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城市污泥电渗脱水实验研究

Laboratory study on electroosmosis dewatering of sewage sludge

关键词: [污泥](#) [电渗脱水](#) [电渗流量](#) [脱水效果](#) [电压梯度](#) [剩余含水率](#)

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摘要: 电渗脱水是一种能有效去除污泥中水分以实现减量的处理方法. 本文采用自制电渗脱水装置进行了城市污泥的电渗脱水实验. 通过监测脱水过程中电渗流量、电压梯度与剩余含水率的变化, 考察了电压梯度、电极间距和处理时间的影响, 并进一步分析了电渗处理过程中脱水效果变化的原因. 处理中随着脱水效果由阳极向阴极发展, 污泥可划分为已脱水污泥与未脱水污泥, 已脱水污泥内电渗停止, 电渗与水分的脱除发生在未脱水污泥内, 并由未脱水污泥的电压梯度决定. 已脱水污泥阻值上升, 使未脱水污泥电压梯度逐渐降低, 造成了电渗流量与脱水效果的衰减, 并使得污泥剩余含水率由阳极至阴极逐渐增加. 电渗脱水的整体效果随加载电压的增加而提高, 脱水能耗亦随之增加, 选取较小的电极间距时电渗脱水能效较高.

Abstract: Electroosmosis dewatering is a method which can remove water in sludge effectively to achieve volume reduction. This paper presented a laboratory study on electroosmosis dewatering of sludge with purposely-designed apparatuses. During the dewatering tests, the changes of electroosmotic flow rate, voltage gradient and residual water content were measured. On the basis of the measurements, the influences of voltage gradient, electrode distance and treating time on the dewatering process were analyzed, and the attenuation mechanism in the dewatering effect was explained. It was found that the electroosmosis dewatering gradually extended from the anode to cathode, and after a certain time the dewatering ceased in the dewatered section and transited to the subsequent undewatered section. Electrical resistance of the dewatered section gradually increased, and in response the voltage left for the undewatered section decreased. Both the electroosmotic flow rate and dewatering effect were determined by the voltage gradient of the undewatered sludge. The phenomenon resulted in significant attenuation in electroosmotic flow and dewatering effect over time and non-uniform distribution of residual water content along the dewatering direction. The overall dewatering effect and the corresponding energy consumption increased with an increase in the applied voltage. The dewatering efficiency would be improved with a shorter electrode distance.

Key words: [sludge](#) [electroosmosis dewatering](#) [electroosmotic flow rate](#) [dewatering effect](#) [voltage gradient](#) [residual water content](#)

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