Leachate-Filtering Efficacy of Varied Liners

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To prevent the leaching of contaminated water (leachate) into the surrounding environment, current landfills utilize a system of liners that often contain Bentonite powder, a material intended to filter acidic leachate and release clean water. This research aimed to test different powders' neutralizing abilities to detect a better alternative to the currently used, Bentonite. It was hypothesized that if the basic powders Kaolin (KL), Diatomaceous Earth (DE), and Activated Charcoal (AC) are used to filter acidic leachates, then the most basic powder will shift the pH closer to neutral than Bentonite. This was tested through gravitational filtration by placing each clay into holed cups and running them through with lemon juice (pH=4.8) or vinegar (pH=4.5). The filtered samples were collected and the average pH changes for each powder were recorded. As shown from the means, DE and AC displayed higher pH increases than Bentonite, while KL clay failed to filter any leachate. The data was analyzed by conducting one-tailed (directional) t-tests. The final comparisons of DE (avg pH=6.57, SD=0.11, n=5, p=0.023), and AC (avg pH=6.54, SD=0.15, n=5, p=0.068) with Bentonite (avg pH=6.25, SD=0.21, n=5), revealed that DE had the highest pH increase. The t-test results gave sufficient evidence (p=0.023) to conclude that DE powder is a better filtering alternative for BT. Future research will investigate other factors that contribute to the finest landfill powder.

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