

Comparison performance of coagulation flocculation process and combination with ozonation process of stabilized landfill leachate treatment

ABSTRACT

Landfill leachate is well known as a hazardous byproduct from dumping sites that has a negative impact on the environment and human life. Therefore, an effective treatment is imperative to overcome this issue. This research study investigates the effectiveness of zirconium tetrachloride ($ZrCl_4$) and tin tetrachloride ($SnCl_4$) as a coagulant in leachate treatment. Two parameters selected as a performance indicator in this study are color and chemical oxygen demand (COD). The data obtained showed that $SnCl_4$ performed well as a coagulant with removal percentages of color and COD, which are 97% and 77%, respectively. Furthermore, the potential of integrated treatment using ozonation (O_3) and the coagulation-flocculation process was also investigated. Four sequences of integrated treatment setup for this study were ozonation followed by jar test ($ZrCl_4$ as a coagulant), ozonation followed by jar test ($SnCl_4$ as a coagulant), jar test ($ZrCl_4$ as a coagulant) followed by the ozonation process, and jar test ($SnCl_4$ as a coagulant) followed by the ozonation process. The experimental data showed that the combination treatment of $SnCl_4$ as a coagulant (jar test) followed by the ozonation process had recorded the highest removal of color (97.1%) and COD (88%) compared to other sequences. Moreover, the biodegradability ratio of this sequence also improved from 0.03 to 0.28, compared with other methods. Comparatively, integrated treatment is more effective in treating stabilized landfill leachate compared to the coagulation flocculation process alone.