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MSDS No.: [AA06637-0000000001]

1. Chemical Product and Company Information

- a. Product Name: Special Steel (Carbon Steel, Alloy Steel)
 - ☐ Semi-finished products (Ingot, Bloom, Billet) / Rolled products (Rolled Bar: SB/RB/WR) / Forged products (Forged Bar)
- b. Recommended Use and Restrictions on Use
 - ☐ Recommended use of this: Steel manufacturing
 - ☐ Restrictions on use of this: No data available
- c. Supplier Information
 - ☐ Company name SeAH Besteel Corporation
 - ☐ Address
 - Gunsan Plant: 522 Oehang-ro, Gunsan-si, Jeollabuk-do (063-460-8114)
 - Changnyeong Plant: 100 Daehapsaneopdanji-ro, Daehap-myeon, Changnyeong-gun, Gyeongsangnam-do
 - ☐ Emergency telephone number
 - Gunsan 063-460-8728
 - Changnyeong 055-530-8515

2. Hazards Identification

- a. GHS Hazard Classification
 - ▷ Acute toxicity (oral): Category 4 (upon exposure to processing dust and fumes)
 - ▷ Skin corrosion/irritation: Category 2
 - ▷ Serious eye damage/eye irritation: Category 2
 - ▷ Skin sensitization: Category 1
 - ▷ Carcinogenicity: Category 2
 - ▷ Specific target organ toxicity (repeated exposure): Category 1
- b. Label Elements, Including Precautionary Statements
 - ☐ Pictogram



 - ☐ Signal word: Danger
 - ☐ Hazard statements
 - H302 Harmful if swallowed
 - H315 Causes skin irritation
 - H317 May cause an allergic skin reaction
 - H319 Causes serious eye irritation
 - H351 Suspected of causing cancer
 - H372 Causes damage to organs through prolonged or repeated exposure
 - ☐ Precautionary statements
 - ▷ Prevention
 - P260 Do not breathe dust/fume/gas/mist/vapors/spray.

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P264 Wash exposed areas thoroughly after handling.

P270 Do not eat, drink or smoke when using this product.

P272 Contaminated work clothing should not be allowed out of the workplace.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

P284 Wear respiratory protection.

▷ Response

P301+P312 IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell.

P302+P352 IF ON SKIN: Wash with plenty of soap and water.

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes.

Remove contact lenses, if present and easy to do. Continue rinsing.

P308+P313 IF exposed or concerned: Get medical advice/attention.

P314 Get medical advice/attention if you feel unwell.

P330 Rinse mouth.

P333+P313 If skin irritation or rash occurs: Get medical advice/attention.

P337+P313 If eye irritation persists: Get medical advice/attention.

P362+P364 Take off contaminated clothing and wash it before reuse.

▷ Storage: No data available

▷ Disposal

P501 Dispose of contents/container in accordance with applicable regulations.

c. Other Hazards Not Otherwise Classified (NFPA)

※ As no NFPA data is available for the product, data are provided by individual component.

Category	Iron	Silicon	Manganese	Nickel	Chromium	Carbon	Copper	Molybdenum	Vanadium	Aluminum
Health	1	0	1	No data available	1	0	1	1	1	1
Flammability	3	0	3	No data available	3	1	0	1	1	3
Reactivity	0	0	1	No data available	0	0	0	0	0	1

* No health, flammability, or reactivity data available for calcium, sulfur, niobium, titanium, phosphorus, and magnesium

3. Composition/Information on Ingredients

Substance Name	Synonyms (Common Name)	CAS No.	Content (%)
Iron	Ferrum	7439-89-6	89.5~99.5%
Chromium	Chrome	7440-47-3	0~10%
Silicon	SILICON POWDER, AMORPHOUS	7440-21-3	0~5%
Manganese	Colloidal Manganese	7439-96-5	0~5%
Nickel	Nickel Element	7440-02-0	0~5%
Carbon	Carbon	7440-44-0	0~2%
Copper	Copper Element (1 mm or larger)	7440-50-8	0~2%
Molybdenum	Molybdenum	7439-98-7	0~3%
Vanadium	Vanadium Element	7440-62-2	0~2%
Aluminum	Aluminum Element	7429-90-5	0~2%
Calcium	Calcium Metal	7440-70-2	0~1%

