SAFETY DATA SHEET
Zero Valent Iron (ZVI) Powder D50 = 7-8 um

Revision Date: 4/19/2022
Version: 1.1

1. PRODUCT AND COMPANY IDENTIFICATION

Product identifier

Product Name Zero Valent Iron (ZVI) Powder D50 = 7-8 um

Relevant identified uses of the substance or mixture and uses advised against

Recommended Use: Professional use, Industrial use. Remediation of Groundwater and Soil.
Restrictions on Use: Use as recommended by the label

Details of the supplier and of the safety data sheet

Supplier
Tersus Environmental, LLC
1116 Colonial Club Rd
Wake Forest, NC 27587
Phone: +1-919-453-5577
Email: info@tersusenv.com

Emergency telephone number

For leak, fire, spill or accident emergencies, call:

+1-919-453-5577 (Tersus Office Hours, 8:00 AM to 5:00 PM Eastern)
+1-919-638-7892 (Tersus Outside office hours)
+1-800-424-9300 (Chemtrec 24 Hour Service – Emergency Only)
+1-703-527-3887 (Chemtrec Outside United States 24 Hour Service – Emergency Only)

2. HAZARD IDENTIFICATION

Classification of the substance or mixture

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)
Combustible dust Classified

Label Elements

Signal Word
Warning

Hazard Statements
May form combustible dust concentrations in air

Precautionary Statements
Not applicable

Hazards not otherwise classified (HNOC)
Not applicable

Other hazards

Not classified as PBT or vPvB

Emergency Overview

The product contains no substances which at their given concentration, are considered hazardous to health**.**		
Appearance	**Physical State**	**Odor**
Light grey metal Powder	Powder	Odorless

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substances/Mixtures

Chemical Name	CAS-No.	Content (%)	Trade Secret
Iron	7439-89-6	>99%	-

Synonyms are provided in Section 1.
Occupational exposure limits, if available, are listed in Section 8.

4. FIRST AID MEASURES

4.1 Description of first-aid measures

Inhalation Move to fresh air. If symptoms persist, call a physician.
Skin contact Take off contaminated clothing. Wash skin with soap and water.
Eye contact Rinse thoroughly with plenty of water, also under the eyelids. Get medical attention if irritation persists.
Ingestion Drink 1 or 2 glasses of water. If possible, drink milk afterwards. Get medical attention.

4.2 Most important symptoms and effects, both acute and delayed

Inhalation Main symptoms: Cough and shortness of breath. May cause irritation of respiratory tract.
Skin contact Long term contact can cause irritation.
Eye contact May cause mechanical irritation.
Ingestion Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

4.3 Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

5. FIRE-FIGHTING MEASURES

5.1 Extinguishing media

Suitable Extinguishing Media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Keep containers and surroundings cool with water spray. Confining and smothering metal fires is preferable rather than applying water. Use: Dry powder, dry chemical.

Extinguishing media which shall not be used for safety reasons
Do not use a solid water stream as it may scatter and spread fire.

5.2 Special hazards arising from the substance or mixture

Special Hazard

Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

5.3 Advice for firefighters

As in any fire, wear self-contained breathing apparatus and full protective gear.

6. FIRE-FIGHTING MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Avoid dust formation. Remove all sources of ignition. For personal protection equipment see section 8.

6.2 Environmental precautions

Try to prevent the material from entering drains or water sources.

6.3 Methods and material for containment and cleaning up

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections

Refer to protective measures listed in section 8 and 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Protective measures
Use sufficient dust extraction. Keep workplace clean from dust. Accumulated dust dispersed in air may cause dust explosion if ignited.

Advice on general occupational hygiene
Avoid inhalation, ingestion and contact with skin and eyes. General occupational hygiene measures are required to ensure safe handling of the substance. The measures involve good personal and housekeeping practices (i.e., regular cleaning with suitable cleaning devices), no drinking, eating, and smoking at the workplace. Shower and change clothes at end of work shift.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in dry place to avoid oxidation of material. Make sure the product does not come in contact with acids or strong oxidizers.

7.3 Specific end uses

No information available.

