

## **Effect of dilution and operating parameters on ammonia removal from scheduled waste landfill leachate in a lab-scale ammonia stripping reactor**

### **ABSTRACT**

A lab-scale ammonia stripping reactor was used to treat raw and diluted (1:1) scheduled waste landfill (SWL) leachate containing ammonia-nitrogen (NH<sub>3</sub>-N). Operating parameters such as air-liquid ratio, hydrated lime [Ca(OH)<sub>2</sub>] dosage, types of packing materials and packing heights were investigated with central composite design (CCD) of response surface methodology (RSM) was used to optimize the parameters affecting NH<sub>3</sub>-N removal from the leachate. The percentage removal on turbidity, colour and phosphate were also evaluated in this study. It was observed that the optimal conditions obtained from desirable response (NH<sub>3</sub>-N removal) for raw leachate were predicted at air-liquid ratio of 70, Ca(OH)<sub>2</sub> dosage of 5 gL<sup>-1</sup>, packing height of 60 cm and types of packing material was number 3 (nonwoven polyester) while for diluted leachate these were 70, 6 gL<sup>-1</sup>, 60 cm and Type 3 (nonwoven polyester), respectively. Quadratic RSM predicted the maximum NH<sub>3</sub>-N removal to be 78% for raw leachate and 81% for diluted leachate at these optimal conditions concurred with the experiment which successfully removed 76% and 80% of NH<sub>3</sub>-N, respectively. However, higher removal efficiencies of turbidity (97%), colour (88%) and phosphate (93%) was observed in the treatment with diluted leachate compared to raw leachate merely up to 55%, 34% and 49%, respectively. The finding showed that the difference in the removal of NH<sub>3</sub>-N in diluted and raw SWL leachate was insignificant. However, turbidity, colour and phosphate showed a significant reduction in the diluted leachate during the treatment. The study suggests that the dilution of SWL leachate does not present a significant effect on the removal of ammonia in the stripping reactor.

**Keyword:** Dilution; Operating parameters; Ammonia removal; Scheduled waste landfill; Ammonia stripping reactor