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Niobium	Niobium	7440-03-1	0~0.2%	
Phosphorus	Phosphorus	7723-14-0	0~0.1%	
Sulfur	Sulfur	7704-34-9	0~0.5%	
Titanium	Titanium	7440-32-6	0~0.1%	
Magnesium	Magnesium Metal	7439-95-4	Trace amount (less than 0.01%)	

※ This product is a solidified finished item and normally poses no risk of exposure to the chemical substances it contains; however, partial exposure may occur during operations such as cutting, machining, or welding involving a molten state.

※ May contain small amounts of other components

4. First-Aid Measures

a. Eye Contact

▷ If in eyes, rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do, and continue rinsing.

b. Skin Contact

- ▷ If skin irritation occurs, get medical advice/attention.
- ▷ Take off contaminated clothing and wash it before reuse.
- ▷ If the material is hot, immerse or flush the affected area with cold water to remove heat.
- ▷ Remove contaminated clothing and shoes and isolate the contaminated area.

c. Inhalation

- ▷ If exposed or feeling unwell, seek medical attention.
- ▷ Move to fresh air.

d. Ingestion

- ▷ If feeling unwell, seek medical attention.
- ▷ Rinse mouth.

e. Notes to Physician

- ▷ In case of exposure, contact medical personnel and take special emergency measures such as follow-up examination.
- ▷ Ensure that medical personnel are aware of the material and take appropriate protective measures.

5. Fire-Fighting Measures

a. Suitable (and Unsuitable) Extinguishing Media

- ▷ Use water spray when fighting fires involving this material.
- ▷ Use dry sand or dry earth for smothering fires.

b. Specific Hazards Arising from the Chemical

- ▷ Combustion and thermal decomposition may release irritating and highly toxic gases.
- ▷ Container may explode when heated.
- ▷ Some materials may burn but do not ignite readily.

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- ▷ Non-flammable; the material itself does not burn, but may decompose upon heating to produce corrosive/toxic fumes.
- ▷ Dust and fumes may form explosive mixtures with air.

c. Protective Equipment and Precautions for Firefighters

- ▷ Rescuers should wear a KOSHA (KCs) certified positive-pressure supplied-air respirator or self-contained breathing apparatus.
- ▷ Fight fire from a safe distance, maintaining a safe evacuation distance from the area.
- ▷ Move containers from the fire area if it can be done without risk.

6. Accidental Release Measures

a. Personal Precautions and Protective Equipment

- ▷ Avoid direct inhalation of any dust or fumes generated.
- ▷ Keep unnecessary and unprotected personnel from entering the area.
- ▷ Do not touch damaged containers or spilled material without wearing appropriate protective clothing.
- ▷ Be aware of materials and conditions to avoid.

b. Environmental Precautions

- ▷ Prevent spilled material from entering waterways, sewers, basements, or other confined spaces.

c. Methods for Cleanup

- ▷ Recover the spilled material safely using mechanical equipment.

7. Handling and Storage

a. Precautions for Safe Handling

- ▷ Avoid prolonged or repeated skin contact.
- ▷ Be aware of materials and conditions to avoid (water, heat sources).
- ▷ Work in accordance with engineering controls and the personal protective equipment specified in Section 8.
- ▷ Prevent the generation of dust at the source during processing.
- ▷ Wash exposed areas thoroughly after handling.
- ▷ Eating, drinking, and smoking are strictly prohibited in areas where the product is handled.

b. Conditions for Safe Storage

- ▷ Maintain a safe distance between stacked loads to prevent tipping.
- ▷ Store in a dry place to prevent corrosion and reaction caused by moisture.

