含氧汽油添加劑分解菌之馴化、篩選及生長條件研究

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摘 要

本研究之目的為探討含氧汽油添加劑分解菌之馴化、篩選及生長條件，期能藉由研究結果之分析比較，以了解MTBE分解菌對MTBE及其他環境中常見之有機污染物分解情形。本研究經由實驗室自行組設氣舉式(Air lift)反應器，馴化(Acclimated)出能以MTBE為利用基質的MTBE分解菌，馴化初期以異丙醇(IPA)與MTBE等比例混合作為其馴化之基質，並隨馴化時間增加而逐漸減少IPA之添加量，最後完全以MTBE為其唯一馴化碳源，待得到具MTBE分解能力之混合菌，再利用批次分解之方式探討該混合菌對MTBE的分解特性、及其他基質(BTEX、TAME、ETBE、Ethyl ether、TBA)存在下之分解情形。最後由此混合菌中進行菌株分離篩選，藉此得到具分解MTBE能力之純菌，再針對分解過程中副產品產生情形及MTBE分解特性進行探討。 研究結果顯示：⑴以IPA為輔助碳源進行煉油廠污泥之馴化，可成功地馴化出能以MTBE為利用基質之混合菌，於經過約五個月之馴化後，反應器中菌液之pH呈明顯降低情形；⑵批次分解試驗結果顯示，於約二星期後能完全分解7.2ppm之MTBE，在碳源濃度達288ppm時仍不致造成對MTBE分解的抑制；⑶由馴化所得混合菌進行批次實驗，評估其分解基質能力之結果顯示，此混合菌具有分解多種芳香族化合物之能力，依其分解速率排序由快而慢依序為Toluene、Benzene、Ethyl benzene、p-Xylene、Ethyl ether、MTBE、TAME、ETBE；⑷MTBE與Benzene、Toluene分別共存者，須待Benzene或Toluene分解完畢後才開始分解MTBE，且最後皆仍可完全分解MTBE；⑸MTBE與TBA、TAME、ETBE分別共存者，其添加之複合碳源皆可同時被本土混合菌分解；⑹將本土混合菌以其他碳源馴化培養後之MTBE分解結果顯示，在經過Benzene或Toluene之培養後本土混合菌仍具有分解MTBE之能力；⑺由混合菌中分離所得之純菌，其對MTBE之分解能力優於混合菌，完全分解4.09mg MTBE所需時間約6小時，但其分解MTBE過程中會產生TBA累積之情形；⑻MTBE分解菌於MTBE濃度為30mg/L時具有之最大比生長速率為0.000778hr-1，其飽和常數則為0.029mg/L，但在MTBE濃度增至60mg/L時，其比生長速率會因其濃度的增加而產生抑制。

關鍵詞 : 甲基第三丁基醚 ; 馴化 ; 氣舉式反應器 ; 批次分解 ; 篩選

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