

## 使用不同混凝劑於混凝薄膜過濾單元 處理石化廢水之研究

陳煜斌 張家源 張錦松 陳必祥

嘉南藥理科技大學環境工程衛生系

### 摘 要

本研究以石化廢水為實驗對象，以混凝沉澱為前處理，再配合掃流微過濾技術來降低廢水中的有機物質及其毒性。以濁度、過濾液量、COD及Microtox毒性試驗等為效益評估參數，來探討混凝-薄膜混合系統應用在ABS製程廢水處理之可行性。本研究分成二個階段，前一階段以混凝沉澱瓶杯實驗，決定最佳的混凝劑種類及其劑量與pH值。實驗發現多元氯化鋁(PAC)與三氯化鐵有較好的濁度去除率，可高達98.6%，但COD之去除率均有限，且因濁度之去除率並不與COD之去除率成正比，故推斷混凝沉澱後之上層液中尚含有大量之有機質。本研究的第二個階段進行薄膜過濾實驗，探討在不同薄膜孔徑之過濾條件下對混凝-薄膜過濾程序效益之影響。研究結果顯示，混凝及薄膜過濾操作後可改善累積流量，降低濁度及去除部分之COD，廢水之毒性亦可大幅降低；而毒性測試結果顯示廢水之生物毒性與有機物質之含量有相當之關聯性。

關鍵詞：石化廢水、混凝劑、薄膜過濾、Microtox毒性測試

### 前 言

石化工業為台灣主要工業之一，ABS樹脂則為壓克力與塑膠產業重要原料，台灣的產量居全世界之首。ABS樹脂是由丙烯腈(Acrylonitrile)-丁二烯(Butadiene)-苯乙烯(Styrene)三種成分共聚合(copolymer)所形成的耐衝擊、熱可塑性樹脂的總稱，由於其製程中所排放之廢水量大，廢水中的成分複雜且多含抑制微生物生長的毒性物質，造成生物不易分解之特性。此外廢水中COD濃度甚高，過多的有機質會影響排放水水質，若未經妥善處理即排放至承受水體，將會導致水質日益惡化，破壞環境並危害人體健康。目前國內對於此類廢水之處理情形，在現場方面多以傳統的化學混凝配合活性污泥法進行處理，在學界方面則有學者以生物處理法來處理<sup>(1)(2)(3)</sup>，處理效果也各有優劣。

本研究以另一種不同角度來探討處理石化製程所產生之廢水，系統程序採用化學混凝機制與掃

## ABSTRACT

### Using Different Coagulants in Coagulation-Microfiltration System for the Treatment of Petrochemical Industry Wastewater

I-Pin Chen, Chia-Yuan Chang, Jing-Song Chang and Pi-Hsiang Chen

*Department of Environmental Engineering and Health,  
Chia-Nan University of Pharmacy and Science,  
Tainan, Taiwan 71710, R.O.C.*

#### ABSTRACT

In this study, coagulation with microfiltration membrane systems was evaluated for the treatment of petrochemical industry wastewater. Three different coagulants, i.e. polyaluminium chloride (PAC), ferric chloride and ferrous sulfate, were used in this study. Turbidity, COD, quantity of permeates and Microtox toxicity was used as the parameters for the assessment. There were two phases of this study, the first phase was to decide the optimum dosage of coagulant for coagulation, and the second phase was to evaluate the efficacy of the coagulation-microfiltration system under the different operating modes. As for coagulation, the results showed that an exceptionally high removal efficiency of turbidity was obtained when PAC was used as the coagulant. However, the removal of COD was not effective by PAC. Similar results were observed for ferric chloride while the lowest removal efficiencies of turbidity and COD appeared when ferrous sulfate was used. As for coagulation-microfiltration system, two positive results were obtained from this study; the first one showed that the operation of settling after coagulation could enhance the removal efficiencies of turbidity and COD, especially on COD removal. The second one, from the results of Microtox test, showed that the toxicity referred as TU50 could approximately be reduced about 50% by this process.

**Key words:** petrochemical industry wastewater, coagulants, membrane microfiltration, microtox tests.