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DEGRADATION AND ADSORPTION BEHAVIOR OF DIBUTYL PHTHALATE IN METHANOGENIC PHASE REFUSE

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Abstract

The degradation and adsorption behavior of dibutyl phthalate (DBP) in methanogenic phase refuse was investigated through laboratory microcosm experiments. The results showed that the half-life of DBP in the sterilized refuse was 5.9 times higher than in unsterilized samples, but that it decreased by 35.8% when dominant bacterial strains were added. Different concentrations of DBP did not have obvious effects on its degradation. The half-lives of DBP were decreased by 53.0%, 37.2% and 20.8% when the refuse moisture increased from 20%, 40% and 60% to 80%, respectively. The pH of refuse was an important factor influencing DBP biodegradation, with the optimal pH being around 7.0. The optimal temperature for DBP degradation in refuse was around 30°C. In addition, the Freundlich model fits the adsorption and desorption isotherm of DBP for refuse with n values that suggest nonlinear adsorption characteristics. The free energy change ΔG value ($-23.5 \text{ kJ mol}^{-1}$) indicates that the adsorption of DBP on refuse was a physical reaction. Desorption hysteresis was observed in the DBP desorption experiments. Overall, the results indicate that DBP may accumulate in refuse, and that its transformation and bio-availability may be limited under landfill conditions.

Key words: adsorption, degradation, dibutyl phthalate, refuse

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