可呈現最佳圖譜；⑹混合菌群中若含有已篩選或已確認之菌種時，則可以引子方式添加於混合菌群中，並由SSCP凝膠之跳躍位置得知此已知菌種是否存在於系統中；⑺MTBE分解菌(#3菌株)降解單一基質之MTBE時，所產生之中間代謝物(TBA)亦可被MTBE分解菌降解完畢。

關鍵詞 : 甲基第三丁基醚 ; 聚合? ; 鏈鎖反應 ; 單股DNA構形多型性分析 ; 菌群社會結構 ; 生物分解

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