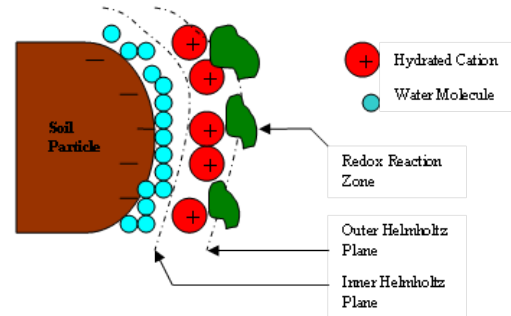
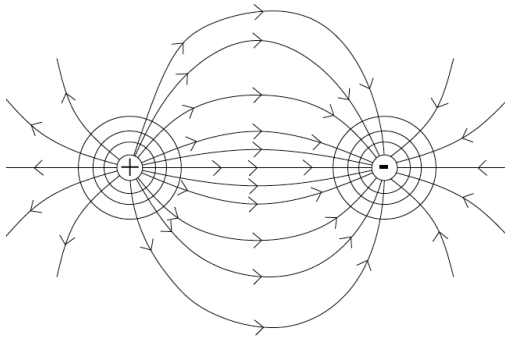


E-Redox-I: Enhanced Contaminant Mobilization for Removal

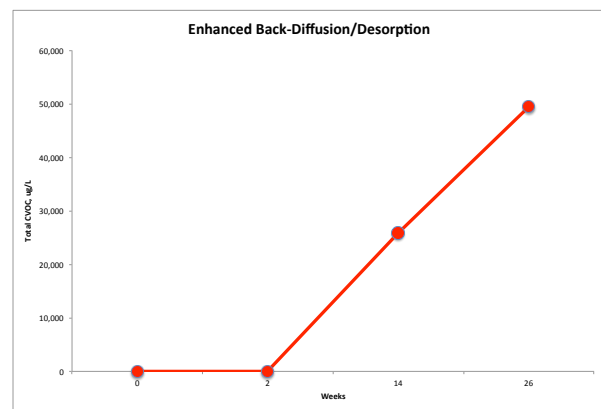
E-Redox-I is a patented technology developed by Advanced Environmental Technologies, LLC (AET, Fort Collins, CO). Field applications of **E-Redox-I** have demonstrated the sustainability and cost-effectiveness of this technology in enhancing the back-diffusion and/or desorption of contaminants in environmental matrices (e.g., groundwater, soil, and sediments), where increased contaminant mass removal may be realized when operating in conjunction with extraction methods (e.g., multiphase extraction).

E-Redox-I technology generates and sustains a low-voltage gradient electric field in between electrodes, uniformly inducing redox reactions within the impacted matrices. The soil/sediment particles within the matrices become “micro-electrodes” within the induced electric field, triggering and sustaining numerous redox reactions. Enhanced back-diffusion (desorption) and mobilization of organic contaminants can occur within an electric field produced by E-Redox-I systems. Within the electric field, localized redox reactions at the soil/sediment particle surface can cause contaminant desorption, and localized “micro-electrode” reactions may produce localized increases in basicity that increase organic contaminant solubility. Contaminant reduction and removal can be maximized by integrating E-Redox-I with water and vapor phase removal methods (e.g., dual-phase or multiphase extractions).



Applications

- Organic contaminants
 - Examples: Chlorinated solvents, PAHs
- Water saturated matrices (e.g., groundwater, sediments)
- Integration with other mass extraction methods, such as multiphase extraction
- Integration with in situ and ex situ methods, strategies for contaminant mass removal
- Simultaneous contaminant degradation/transformation

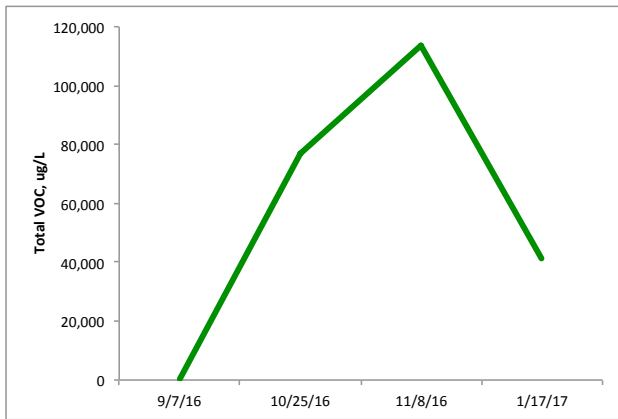


Advantages

- Implementable in wide-range of matrices, including low permeable zones
- Requires very low energy input
- Easily integrated with renewable energy sources (e.g., solar panels, wind turbine)
 - Allows application in remote locations
 - Sustainable

