

城市生活垃圾的气体渗透性试验研究

魏海云, 詹良通, 陈云敏

(浙江大学 岩土工程研究所, 浙江 杭州 310027)

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摘要 采用填埋场钻孔获得的垃圾样, 用自制导气试验装置, 测试垃圾的气体渗透系数, 分析孔隙比、饱和度和垃圾组分对气体渗透性的影响。测试结果表明: 所测试垃圾的气体渗透系数为 $(10^{-8} \sim 10^{-5}) \text{ m}^2 \cdot \text{Pa}^{-1} \cdot \text{s}^{-1}$ 量级, 固有渗透系数为 $(10^{-13} \sim 10^{-10}) \text{ m}^2$ 量级。垃圾试样的孔隙比、饱和度和组分均对气体渗透性均有显著的影响。当垃圾组分和饱和度($S_r = 0\%$ 或 40%)给定时, 气体渗透系数随孔隙比($e = 1.5 \sim 3.0$)增加呈指数递增; 当试样组分和孔隙比($e = 2.0$)给定时, 气体渗透系数与饱和度呈双线性关系, 其分界点所对应的饱和度($S_r = 50\%$)略低于该垃圾田间持水量所对应饱和度值; 当饱和度高于该界限值时, 气体渗透系数随饱和度增加呈指数递减, 而在低饱和度阶段, 气体渗透系数受其影响相对较小。在控制试样孔隙比与饱和度均相同的特定条件下, 气体渗透系数随填埋龄期($t = 0 \sim 11 \text{ a}$)的增加而增大。

关键词 [环境工程](#); [城市生活垃圾](#); [气体渗透系数](#); [孔隙比](#); [饱和度](#); [田间持水量](#); [填埋龄期](#)

分类号

EXPERIMENTAL STUDY ON GAS PERMEABILITY OF MUNICIPAL SOLID WASTE

WEI Haiyun, ZHAN Liangtong, CHEN Yunmin

(Institute of Geotechnical Engineering, Zhejiang University, Hangzhou, Zhejiang 310027, China)

Abstract

Gas permeability of municipal solid waste(MSW) is an important parameter for the analyses of landfill gas migration. The laboratory measurement of gas permeability was carried out on the MSWs taken from the Qizishan landfill in Suzhou City, China. The measurement was performed with a purposely-designed lysimeter. The influences of void ratio, degree of saturation and MSW composition on gas permeability were investigated. The test results show that the gas permeability of the MSW ranges from $10^{-8} \text{ m}^2 \cdot \text{Pa}^{-1} \cdot \text{s}^{-1}$ to $10^{-5} \text{ m}^2 \cdot \text{Pa}^{-1} \cdot \text{s}^{-1}$, and the corresponding intrinsic permeability is between 10^{-13} m^2 and 10^{-10} m^2 . For a given composition and degree of saturation($S_r = 0\%$ or 40%), gas permeability was found to increase exponentially with void ratio of the MSW. For a given composition and void ratio($e = 2.0$), a bilinear relationship was observed between gas permeability and degree of

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saturation. The degree of saturation corresponding to the division point (i.e. $S_r = 50\%$) was slightly less than that corresponding to the field capacity of the MSW. When the degree of saturation is greater than the division point, gas permeability decreases exponentially with an increase in the degree of saturation. However, at the low range of degree of saturation (i.e. $S_r \leq 50\%$), the influence of S_r on gas permeability is not so significant. When the samples have the same void ratio as well as degree of saturation, it is unexpected to find that the gas permeability of the MSW increases with fill age.

Key words [environmental engineering](#); [municipal solid waste \(MSW\)](#); [gas permeability](#); [void ratio](#); [degree of saturation](#); [field capacity](#); [fill age](#)

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