Electro-Osmosis Treatment of Lead-Contaminated Soil with Carbon Fiber-Based Geotextile Electrodes

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doi: 10.20964/2020.11.54

Received: 28 July 2020 / Accepted: 16 September 2020 / Published: 30 September 2020

The application of electro-osmosis (EO) can rapidly improve the strength of soft soil by EO consolidation; at the same time, heavy metal migration in the soil can be induced. Traditional metal electrodes have many shortcomings and need to be improved. This paper investigates the effects of carbon fiber-based geotextiles (CFBGs) as electrodes on the characteristics of EO for the treatment of lead-contaminated soil. The experimental results show that the CFBG material leads to a lower electric current and energy consumption coefficient than stainless steel (SS) electrodes at similar drainage volumes, thus expending less energy than the SS electrodes. The treatment effect of CFBGs on lead migration is better than that of SS, which is due to the inert electrochemical properties of the CFBGs. In addition, the presence of lead results in an irregular distribution of the bearing capacity of the soil after EO. Finally, the EO treatment mainly reduces the contents of the exchangeable and carbonate-bound lead fractions, which is due to the strong mobility of exchangeable lead and the acidic environment generated at the anode.

Keywords: Electro-osmosis; Carbon fiber-based geotextiles; Lead; Migration; Exchangeable.

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