以反應曲面法研究生化柴油之最優化酵素合成

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摘 要

生化柴油為一種柴油的替代品，基於環保和可從回復原料（食用廢油）來製備的益處，已成為大眾所關注的焦點。雖然現今商業界可由化學合成的方式來大量生產，但仍有些缺點，包括產生副產物及合成須在高溫高壓的條件下進行。相反地，以酵素法合成生化柴油相當溫和、無副產物且更屬天然。因此，在溫和條件下，以脂解酵素催化來合成生化柴油衍然成為商業界未來之主要發展趨勢。 本研究是利用固定化脂解酵素Rhizomucor miehei (Lipozyme IM-77)或Candida antarctica(Novozym 435)來催化大豆油或芥花油，並與甲醇進行轉酯化反應。利用反應曲面法(Response surface methodology; RSM)及五階層五變數之中心混層實驗設計法(Central composite rotatable design; CCRD)，分別探討以Lipozyme IM-77合成大豆油甲酯與Novozym 435合成芥花油甲酯的反應時間 (2-10 h 與 4-20 h)、反應溫度 (25-65 oC)、酵素用量(0.2-1.0 BAUN 與0.1-0.5 g)、基質莫耳比 (大豆油與 芥花油：甲醇 = 1:2-1:4) 及水分添加量 (0 -20%)等反應參數對轉酯化合成大豆油甲酯與芥花油甲酯的重量轉換率之影響。 研究結果發現反應溫度和酵素量對大豆油甲酯或芥花油甲酯之重量轉化率的影響很重要。利用脊形分析可得到大豆油甲酯與芥花油甲酯之最優化重量轉換率分別為92.2或99.4%，而反應條件為：反應時間6.3與12.4 h、反應溫度36.5與38.1 oC、酵素用量0.9 BAUN與0.42 g、基質莫耳比(甲醇：大豆油或芥花油)3.4:1與3.5 :1及水分添加量5.8或7.2%。

關鍵詞 : 脂解酵素、生化柴油、固定化、最優化、反應曲面法、轉酯化。

目錄

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