Hepure Technologies Inc

Committed to Comprehensive Environmental Solutions

Technical Specification Sheet
Ferox Flow ZVI Reactive Iron Powder

General Description:

Ferox Flow ZVI reactive iron powder represents a breakthrough in terms of performance and efficiency in the granular ZVI marketplace.

- **Certifiable 95+% Pure**
- **Cast iron (reactive alternative to iron filings)**
- **15-500 micron particle**
- **Bulk Density: 2.68 gm/cm^3**

Hepure's Ferox ZVI reactive iron powder line (Fe 92 % to 98 %) is produced by a global producer of high quality cast iron powder to Hepure's exacting requirements. The product line represents a very high purity cast iron powder with different available grades and mesh sizes to US sieve standards. Using high quality feed stock, a proprietary grinding and pulverizing method creates powders suitable for the most demanding remediation environments. From the selection of raw materials, manufacturing, and through to packaging, all processes satisfy demanding product standards. Quality assurance testing is performed at every stage of production so product consistency is maintained. Ferox ZVI reactive iron powder is available in micro-scale or granular particle size distributions suitable for injection, auger placement or permanent wall barriers.

Product Specifications:

Ferox Flow (-100 mesh)
(Granular Cast Iron Powder)

Chemistry Limits:

Carbon:	2 to 2.5%
Sulfur:	0.050%
Silicon :	1.5 to 2%
Iron:	Balance

Particle Size Distribution:

+ 60	mesh	(BSS)	nil or 1% max
+100	mesh	(BSS)	nil to 2% max
-100/+325	mesh	(BSS)	approx. 90%
-325	mesh	(BSS)	balance

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Specific surface area measurements using BET gas adsorption are compared for similar types of ZVI iron powders in Table 1. Ferox Flow ZVI reactive iron powder has large specific surface areas (i.e more reactive surface) compared with other commercially available ZVI iron powders.

Table 1: BET Surface Area Measurement for Hepure's Ferox Flow Reactive Iron Powder Compared to a Typical Iron Powder

Sample	Surface Area (m^2/g)	R^2	Fe Mass (g)
Ferox Flow	0.9707 ± 0.0115	0.9994976	1.2511
QMP	0.2112 ± 0.0026	0.9994514	1.1349

Product Performance:

Ferox Flow's uniform bulk characteristics provide exceptional cost-effective performance. The substantial number of catalytic sites on the powder surface ensures superior reactivity and generally supports lower ZVI loading requirements in comparison to other ZVI materials Cast Iron Powder (CAS # 7439-89-6). Figure 1 shows a comparison of several ZVI iron powder ability to degrade Trichoroethylene (TCE).

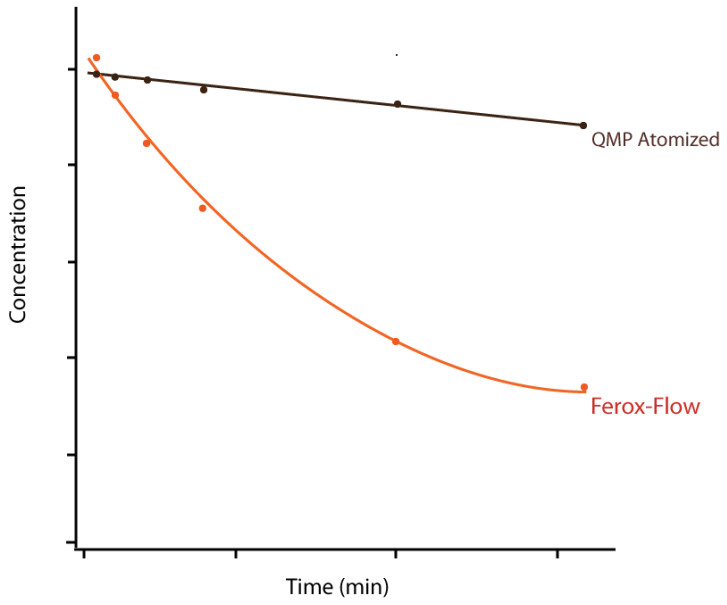

Figure 1. Comparison of ZVI Iron Powders Ability to Degrade TCE

When adjusted to surface area and mass, the kinetic rates of TCE degradation by Ferox Flow reactive iron powder are greater than other commercially available iron powders. Table 2 shows the adjusted pseudo-first order rate constants for TCE degradation.

Table 2: Rate constants for Ferox Flow and a leading competitor.

Iron Type	k_{OBS} (hr^{-1})	k_{SA} (L m^{-2} hr^{-1})	k_{mass} (L g^{-1} hr^{-1})
Ferox Flow	0.343	3.48E-04	4.90E-04
QMP H_2Omet-56	0.088	5.09E-04	1.26E-04

K_{obs} is the best fit curve to the first- order kinetic data in Figure 1. k_{SA} and k_{Mass} are calculated with the following equations: $k_{SA} = k_{obs} / Fe_{Surface\ Area}$, and $k_{Mass} = k_{obs} / Fe_{mass}$

Table 3 shows the typical trace metals found in the Ferox Flow product. Our products are sampled periodically for quality control and quality assurance.

Table 3: Trace Metals Analysis - Mass Spec – Semi-Quantitative Results.

Element	Result (wt%)	Element	Result (wt%)
Boron	<0.0002	Cobalt	0.0029
Magnesium	0.0042	Nickel	0.0207
Aluminum	0.0249	Copper	0.0575
Titanium	0.0278	Zinc	0.0031
Vanadium	0.0075	Zirconium	0.0004
Chromium	0.0623	Molybdenum	0.0129
Manganese	0.3552		