Reactive walls with modular reactor systems with Fe (0) / zero valent iron

Project description

Outflowing contaminated groundwater was remediated using a passive system of reactive walls without surface technical installations. The reactive walls were installed perpendicular to the water outflow thus forcing water through the wall. Remediation was achieved thanks to the reactive and adsorptive components of the wall.

In Germany, these partially passive modular and fully controllable reactor systems have demonstrated their value and effectiveness.

Components and operation

The system designed and operated by Sensatec Berlin GmbH at the site of former company, WGT-Kaserne Bernau, consisted of a modular horizontal reactor, based on parallel operating modules and used Fe (0) as the reactive material.

The reactor system remediated over 100,000 m^3 of highly contaminated ground water containing CHC with concentration exceeding 100 mg/L.

The remediation of the contaminated ground water was possible due to the unique regenerative properties of the active material.

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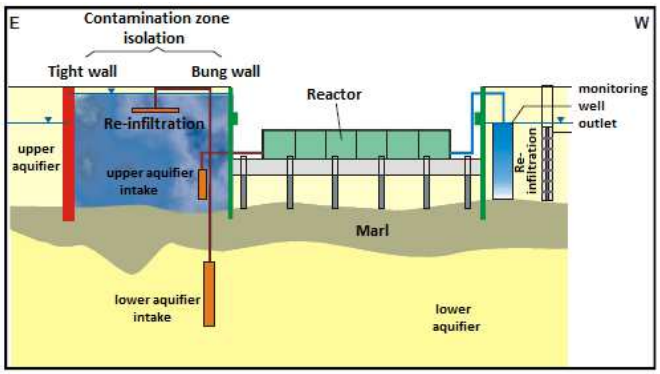
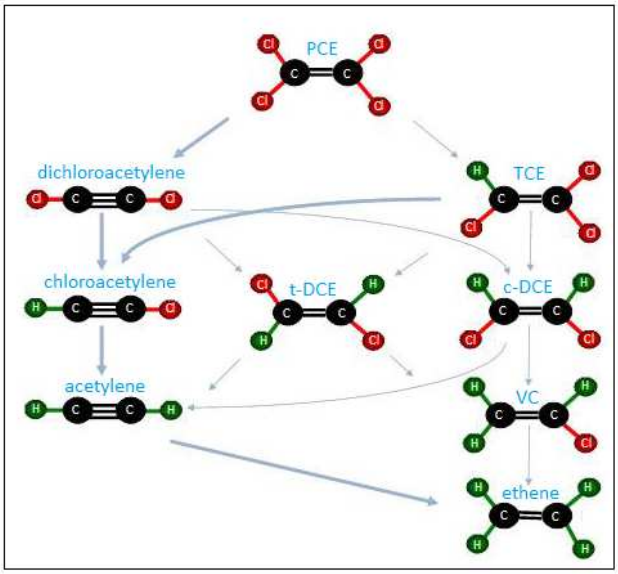


Reaction mechanism

The drawing below shows the dehalogenation of tetrachloroethylene (PCE) by β-elimination to ethene. Unstable intermediates such as, chloroacetylene or acetylene are formed during the process with vinyl chloride formation occuring to a lesser extent.

During the transformation reaction, the anaerobic corrosion of iron by hydrogen takes place. This results in an increase of the pH of the treated water. Since, the reaction principle is based on direct reduction that is, a reaction with a measurable half-life.The process is considered highly effective for the remediation of ground water contaminated with tetra and trichlorethene. Microbial metabolites, cis-dichloroetene or vinyl chloride result from the incomplete reduction of Fe (0).



Reference:
HEIN, P., ZITTWITZ, M., PISTIOLIS, I., MOSCHICK, A.,FREYGANG, M., GROßMANN, J. (2008) In-situ-Abreinigung von Trichlorethen im Grundwasser mit regenerierbarem Fe(0)-Reaktor, Altlastenspektrum Vol. 2/2008

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