



INFORMATION

ABC⁺ (Anaerobic BioChem⁺) is a mixture of ABC[®] (Anaerobic BioChem) and Zero Valent Iron (ZVI), promoting both anaerobic biodegradation and reductive dechlorination of halogenated solvents in groundwater. Formulated and mixed on a site-by-site basis, up to fifty percent (50%) by weight of ZVI can be added. ZVI has been proven and widely accepted as an effective *in situ* remediation technology for treating chlorinated solvents such as trichloroethane (TCA), tetrachloroethylene (PCE), trichloroethylene (TCE), and daughter products. The degradation process using ZVI alone is comprised of several abiotic reductive dechlorination processes occurring on the surface of the granular iron, with the iron acting primarily as an electron donor.

The addition of ZVI to the ABC mixture provides a number of advantages for enhanced reductive dechlorination (ERD). The ZVI provides an immediate reduction. The ABC provides short-term and long-term nutrients to support anaerobic bacteria growth, which also assists in creating a reducing environment. ABC contains soluble lactic acid and a phosphate buffer that maintains the pH in a range that is best suited for microbial growth and provides an important micronutrient for bioremediation. In addition, the corrosion of iron metal yields ferrous iron and hydrogen, both of which are possible reducing agents. The hydrogen gas produced is also an excellent energy source for a wide variety of anaerobic bacteria.

The ABC and ZVI are mixed with potable water and emplaced in the subsurface simultaneously. The dilution factor (i.e. water content) can be adjusted to achieve optimal dispersion and distribution based on site-specific parameters such as well spacing, permeability of the formation, and contaminant concentrations. The solution can be emplaced by a variety of techniques, including injection through wells or drill rods (for permeable geologic environments such as sands and fractured rock), hydraulic fracturing (for lower permeable environments such as silt and clay), and through soil blending (for all unconsolidated shallow depth applications less than 20 ft bgs).

ADVANTAGES

- The presence of ZVI allows for the rapid and complete dechlorination of target compounds. Degradation rates using ZVI are several orders of magnitude greater than under natural conditions. As a consequence, the process does not result in the formation of daughter products other than ethene, ethane, and methane.
- By creating a reducing environment, ABC⁺ has the ability to provide long-term immobilization of heavy metals (e.g. Ni, Zn, Hg, As).
- Does not require direct contact to act on target constituents.
- Does not divert groundwater flow. ABC is typically mixed at a 15% by weight solution with water. The viscosity of the solution is similar to sugar water and therefore does not measurably influence groundwater flow paths. Due to the relatively low volume of ZVI used, it does not measurably lower the bulk permeability of the formation.
- Ease of handling. The ABC⁺ product is comprised of food grade compounds and therefore does not require high-levels of personal protective equipment (PPE) or special training to handle. The ZVI is a stable compound that also requires low-level PPE protection.
- Price advantage. The cost of the ABC⁺ formula is an extremely competitive approach in relation to other enhanced reductive dichlorination (ERD) products on the market.
- ABC⁺ produces a significantly lower redox potential of approximately -450 mV.

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ABC⁺ available only in Europe

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rev. 03/20
form RX 1667

