Pre-treatment of ammonia-nitrogen (NH3-N) removal from scheduled waste leachate by air stripping

ABSTRACT

The effect of lime dosage, pH and air flow rate on the removal process of NH3–N from a scheduled waste landfill leachate was investigated by using a lab-scale air stripping column. The main objectives were to reduce NH3–N concentration prior further biological treatment and to investigate factors affecting air stripping processes. A central composite design (CCD) of response surface methodology (RSM) was employed to optimize the parameters affecting NH3–N removal from the leachate. It was observed that the optimal conditions obtained from desirable response (NH3–N removal) were predicted at lime dosage of 9.8 g L⁻¹, pH = 11 and air flow rate of 2.25 L min⁻¹. Quadratic RSM predicted the maximum NH3–N removal to be 96.5% at these optimal conditions and concurred with the experiments which successfully removed 96.3% of NH3–N within 24 h. This study shows that the RSM could successfully predict the degree of NH3–N removal. The findings suggest that RSM approach was feasible for optimizing the air stripping process for NH3–N removal from scheduled waste landfill leachate in laboratory scale. Based on the obtained results, air stripping process can be used as an efficient pre-treatment for removal of NH3–N in scheduled waste leachate.

Keyword: Air stripping; Ammonia-nitrogen removal; Leachate; Response surface methodology (RSM); Scheduled waste leachate