8. EXPOSRE CONTROL / PERSONAL PROTECTION

8.1 Control parameters

Exposure limits	ACGIH TLV	OSHA PEL	NIOSH IDLH
Iron 7439-89-6	Nuisance dust: 15 mg/m^3	Nuisance Dust: 15 mg/m^3	-

8.2 Exposure controls

Engineering Measures Ensure adequate ventilation, especially in confined areas

Protective measures

Eye/Face Protection ANSI approved safety glasses or protective goggles
Skin protection Long sleeved clothing.
Hand Protection Use of canvass gloves is advisable.
Respiratory protection If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Respiratory protection must be provided in accordance with current local regulations minimum N95
Thermal hazards The substance does not represent a thermal hazard, thus special consideration is not required.

Environmental Exposure Controls
Dust from exhaust ventilation should be separated out in order to avoid release to the natural environment.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Physical state Powder
Appearance Light grey metal Powder.
Odor Odorless
Odor Threshold Not applicable
Particle size D50 = 7-8 um (micron)

Property	Values	Note
pH	Not applicable	Insoluble in water.
Melting/freezing point	1538°C @ 1013hPa	
Boiling point/boiling range	2861°C @ 1013hPa	
Flash Point	Not Applicable	Not relevant for inorganic substance
Evaporation rate	Solid with a melting point >300°C	
Flammability (solid, gas)	Not flammable.	According to Method A10, EU-Regulation 440/2008
Flammability Limits in Air • Upper flammability or explosive limit • Lower flammability or explosive limit	No information available No information available	

Property	Values	Note
Vapor pressure	No information available	Solid with a melting point >300°C
Vapor density	No information available	Solid with a melting point >300°C
Relative density	7.87g/cm3 @ 20°C	
Water Solubility	0.015 mg/l @ 22°C	
Solubility in other solvents	No information available	
Partition coefficient: n-octanol/water	Not determined	Not relevant for inorganic substances
Autoignition temperature	Not classified.	UN test N.4
Decomposition temperature	Will not decompose	Not relevant for inorganic substances
Viscosity	No information available	Solid with a melting point >300°C
Explosive properties	Not explosive	The substance contains no chemical groups associated with explosive properties.
Oxidizing Properties	Not oxidizing	The substance is incapable of reacting exothermically with combustible materials based on the chemical structure.

9.2 Other information

VOC Content (%) Not applicable
Bulk Density 1.0-3.0 g/cm3
Dust explosion class St 1

10. STABILITY AND REACTIVITY

10.1 Reactivity
Stable under normal conditions.

10.2 Chemical stability
Stable under normal handling and storage conditions.

10.3 Possibility of hazardous reactions
None under normal processing.

10.4 Conditions to Avoid
Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

10.5 Incompatible Materials
Strong oxidizing agents and strong acids.

10.6 Hazardous decomposition products
None under normal use

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Information on likely routes of exposure

General	The principal risk to human health presented by "iron" dust is related to the concentration of dust in the air acting as a nuisance dust. The higher the concentration of dust the greater the risk of irritation to the respiratory system and mechanical irritation to the eyes
Acute Toxicity	The substance is not toxic for skin, inhalation or ingestion
Skin corrosion/irritation	Not irritating.
Serious Eye Damage/Eye Irritation	OECD 405: Not irritating
Respiratory or skin sensitization	Not sensitizing.
Germ Cell Mutagenicity	Ames test OECD 471 negative
Reproductive Toxicity	Testing of metallic iron for reproductive toxicity is not appropriate due to a lack of systemic exposure.
STOT-single exposure	Not classified according to the criteria of the Globally Harmonized System (GHS)
STOT-repeated exposure	Not classified according to the criteria of the Globally Harmonized System (GHS)
Aspiration hazard	Not classified according to the criteria of the Globally Harmonized System (GHS)

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Iron 7439-89-6	7500 mg/kg bw (Rat)	-	-

Carcinogenicity Not classified according to the criteria of the Globally Harmonized System (GHS)

Legend:

ACGIH: (American Conference of Governmental Industrial Hygienists)
A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
A4 - Not Classifiable as a Human Carcinogen
IARC: (International Agency for Research on Cancer) *Group 1 - Carcinogenic to Humans*
Group 2A - Probably Carcinogenic to Humans Group 2B - Possibly Carcinogenic to Humans Group 3 - Not Classifiable as to Carcinogenicity in Humans
NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen
OSHA: (Occupational Safety & Health Administration)
X – Present

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Ecotoxicity effects
Contains forms of iron which are highly insoluble and non-hazardous.

