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## EXPERIMENTAL STUDY ON REMEDYING HEAVY METAL CONTAMINATION IN CLAYEY SOIL USING THE FREEZING-THAWING PHENOMENON IN COLD REGIONS

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### Abstract

Soil washing has been widely applied and studied in the remediation of heavy metal contamination soil. However, it proves easily limited by soil texture. To this end, the method of freeze-thaw and washing is used to enhance washing efficiency of clayey soils. An array of experiments of laboratory indirectness washing and freeze-thaw and washing were carried out to investigate the removal effect of single and compound washing on heavy metals. The results showed that the stability of soil aggregates would be destabilized by repeated freezing and thawing, contributing to a sufficient contact reaction between eluents and contaminations. The process can also remove heavy metals under a lower liquid-solid ratio, thus reducing the risk of secondary contamination of the soil environment. The eluent has a certain viscosity, which increases the viscosity of the pore water. Accordingly, the water migration resistance increases and inhibits the soil frost heaving-water intake, resulting in the reduction of removal efficiency. The removal effect of compound washing is preferable to the single washing, proving effectively removing the weak acid extractable fractions, reducible fractions, as well as residue fractions of Cd and the weak acid extractable fractions and reducible fractions of Pb in the soil. The research results provide a novel method of reusing natural cold energy to remedy clayey soil contamination with heavy metals.

*Key words:* clayey soil, compound eluent, freeze-thaw, heavy metal contamination, soil washing,

*Received:* June, 2023; *Revised final:* November, 2023; *Accepted:* December, 2023; *Published in final edited form:* May, 2024

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