

eZVI

Emulsified Zero-Valent Iron

A Combination Technology for DNAPL Remediation

eZVI is an emulsion of powdered zero-valent iron, surfactant, vegetable oil, and water specifically designed for the remediation of source zones impacted with halogenated hydrocarbons. eZVI has the unique ability to mix with dense non-aqueous phase liquids (DNAPLs) by capitalizing on the ability of food-grade surfactants, biodegradable vegetable oil, water, and zero-valent iron to form hydrophobic emulsion droplets (micelles) that are miscible with DNAPL material in-situ due to matching physical chemistries. Abiotic reductive dechlorination occurs as the halogenated hydrocarbons in DNAPL diffuse through the outer oil membrane into the interior aqueous phase of the emulsion, which contains zero-valent iron. Encapsulating zero-valent iron with a hydrophobic membrane protects the nano-microscale iron from native groundwater constituents that might otherwise waste the iron's reducing capacity, and thereby reduce the mass of eZVI available to treat target contaminants and overall project costs. In addition to the abiotic reactions provided by the ZVI, the vegetable oil and surfactant components present in eZVI act as a long-term electron donor for enhanced biological reductive dechlorination.

Our Product

eZVI is an emulsion of powdered zero-valent iron, surfactant, oil, and water that reductively dehalogenates halogenated hydrocarbons (e.g., PCE, TCE, DCE, VC, TCA, CT, etc.).

Benefits

- Effective for in situ treatment of DNAPL
- Field-tested by the U.S. Environmental Protection Agency (EPA) under the Superfund Innovative Technology Evaluation (SITE) program
- Typical source concentration decrease ~90+% within 3 months
- Hydrophobic, dense emulsion absorbs DNAPL, delivering contaminant to iron
- Applied using injection or soil mixing using conventional technologies
- Developed/patented by NASA

Chemical / Physical Data

Appearance: Grey to black viscous liquid
Odor: Soybean oil (cooking oil) odor
Solubility in Water: Insoluble
Specific Gravity: 1.05-1.13 g/mL
Percent Solids by Weight: 10-17%

Packaging Options

- 275-gallon IBC containers
- 3,000 - 5,000 gallon tankers

Product Specifications

Density: 1.05-1.10 g/mL

Hydrophobicity: Digital image verification

Micellular Structure: Micrograph digital image verification

Field Application Design

eZVI applications are easily configured and tailored to meet site-specific conditions. Configurations include applications in grids, barriers and excavations. eZVI can be applied to the subsurface using direct-push injection, hollow-stem auger, hydraulic or pneumatic fracking, and large diameter auger (LDA) or other soil mixing technologies.