8. Exposure Controls/Personal Protection

a. Exposure Limits

- Iron
 - Domestic regulation: No data available
 - ACGIH: No data available

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Biological exposure index: No data available

○ Chromium

Domestic regulation: TWA 0.5 mg/m³ (metal)

TWA 0.05 mg/m³ (chromic acid/hexavalent)

ACGIH: TWA 0.5 mg/m³

Biological exposure index: No data available

○ Silicon

Domestic regulation: TWA 10 mg/m³

ACGIH: Not applicable

Biological exposure index: Not applicable

○ Manganese

Domestic regulation: TWA 1 mg/m³, manganese and inorganic compounds

TWA 1 mg/m³, STEL 3 mg/m³ (fume)

ACGIH: TWA 0.2 mg/m³

Biological exposure index: No data available

○ Nickel

Domestic regulation: TWA 1 mg/m³ (metal)

TWA 0.5 mg/m³, nickel (insoluble compounds)

TWA 0.1 mg/m³, nickel (soluble compounds)

ACGIH: TWA 1.5 mg/m³

Biological exposure index: No data available

○ Carbon

Domestic regulation: TWA 2 mg/m³ (inhalable dust)

ACGIH: TWA 2 mg/m³

Biological exposure index: No data available

○ Copper

Domestic regulation: TWA 1 mg/m³ (dust and mist)

ACGIH: TWA 1 mg/m³

Biological exposure index: No data available

○ Molybdenum

Domestic regulation: TWA 10 mg/m³ (metal and insoluble compounds)

ACGIH: TWA 10 mg/m³

Biological exposure index: No data available

○ Vanadium

Domestic regulation: TWA 0.05 mg/m³ (vanadium pentoxide fume)

ACGIH: TWA 0.05 mg/m³

Biological exposure index: No data available

○ Aluminum

Domestic regulation: TWA 10 mg/m³ (metal dust)

ACGIH: TWA 1 mg/m³

Biological exposure index: No data available

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- Calcium (Ca), Sulfur (S), Niobium (Nb), Titanium (Ti), Phosphorus (P), Magnesium (Mg): No domestic/ACGIH data available

b. Appropriate Engineering Controls

- ▷ Operate local exhaust ventilation when dust or fume is generated, and keep workplace concentrations below the legal exposure limits at all times.

c. Personal Protective Equipment

- Respiratory protection
 - ▷ Wear a KOSHA (KCs) certified dust respirator (special or first grade) or air-supplied respirator, selected according to the exposure concentration.
- Eye protection
 - ▷ Wear safety goggles that protect the eyes from flying particles.
- Hand and body protection
 - ▷ Wear chemical-resistant/heat-resistant protective gloves and clothing that meet KOSHA-certified standards.

9. Physical and Chemical Properties

a. Appearance

- ▷ Physical state: Solid
- ▷ Color: Metallic gray

b. Odor: None

c. Odor threshold: No data available

d. pH: Not applicable

e. Melting point/freezing point: approx. 1400~1530°C (varies with alloy composition)

f. Initial boiling point and boiling range: above 2750°C

g. Flash point: No data available

h. Evaporation rate: No data available

i. Flammability (solid, gas): No data available

j. Upper/lower flammability or explosive limits: - / -

k. Vapor pressure: 1 mmHg (at 1787°C)

l. Solubility: (Water solubility: insoluble. Solvent solubility: soluble in acid; insoluble in alkali, alcohol, ether)

m. Vapor density: No data available

n. Specific gravity: 7.7~8.1 (water=1)

o. n-Octanol/water partition coefficient: (none)

p. Auto-ignition temperature: No data available

q. Decomposition temperature: No data available

r. Viscosity: No data available

s. Molecular weight: No data available

10. Stability and Reactivity

a. Chemical Stability and Possibility of Hazardous Reactions

- ▷ Stable at normal temperature and pressure, but there is a risk of container explosion upon heating.
- ▷ May be ignited by friction, heat, sparks, or flame.
- ▷ May reignite after extinguishing.
- ▷ Dust and fumes may form explosive mixtures with air.
- ▷ Some materials burn with intense heat.
- ▷ May release irritating, corrosive, or toxic gases in a fire.
- ▷ Inhalation of or contact with vapors, the material, or decomposition products may cause serious injury or death.
- ▷ Oxides formed during metal fires present serious health hazards.

b. Conditions to Avoid

- ▷ Friction, high heat, sparks, and flame.

c. Incompatible Materials

- ▷ Water (dust hazard due to rust formation)

d. Hazardous Decomposition Products

- ▷ Combustion may generate irritating and highly toxic metal fumes and oxides.

