Product Sheet

EHC® LIQUID

EHC® Liquid

A DYNAMIC SOLUTION PROMOTING ABIOTIC AND BIOTIC PROCESSES

EHC® Liquid is an in situ chemical reduction (ISCR) product for the treatment of impacted groundwater. It is a cold-water soluble formulation that is specially designed for injection via existing wells or hydraulic injection networks for the treatment of a wide range of groundwater contaminants. EHC® Liquid creates strong reducing conditions and promotes both biotic and abiotic dechlorination reactions. EHC® Liquid is composed of two parts: EHC® Liquid Reagent Mix, an organo-iron compound, and ELS® Micro, which are easily combined and diluted for injection.

KEY BENEFITS

- Stimulation of biotic reductive dechlorination through the generation of strong reducing conditions
- Structurally bound nutrients phosphorous and nitrogen released to bacteria via the fermentation of the lecithin molecule
- Direct chemical reduction from redox reaction of organoiron compound
- Surface dechlorination by magnetite and green rust precipitates from iron corrosion
- Replenished reactive iron surface provided by the cycling of iron from ferrous to ferric state in the presence of a carbon source – anticipated longevity of 2-3 yrs. depending on site conditions
- Easy to handle and cold water soluble

CONTAMINANTS TREATED

- Chlorinated solvents such as PCE, TCE, TCA, DCA, CCl_4, chloroform and methylene chloride
- Chlorobenzenes including di- and tri-chlorobenzene
- Energetic compounds such as TNT, DNT, HMX, RDX, nitroglycerine and perchlorate
- Most pesticides including DDT, DDE, dieldrin, 2,4-D and 2,4,5-T
- Chlorofluorocarbons
- Nitrate compounds
- Chromium

THE SOUND SCIENCE OF EHC® LIQUID

Organic carbon addition in the saturated zone is well-known to promote conventional enzymatic reductive dechlorination reactions. This happens because the carbon in the subsurface will support the growth of indigenous microbes in the groundwater environment. As bacteria feed on the soluble carbon, they consume dissolved oxygen and other electron acceptors, thereby reducing the redox potential in groundwater. As bacteria ferment the ELS® Microemulsion, they release a variety of volatile fatty acids (VFAs) such as lactic, propionic and butyric, which diffuse from the site of fermentation into the groundwater plume and serve as electron donors for other bacteria, including dehalogenators. The biogenolysis/hydrogenolysis reaction for the reduction of PCE is shown on the next page (Figure 2).

ISCR reactions of Fe^{2+} with chlorinated contaminants and formation of Fe^{3+}

Bacterial extraction of electrons from carbon restore Fe^{3+} to Fe^{2+} (Fe^{3+} is the e^- acceptor)

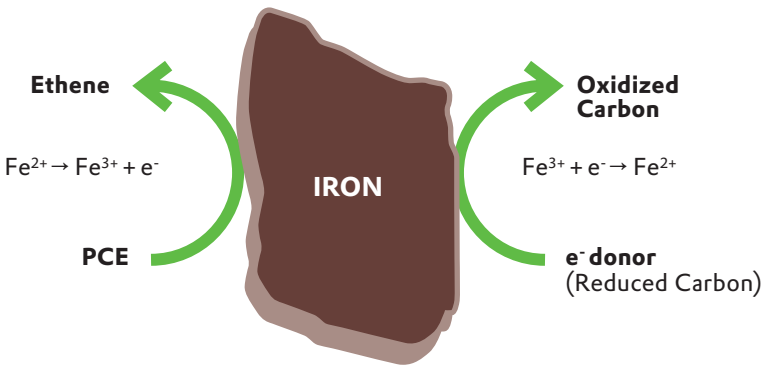

Figure 1

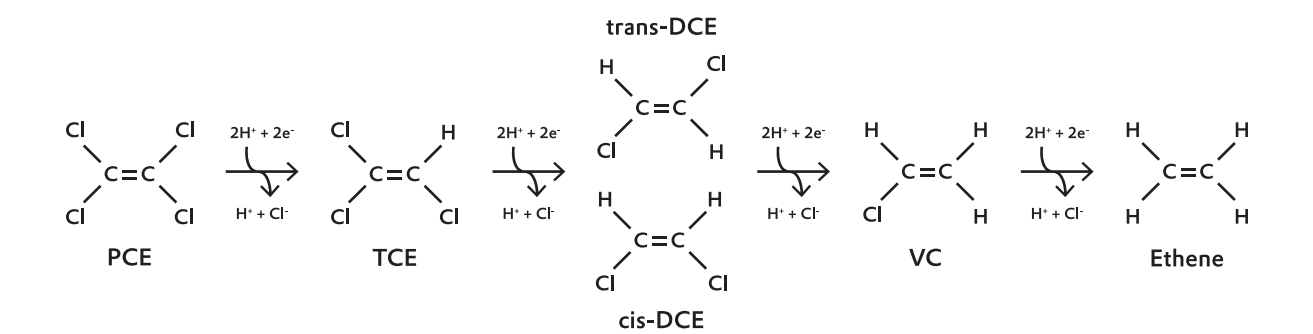

Figure 2

Lecithin itself is composed primarily of phospholipids, which have both hydrophilic and hydrophobic regions in their molecular structure. As a result, ELS® emulsions tend to be stable emulsions, expectedly more stable than with only hydrophobic compounds. Further, phospholipids support remediation by providing essential nutrients (carbon, nitrogen, phosphorus) to bacteria.

The soluble organo-iron compound is comprised of a ferrous iron (Fe^{+2}) that can form a variety of iron minerals (e.g. magnetite, pyrite) that are capable of reducing contaminants as they oxidize further to the ferric (Fe^{+3}) state via one electron transfer. The ferric ion can be "recycled" back to ferrous as long as other electrons from supplied carbon and indigenous carbon are available.

EHC® Liquid is primarily recommended for plume treatment. It can be used as a source treatment depending on site conditions.

APPLICATION METHODS

- Direct push injection
- Gravity feed through existing wells
- Low pressure injections
- Recirculation systems

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