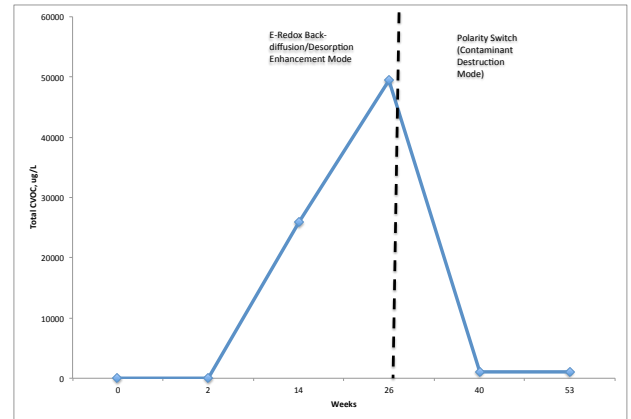
CASE STUDY 1: Former Manufacturing Site

An E-Redox-I field demonstration was conducted at a former manufacturing site located in the UK, where the subsurface has been historically impacted by chlorinated VOCs. The E-Redox-I system operated in conjunction with a dual-phase extraction (DPE) system within an area of 50 ft². After 2 months of E-Redox-I operation, the concentration of VOCs at the DPE increased from 350 to 113,000 µg/L. After 10 months of operation, approximately 480.2 pounds of chlorinated VOCs were extracted from the groundwater (PID measurements increased from 400 ppm to >100,000 ppm.)



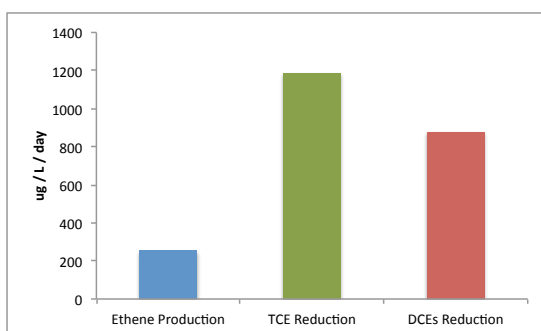
CASE STUDY 2: Former Industrial Site

E-Redox-I was implemented at a former industrial site in southeast US, where groundwater is contaminated with chlorinated VOCs (CVOCs). After 2 weeks of operation, enhancement of back-diffusion was observed in wells that were historically low in CVOc concentration (yet persistent). In one example well, the CVOc concentration was 12 µg/L before E-Redox-I operation, but increased to 50,000 µg/L after 26 weeks of operation. To demonstrate the E-Redox-I back-diffusion enhancement effect, the system polarity was switched, which resulted in the decrease (reduction) of the CVOcs.



Contaminant Destruction by E-Redox-I

Contaminant destruction is another application for E-Redox-I. Within an electric field, soil/sediment particles become “micro-electrodes” that trigger redox reactions. Contaminants within the soil/sediment matrix are susceptible to these redox reactions and may be rapidly degraded or transformed. Typically, reductive degradation of contaminants is observed, where contaminants may include chlorinated solvents, oxidized metals, and oxyanions. The chart below is for one field application where simultaneous enhanced back-diffusion and contaminant reduction occurred at a chlorinated solvent-contaminated site. About 47 days after E-Redox-I startup, the observed TCE and DCEs reduction rates were 1187 and 876 µg/L/day, respectively.



About Us

Advanced Environmental Technologies, LLC (AET) is a technology innovator and implementer, specializing in sustainable treatment solutions for wastewater, contaminated soils, groundwater, and sediments. Our patented and patent-pending technologies focus on remediation of a variety of recalcitrant contaminants, wastewater treatment, and low-value compounds to energy conversion. We provide both technologies and specialized services to project owners and engineering companies by offering innovative and sustainable solutions for environmental remediation, wastewater treatment, and bioenergy.



Advanced Environmental Technologies, LLC

4025 Automation Way, Suite F4

Fort Collins, CO 80525, USA

Tel: +1-970-449-9711

E-mail: info@aetecs.com

URL: www.aetecs.com