

## Abstract

Large amount of excess waste activated sludge (WAS) discharges from the municipal 2nd treatment plant may generate tremendous solid waste and disposal problems. Therefore, the minimization and reutilization of WAS are important topics to deal with. In this study, the pellets were made of various mixed ratios with WAS, local red soil and chemical additive (A) and then baked at 800°C for 1 hr. The optimal formula of pellets is 6: 5: 1 (WAS: red soil: additive) and with water absorption, density, and compressive strength of 60.49 %, 0.67 g/cm<sup>3</sup> and 2.44 kgf/cm<sup>2</sup>, respectively. The leachates of pellets also meet Toxicity Characteristics Leaching Procedure (TCLP) test. The pellets were used as immobilized media in biological SND process. The result showed the satisfactory (90 %) SND efficiency of the immobilized system under aerobic condition (DO = 1~2 mg/L) with an ammonium loading rate of 0.019 g-NH<sub>4</sub><sup>+</sup>-N/g-VSS/day. The Nernst equation can provide the practical information such as ORP control in a biological treatment for using on-line control strategy.

Keywords: waste activated sludge (WAS), bake, reuse, pellet, simultaneous nitrification and denitrification (SND), Nernst equations

## 摘 要

生物廢水處理已是目前全世界最盛行方式之一，它能有效率地除去廢水中有機物污染(如碳、氮等基質污染)，卻也隨著處理過程中產生大量廢棄活性污泥。目前針對廢棄污泥處理方式仍以掩埋為主，對環境上可能造成二次污染之虞，因此，未來針對廢棄污泥處理方式應以減量及資源回收方面進行。

在本研究中，係以斗六工業廢水處理之廢棄活性污泥與東海當地廢棄紅土與少許化學添加物，按照重量以 6:5:1 比例混合並逐漸加溫至 800°C 後一小時燒製成擔體(rebuilt WAS pellet)，燒製而成之擔體具有 60.49 % 吸水率、0.67 g/cm<sup>3</sup> 密度及 2.44 kgf/cm<sup>2</sup> 抗壓強度等性質。而燒製後之擔體經毒性溶出特性(TCLP test)檢驗後並無重金屬溶出現象，因此，此燒製擔體可以作為生物廢水處理系統中生物接觸擔體，並以生物膜形成方式來引導同時硝化與脫硝(simultaneous nitrification and denitrification, SND)反應效能。實驗結果顯示在生物膜固定化之反應槽內，溶氧值為 1.0~2.0 mg/L，氨氮負荷率 0.019 g-NH<sub>4</sub><sup>+</sup>-N / g-VSS/day，可以引導出 SND 現象與效率，並透過 Nernst equation 模擬出能以 ORP 作為此反應系統控制之策略。

關鍵字：廢棄活性污泥、燒製、再利用、擔體、同時硝化與脫硝、

Nernst equation

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