11. Toxicological Information

※ As no data is available for the product, data are provided by individual component.

a. Information on likely routes of exposure: No data available

b. Health Hazard Information

○ Acute toxicity (LD50/LC50)

▷ Oral

Iron	Rat LD50 = 984 mg/kg
Silicon	Rat LD50 = 3160 mg/kg
Manganese	Rat LD50 = 9000 mg/kg
Nickel	No data available
Chromium	No data available
Carbon	Rat LD50 > 10000 mg/kg
Copper	Rat LD50 > 500 mg/kg
Molybdenum	Rat LD50 > 2000 mg/kg
Vanadium	Rat LD50 > 2000 mg/kg
Aluminum	Rat LD50 > 5000 mg/kg
Calcium	No data available
Niobium	No data available
Phosphorus	Rat LD50 > 15,000 mg/kg (as alloy additive)
Sulfur	Rat LD50 > 2,000 mg/kg
Titanium	Rat LD50 > 5,000 mg/kg

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Magnesium Rat LD50 > 2,000 mg/kg

▷ Dermal

Iron Guinea pig LD50 = 20000 mg/kg

Silicon No data available

Manganese No data available

Nickel No data available

Chromium No data available

Carbon No data available

Copper No data available

Molybdenum No data available

Vanadium No data available

Aluminum No data available

Calcium No data available

Niobium No data available

Phosphorus No data available

Sulfur Rat LD50 > 2,000 mg/kg

Titanium No data available

Magnesium No data available

▷ Inhalation

Iron No data available

Silicon Hamster / 8 mg/m3 / No effects (Source: IUCLID)

Manganese No data available

Nickel No data available

Chromium No data available

Carbon No data available

Copper No data available

Molybdenum No data available

Vanadium No data available

Aluminum No data available

Calcium No data available

Niobium No data available

Phosphorus No data available

Sulfur Rat LC50 > 5.43 mg/L 4 hr (dust/mist)

Titanium No data available

Magnesium No data available

○ Skin corrosion or irritation

Iron Test species Rabbit: irritating

Silicon No data available

Manganese Mild irritation observed in rabbit test

Nickel No data available

Chromium No data available

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Carbon	No data available
Copper	May cause skin irritation
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	May cause skin irritation and corrosion (upon contact with moisture)
Niobium	No data available
Phosphorus	No data available
Sulfur	Test species Rabbit: skin irritant (Category 2)
Titanium	No data available
Magnesium	May cause mechanical irritation

○ Serious eye damage or irritation

Iron	No data available
Silicon	Test species Rabbit: slight irritation
Manganese	Test species Rabbit: mild irritation
Nickel	No data available
Chromium	May cause irritation
Carbon	No data available
Copper	May cause eye irritation
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	May cause serious eye damage
Niobium	No data available
Phosphorus	No data available
Sulfur	Test species Rabbit: slight irritation (not classified)
Titanium	No data available
Magnesium	May cause mechanical eye irritation

○ Respiratory sensitization

Iron	No data available
Silicon	No data available
Manganese	No data available
Nickel	Causes asthma (Source: HSDB)
Chromium	Classified as a respiratory sensitizer
Carbon	No data available
Copper	No data available
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	No data available
Niobium	No data available

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Phosphorus	No data available
Sulfur	No data available
Titanium	No data available
Magnesium	No data available

○ Skin sensitization

Iron	No data available
Silicon	No data available
Manganese	No data available
Nickel	Skin sensitizer (Source: HSDB)
Chromium	Metallic chromium, chromium alloys, and chromium plating may dissolve upon exposure to moisture, releasing chromium ions, which may cause skin sensitization upon exposure
Carbon	No data available
Copper	No data available
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	No data available
Niobium	No data available
Phosphorus	No data available
Sulfur	No data available
Titanium	No data available
Magnesium	No data available

