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Diffusive Transport of VOCs Through Composite Liners

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Abstract : Modern landfills employ a composite liner consisting of a geomembrane overlying a compacted clay liner (CCL) or a geosynthetic clay liner (GCL) as a barrier system. The primary function of a barrier system is to control the contaminant transport from the leachate (dissolved phase) and landfill gas (vapour phase) out of the landfill thereby minimizing the environmental impact. This study is undertaken to investigate the diffusive migration of VOCs through composite liners. VOCs are known hazardous air pollutants were often existing in both the vapour phase and dissolved phase. These compounds are known to diffuse readily through the polymeric geomembranes. The objective of the research is to develop a comprehensive data set of diffusive parameters involved in the diffusion of VOCs in the composite liner (1.5 mm HDPE geomembrane overlying a 30mm compacted clay layer). For this purpose, the study aims to develop a new experimental setup for determining the diffusion characteristics. The key parameters of diffusion (partitioning, diffusion and permeation coefficients) are examined. The diffusion tests are carried out both in aqueous and vapor phase. Finally, an attempt is also made to study the effect of low temperature on the diffusion characteristics.

Keywords : diffusion, sorption, organic compounds, composite liners, geomembrane
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