



CleanER™ – Zero Valent Iron (ZVI)

CleanER. BettER. FastER. Environmental Remediation

Höganäs Environment Solutions' (HES) CleanER media is manufactured using leading-edge powder metallurgy technologies, which yield greater surface area and reactivity compared to traditional ZVI. Höganäs, the largest global manufacturer of iron powder, has been granted 1,000+ patents to manipulate the iron particle to create specialized products for a diverse array of industries. HES brings this technology to the soil and groundwater remediation sector with the CleanER product line. CleanER products range in sizes from 5 µm to 2,000 µm and are suitable for any remedial treatment scenario involving reductive chemistry. Our global network comprises the most advanced metal powder production facilities in the world.

For more information on CleanER and other Höganäs products, please contact your local sales representative.

HES' products fall into the following categories:

» **Electrolytic**

Iron derived from a chemical electrolysis solution containing iron compounds, yielding the highest purity iron on the market.

» **Sponge**

Pure virgin iron produced from the combustion of iron ore and coke breeze with a greater than 98% purity

» **Atomized**

Iron produced by forcing a stream of molten metal through a water jet

Höganäs Environment Solutions

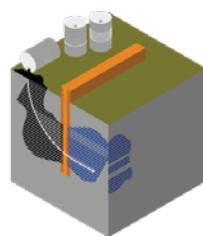
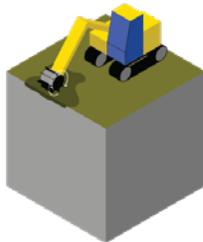
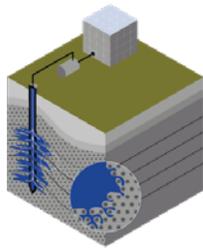
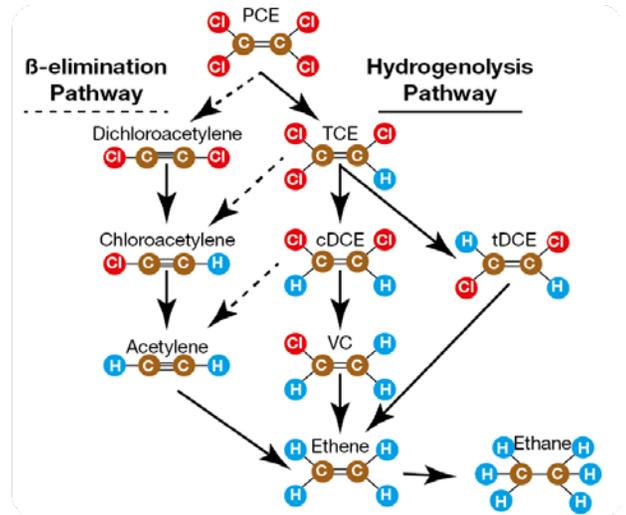
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Höganäs

Abiotic Beta Elimination

Designed to maximize β -elimination, CleanER ZVI limits the production of harmful daughter products from hydrogenolysis. Hydrogenolysis is the sequential replacement of chloride ions with hydrogen, forming compounds like cis-DCE and VC, which are more toxic and can be rate-limiting during degradation.

In β -elimination, two chlorine atoms are replaced with a triple bond between the carbons, forming an acetylene group. Chlorinated acetylenes will undergo rapid degradation with ZVI to form harmless ethene or ethane. All Höganäs ZVI products were designed to minimize the formation of toxic by-products.

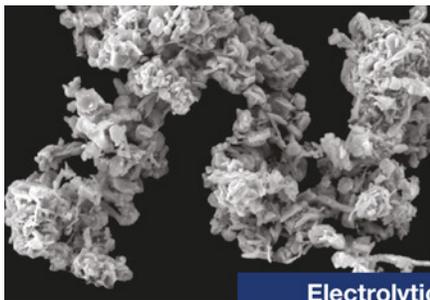


D50	Products	Production	Packaging
5 Micron	CleanER - 5	Electrolytic	Box (10 kg) Pail (25 kg)
10 Micron	CleanER - 10	Electrolytic	Box (20 kg)
25 Micron	CleanER - 25	H-Sponge	Sack (1 MT) Pail (25 kg)
50 Micron	CleanER - 45	Atomized	Sack (1 MT) Bag (25 kg)
100 Micron	CleanER - 90	Atomized	Sack (1 MT) Bag (20 kg)
250 Micron	CleanER - 200	Sponge	Sack (1 MT)
2,000 Micron	CleanER - PRB	Sponge	Sack (500 kg)

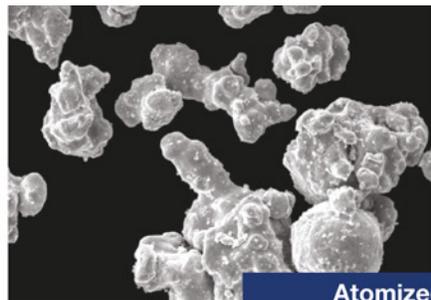
Soil Injection

Soil Blending

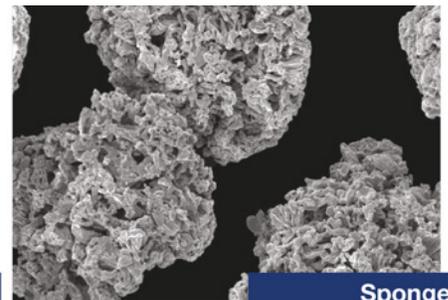
Permeable Reactive Barrier



Electrolytic



Atomized



Sponge

Höganäs 

www.hoganas.com

Established in 1797, Höganäs is the world's leading iron powder manufacturer, supplying 500,000 tons annually to 2,500 customers in 65 countries. Höganäs Environment Solutions specializes in CleanER engineered zero valent iron (ZVI) for environmental applications.