○ Carcinogenicity classification

▷ Ministry of Employment and Labor notification

Iron	No data available
Silicon	No data available
Manganese	No data available
Nickel	2
Chromium	1A (limited to chromite ore processing products (chromic acid))
Carbon	No data available
Copper	No data available
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	No data available
Niobium	No data available
Phosphorus	No data available
Sulfur	No data available
Titanium	No data available
Magnesium	No data available

▷ IARC

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Iron	No data available
Silicon	No data available
Manganese	No data available
Nickel	Group 2B (Nickel, metallic and alloys)
Chromium	Group 3 (Chromium, metallic)
Carbon	No data available
Copper	No data available
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	No data available
Niobium	No data available
Phosphorus	No data available
Sulfur	No data available
Titanium	No data available
Magnesium	No data available
▷ OSHA	
Iron	No data available
Silicon	No data available
Manganese	No data available
Nickel	No data available
Chromium	No data available
Carbon	No data available
Copper	No data available
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	No data available
Niobium	No data available
Phosphorus	No data available
Sulfur	No data available
Titanium	No data available
Magnesium	No data available
▷ ACGIH	
Iron	No data available
Silicon	No data available
Manganese	No data available
Nickel	A5
Chromium	A4 (1A: limited to chromite ore processing products (chromic acid))
Carbon	No data available
Copper	No data available

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Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	No data available
Niobium	No data available
Phosphorus	No data available
Sulfur	No data available
Titanium	No data available
Magnesium	No data available

▷ NTP

Iron	No data available
Silicon	No data available
Manganese	No data available
Nickel	R
Chromium	No data available
Carbon	No data available
Copper	No data available
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	No data available
Niobium	No data available
Phosphorus	No data available
Sulfur	No data available
Titanium	No data available
Magnesium	No data available

▷ EU CLP

Iron	No data available
Silicon	No data available
Manganese	No data available
Nickel	Carc. 2
Chromium	No data available
Carbon	No data available
Copper	No data available
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	No data available
Niobium	No data available
Phosphorus	No data available
Sulfur	No data available

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Titanium	No data available
Magnesium	No data available

○ Germ cell mutagenicity

Iron	No data available
Silicon	No data available
Manganese	No data available
Nickel	No data available
Chromium	Positive in rat chromosomal aberration test
Carbon	No data available
Copper	No data available
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	No data available
Niobium	No data available
Phosphorus	No data available
Sulfur	No data available
Titanium	No data available
Magnesium	No data available

○ Reproductive toxicity

Iron	No data available
Silicon	No data available
Manganese	Teratogenicity study in mice showed embryoletality and fetal malformation (exencephaly)
Nickel	No data available
Chromium	No data available
Carbon	No data available
Copper	No data available
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	No data available
Niobium	No data available
Phosphorus	No data available
Sulfur	No data available
Titanium	No data available
Magnesium	No data available

○ Specific target organ toxicity (single exposure)

Iron	No data available
Silicon	No data available
Manganese	Causes pneumonia

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Nickel	Respiratory system and kidneys (pneumonia, pulmonary edema, and renal abnormalities)
Chromium	May cause metal fume fever. Causes airway irritation in humans.
Carbon	No data available
Copper	Causes metal fume fever upon inhalation
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	No data available
Niobium	No data available
Phosphorus	No data available
Sulfur	No data available
Titanium	No data available
Magnesium	No data available

○ Specific target organ toxicity (repeated exposure)

Iron	No data available
Silicon	No data available
Manganese	Causes effects on the respiratory and nervous systems
Nickel	Respiratory system (asthma, pulmonary fibrosis)
Chromium	No data available
Carbon	No data available
Copper	No data available
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	No data available
Niobium	No data available
Phosphorus	No data available
Sulfur	No data available
Titanium	No data available
Magnesium	No data available

