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Authors: Yize Pan, Joseph Rossabi, Chonggen Pan, Xinyu Xie

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Stabilization/Solidification Characteristics of Organic Clay Contaminated by Lead When Using Cement

Yize Pan[a,b,c], Joseph Rossabi[c], Chonggen Pan[b], Xinyu Xie[a,b,*]

a. Research Center of Coastal and Urban Geotechnical Engineering, Zhejiang University, Hangzhou, 310058, China

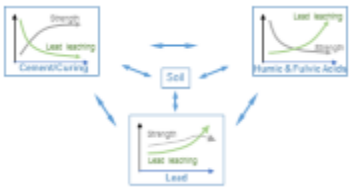
b. Ningbo Institute of Technology, Zhejiang University, Ningbo, 315100, China

c. Department of Civil and Environmental Engineering, Northwestern University, Evanston, 60208, USA

* Corresponding author

E-mail addresses: xiexinyu@zju.edu.cn (X. Xie); panchonggen@zju.edu.cn (C. Pan)

Graphical abstract



Highlights

- HA and FA weaken PTE stabilizing effects in cement treated soil.
- The result of two opposed HA and FA effects on PTE may be mainly determined by material mixing sequence and timing.
- The stabilized strength reaches a peak at a specific lead content in soil.
- Strength increases and lead leaching decreases with more cement added or longer curing time up to about 28 days.

Abstract

Research about cement treated soil has examined various characteristics of strengthened and stabilized soil, but has mainly focused on either the unconfined compressive strength or potentially toxic element (PTE) stabilizing results respectively in response to cement dosing. This study investigates how factors including cement concentration, lead concentration, humic/fulvic acid content and curing age affect these two geotechnical and environmental characteristics. A laboratory study was conducted to measure unconfined compressive strength, and lead leaching under several test conditions. Knowing that humic acid and fulvic acid can weaken cementation in cement treated soil but can stabilize PTEs such as lead by different chemical reactions, it was found that the acids generally reduce lead stabilization in cement treated soil. In addition, the stabilized strength reaches a peak at a specific lead content in soil. Finally, scanning electron microscopy was used to observe more detailed changes and mechanisms.