

## Introduction

Sodium and chloride both dissolve in water and are carried into the ground by precipitation runoff. The use of electrokinetic remediation (EKR) techniques has been demonstrated to remove heavy metals<sup>[1]</sup>, salt<sup>[2]</sup>, and other contaminants<sup>[3]</sup> from soil. Acetic acid has shown promise in the EKR of heavy metals<sup>[4]</sup>.

One issue during the process is that chloride ions buildup near the anode, and are not removed. My experiment was performed to determine if using acetic acid, as the cathode fluid during EKR, would remove this buildup and increase the total amount of chloride removed. I hypothesized that the tube with 0.5M acetic acid would have the least chloride remaining and the buildup in section B reduced the most.

## Materials

	Tube 1	Tube 2	Tube 3
Mass of Kaolinite	2000g	2000g	2000g
Mass of NaCl	26.4g	26.4g	26.5g
Volume of tap water	800mL	800mL	800mL
Anode solution	Tap water	Tap water	Tap water
Cathode solution 1	Tap water	Tap water	Tap water
Cathode solution 2	Tap water	0.1M acetic acid	0.5M acetic acid

## Methods

- Three acrylic tube cells were packed with a kaolinite mixture, using bentonite as a seal
- DSA wire was used as the electrodes and Loresco carbon filled in the remaining volume
- Cathodes and anodes were wired to benchtop DC power supply, providing 15V for 11.5 days
- Pump flushed the anodes and cathodes at a rate of 50.00µL/min
- Cathode purge solutions for tubes 2 and 3 were switched to their respective acetic acid solutions after 2 days
- Ion selective electrodes, spear-tipped pH probe, and a multimeter



Figure 1. Example of a labelled acrylic tube filled with kaolinite prior to the EKR process.

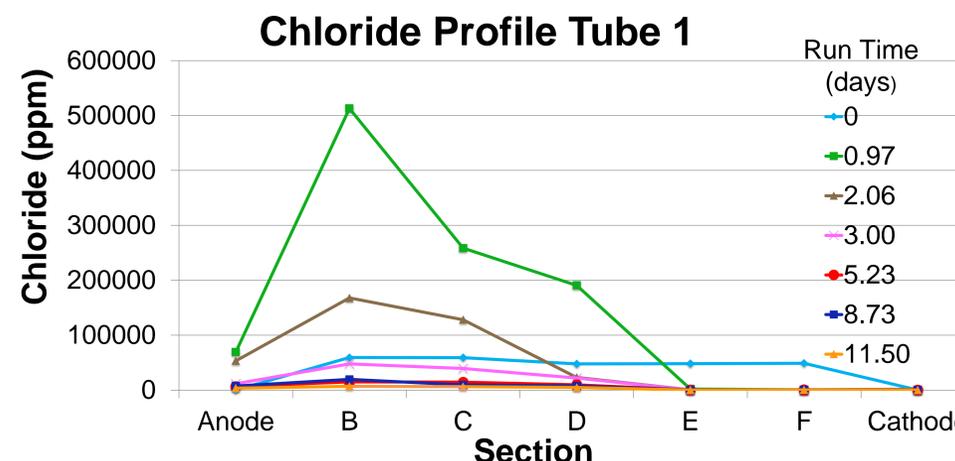
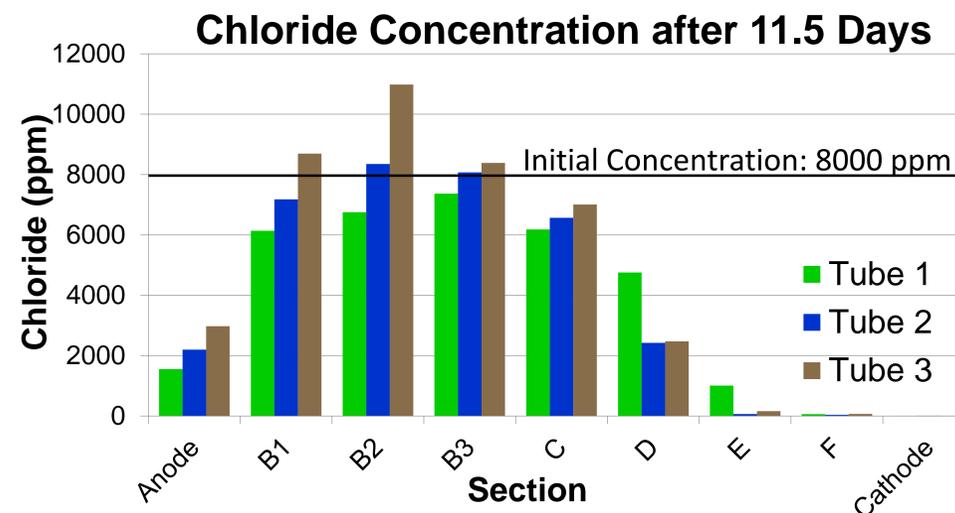
## Results

### Percent Chloride Removed

- Tube 1: 55.8%
- Tube 2: 56.7%
- Tube 3: 53.1%

### Chloride remaining in Section B

- Tube 1: 6745 ppm
- Tube 2: 7883 ppm
- Tube 3: 9220 ppm



## Conclusion

The use of acetic acid as the cathode purge solution during the electrokinetic desalinization process did not have a significant effect on the overall removal of chloride. Tube 2, with 0.1M acetic acid as the cathode purge solution, had the largest percentage of chloride removed. The use of acetic acid slightly increased the percentage of sodium ions removed. Contrary to the hypothesis, the chloride buildup in section B increased with the strength of acetic acid.

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## References

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