○ Aspiration hazard

Iron	No data available
Silicon	No data available
Manganese	No data available
Nickel	No data available
Chromium	No data available
Carbon	No data available
Copper	No data available
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available

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Calcium	No data available
Niobium	No data available
Phosphorus	No data available
Sulfur	No data available
Titanium	No data available
Magnesium	No data available

12. Ecological Information

※ As no data is available for the product, data are provided by individual component.

a. Ecotoxicity

▷ Fish

Iron	LC50 13.6 mg/L 96 hr
Silicon	LC50 573.511 mg/L 96 hr
Manganese	LC50 > 50 mg/L 96 hr
Nickel	No data available
Chromium	No data available
Carbon	No data available
Copper	LC50 = 0.0094 mg/L 96 hr
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	LC50 > 100 mg/L 96 hr (Cyprinus carpio)
Niobium	No data available (insoluble metal)
Phosphorus	LC50 33.2 mg/L 96 hr (Danio rerio)
Sulfur	LC50 < 14 mg/L 96 hr (Lepomis macrochirus)
Titanium	No data available (insoluble metal)
Magnesium	LC50 541 mg/L 96 hr (Pimephales promelas)

▷ Crustaceans

Iron	No data available
Silicon	LC50 555.190 mg/L 48 hr
Manganese	No data available
Nickel	No data available
Chromium	No data available
Carbon	No data available
Copper	EC50 = 0.02 mg/L 48 hr
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	EC50 > 100 mg/L 48 hr (Daphnia magna)

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Niobium	No data available
Phosphorus	No data available
Sulfur	EC50 > 5,000 mg/L 48 hr (Daphnia magna)
Titanium	No data available
Magnesium	EC50 140 mg/L 48 hr (Daphnia magna)

▷ Algae

Iron	No data available
Silicon	LC50 318.927 mg/L 96 hr
Manganese	No data available
Nickel	No data available
Chromium	No data available
Carbon	No data available
Copper	EC50 = 0.047 mg/L 72 hr
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	EC50 > 100 mg/L 72 hr
Niobium	No data available
Phosphorus	No data available
Sulfur	EC50 > 290 mg/L 72 hr
Titanium	No data available
Magnesium	No data available

b. Persistence and Degradability

▷ Persistence

Iron	(none)
Silicon	log Kow -1.50
Manganese	log Kow: No data available
Nickel	No data available
Chromium	No data available
Carbon	No data available
Copper	No data available
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	No data available
Niobium	No data available
Phosphorus	No data available
Sulfur	No data available
Titanium	No data available
Magnesium	No data available

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▷ Degradability

Iron	No data available
Silicon	No data available
Manganese	No data available
Nickel	No data available
Chromium	No data available
Carbon	No data available
Copper	No data available
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	No data available
Niobium	No data available
Phosphorus	No data available
Sulfur	No data available
Titanium	No data available
Magnesium	No data available

c. Bioaccumulative Potential

▷ Bioaccumulation potential

Iron	No data available
Silicon	No data available
Manganese	No data available
Nickel	No data available
Chromium	No data available
Carbon	No data available
Copper	No data available
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	No data available
Niobium	No data available
Phosphorus	No data available
Sulfur	No data available
Titanium	No data available
Magnesium	No data available

▷ Biodegradability

Iron	No data available
Silicon	No data available
Manganese	No data available
Nickel	No data available

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Chromium	No data available
Carbon	No data available
Copper	No data available
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	No data available
Niobium	No data available
Phosphorus	No data available
Sulfur	No data available
Titanium	No data available
Magnesium	No data available

d. Mobility in Soil

Iron	No data available
Silicon	No data available
Manganese	No data available
Nickel	No data available
Chromium	log Kow = 0.23 (3)
Carbon	No data available
Copper	No data available
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	No data available
Niobium	No data available
Phosphorus	No data available
Sulfur	No data available
Titanium	No data available
Magnesium	No data available

e. Other Adverse Effects

Iron	No data available
Silicon	No data available
Manganese	No data available
Nickel	No data available
Chromium	No data available
Carbon	No data available
Copper	No data available
Molybdenum	No data available
Vanadium	No data available
Aluminum	No data available
Calcium	No data available

