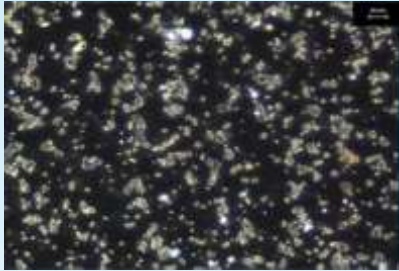


mZVI Suspension

Injectable Zero-Valent Iron Suspension

An ISCR/Bioremediation Technology for Groundwater Remediation



- Small particle size
- Does not require high pressure or large pumps for injection
- Reactive with many groundwater contaminants
- High mobility through groundwater
- Injectable through screened wells or by direct push

Principle

mZVI Suspension is engineered to accomplish the rapid and sustained breakdown of chlorinated hydrocarbons and other toxic groundwater contaminants. The product contains reactive metal particles suspended in an organic carrier. Average particle size is two to three micrometers (2-3 μm), the optimal size for *in situ* remediation.

mZVI Suspension contains both zero valent iron and iron silicide: both are powerful electrochemical reductants. When added to groundwater, these metals react with and eliminate many toxic groundwater contaminants. In addition to reacting directly with groundwater contaminants, *mZVI Suspension* also helps establish and maintain a fertile environment for anaerobic bioremediation.

Advantages

- Stable & easy-to-use product
- Can be stored at ambient conditions
- Diverse possibilities for application

Field Application Design

mZVI Suspension (~3,000 cP; 14 lbs./gallon) is very easy to mix and inject into contaminated groundwater. The fluid is pumped or poured into mixing tanks containing water and, optionally, other remediation products. The resulting aqueous suspension is then pumped directly into the contaminated groundwater at pressures that are often below 20 psi. No other zero valent metal product can be injected with such a diverse set of equipment, including pneumatic diaphragm pumps, progressing cavity pumps, and centrifugal pumps. A unique feature of *mZVI Suspension* is its ability to be injected through horizontal and vertical screened wells as well as sampler screens via DPT.

Small particles are a unique feature of our ZVI products. They are small enough to be suspended in water and injected directly into contaminated aquifers at low pressures but still large enough to provide lasting reactivity without requiring the high injection pressures and fracking normally required by larger ZVI products.

mZVI is a micro-sized elemental iron suspended in a soluble electron donor



mZVI's unique formulation (left) allows suspending elemental iron in a soluble, easy to inject fluid. Other micron-sized iron-based products either use viscous, passivating polymers or complicated injection methods to keep iron particles from settling (right)

In situ chemical reduction and reductive bioremediation

Product Content

Chemical Name	CAS Number	Composition (% wt.)
Iron	7439-89-6	10 - 40
Glycerol	8001-22-7	60 – 90
Thickener and dispersant	Trade secret	1 - 5

Product Characteristics

Parameter	Specification
Specific Gravity	1.05 -1.10 @ 25 °C
Solubility in water	Insoluble
Boiling Point	>572 °F (300 °C)
Appearance	Dark grey/black viscous liquid

Packaging Options

- 275-gallon IBC containers
- 55-gallon poly drum containers

Safety

Wear impervious gloves for prolonged or repeated exposure as appropriate to task. The use of body protection appropriate to task being performed is always suggested when handling chemicals. If necessary, refer to U.S. OSHA 29 CFR 1910.138, the European Standard DIN EN 374, the appropriate Standards of Canada or other relevant standards.

*Sold under a License Agreement for U.S. Patent Nos. 7,129,388 and 7,531,709 relating to use of a mixture of organic hydrogen donors and zero valent metal used for environmental remediation applications.