Chemical Name	Toxicity to algae	Toxicity to fish	Toxicity to microorganisms	Toxicity to daphnia and
Iron	-	LC50 96 h = 13.6 mg/L (Morone saxatilis - static) LC50 96 h = 0.56 mg/L (Cyprinus carpio -	-	-

12.2 Persistence and degradability
The methods for determining the biological degradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential
Iron and its compounds are essential compounds. Iron is an essential trace element, well regulated in all living organisms. The availible evidence shows the absence of iron biomagnification across the trophic chain both in the aquatic and terrestrial food chains. The existing information suggests not only that iron does not biomagnify, but rather that it tends to exhibit biodelution.

12.4 Mobility in soil
Iron and its compounds are found in the form of hydroxides in the environment. They are stabilized in the form of oxides in the long term.

12.5 Results of PBT and vPvB assessment
As iron is not bio-available, owing to its extreme insolubility in water, it is not systematically available or bio-accumulative, and hence it does not fulfil either of the PBT or vPvB criteria for classification.

12.6 Other adverse effects
None anticipated.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product disposal
Dispose of in accordance with local regulations.

Packaging disposal
Packaging that cannot be cleaned should be disposed as special waste in compliance with local and national regulations.

14. TRANSPORTATION INFORMATION

DOT

UN/ID No	Not applicable
Proper shipping name	Not applicable
Transport hazard class(es)	Not applicable
Packaging group	Not applicable

IATA

UN/ID No	Not applicable
Proper shipping name	Not applicable
Transport hazard class(es)	Not applicable
Packing Group	Not applicable

IMDG

UN/ID No	Not applicable
Proper shipping name	Not applicable
Transport hazard class(es)	Not applicable
Packing Group	Not applicable
Marine pollutant	Not applicable

15. REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

International Inventories

All of the components in the product are on the following Inventory lists:

TSCA	Complies
EINECS/ELINCS	Complies
DSL/NDSL	Complies
ENCS	-
IECSC	Complies
KECL	Complies
PICCS	Complies
AICS	Complies

Legend:

TSCA *- United States Toxic Substances Control Act Section 8(b) Inventory* ***DSL/NDSL*** *- Canadian Domestic Substances List/Non-Domestic Substances List*
EINECS/ELINCS *- European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances*
ENCS *- Japan Existing and New Chemical Substances* ***IECSC*** *- China Inventory of Existing Chemical Substances* ***KECL*** *- Korean Existing and Evaluated Chemical Substances*
PICCS *- Philippines Inventory of Chemicals and Chemical Substances* ***AICS*** *- Australian Inventory of Chemical Substances*

U.S. Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

SARA 311/312 Hazard Categories

Acute Health Hazard	No

Chronic Health Hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

CERCLA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

U.S. State Regulations
California Proposition 65
This product does not contain any Proposition 65 chemicals.

16. OTHER INFORMATION

Components not precisely identified are proprietary or non-hazardous.

NFPA	**Health Hazard** 0	**Flammability** 1	**Instability** 0	**Physical and chemical hazards -**
HMIS	**Health Hazard** 0	**Flammability** 1	**Physical Hazard** 0	**Personal protection** E

Abbreviations
EC50: median effective concentration
LC50: median lethal concentration.
LD50: median lethal dose.
NIOSH: The National Institute for Occupational Safety and Health **NOEC:** no observable effect concentration
OEL: occupational exposure limit
OSHA Occupational Safety & Health Administration
PBT: Persistent, bioaccumulative, and toxic chemicals **PNEC:** Predicted no effect concentration (PNEC)
STEL: short-term exposure limit
TLV: Substance with TLV-values
TWA: Time weighted average
vPvB: very persistent, very bioaccumulative chemical

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End of Safety Data Sheet