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Niobium	No data available
Phosphorus	No data available
Sulfur	No data available
Titanium	No data available
Magnesium	No data available

14. Transport Information

- a. UN number: Not applicable
- b. UN proper shipping name: Not applicable
- c. Transport hazard class: Not applicable
- d. Packing group: Not applicable
- e. Marine pollutant: No data available
- f. Special precautions and information required by the user related to transport or means of transport
 - ▷ Emergency measures in case of fire: Not applicable
 - ▷ Emergency measures in case of spill: Not applicable

15. Regulatory Information

- a. Regulations under the Occupational Safety and Health Act
 - ☐ Chromium, manganese, nickel, copper, aluminum: Subject to work environment monitoring (every 6 months)
 - ☐ Iron, chromium, manganese, nickel, copper, aluminum: Designated as controlled hazardous substances
 - ☐ Chromium, manganese, nickel, copper, aluminum: Subject to special health examination (every 12 months)
 - ☐ Iron, chromium, silicon, manganese, nickel, carbon, copper, molybdenum, aluminum: Substances with established occupational exposure limits
 - ☐ Manganese, nickel: Substances with established permissible exposure limits
- b. Regulations under the Chemicals Control Act
 - ☐ Substances hazardous to humans, etc.: Not applicable
(Copper: ecotoxic hazard applies at 1% or more, but is excluded, and therefore not applicable, when particle size is 1 mm or larger)
 - ☐ Accident-preparedness substance, restricted substance, permitted substance, prohibited substance: Not applicable
- c. Regulations under the Act on Registration and Evaluation, etc. of Chemical Substances
 - ☐ Existing chemical substance, hazardous chemical substance
- d. Regulations under the Hazardous Materials S: Not applicable
- e. Regulations under the Wastes Control Act
 - ☐ Among the wastes generated at the workplace, this product falls under general industrial waste, rather than designated (specified) waste, under the Wastes Control Act.
- f. Other Domestic and Foreign Regulations
 - ☐ Domestic regulations
 - ▷ Act on Persistent Organic Pollutants : Not applicable
 - ☐ Foreign regulations
 - ▷ US regulatory information (OSHA reg: Not applicable
 - ▷ US regulatory information (CERCLA r: Not applicable
 - ▷ US regulatory information (EPCRA Se: Not applicable

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- ▷ US regulatory information (EPCRA Se : Not applicable
- ▷ US regulatory information (EPCRA Se : Not applicable
- ▷ US regulatory information (Rotterdam : Not applicable
- ▷ US regulatory information (Stockholm : Not applicable
- ▷ US regulatory information (Montreal : Not applicable
- ▷ EU classification information (final cla : Not applicable
- ▷ EU classification information (risk phr : Not applicable
- ▷ EU classification information (safety p : Not applicable

16. Other Information

a. Data Sources

○ Iron

IUCLID (oral)
IUCLID (skin corrosion or irritation)
IUCLID (fish)

○ Silicon

IUCLID, NLM, TOMES (oral)
IUCLID (inhalation)
IUCLID (serious eye damage or irritation)
ECOSAR (fish)
ECOSAR (crustaceans)
ECOSAR (algae)
KOWWIN (persistence)

○ Manganese

(1) ISCS (2) HSDB (3) RTECS (4) CICAD

○ Nickel

HSDB (respiratory sensitization)
HSDB (skin sensitization)
ICSC2001 (specific target organ toxicity, single exposure)
ATSDR (2005) (specific target organ toxicity, single exposure)
ICSC2001 (specific target organ toxicity, repeated exposure)
ECETOC TR33 (1989) (specific target organ toxicity, repeated exposure)

○ Chromium

(1) ICSC (2) HSDB (3) SRC (4) SITIG (5) Special Committee of the Japanese Society of Occupational and Environmental Allergy
(6) ECETOC (7) IARC (8) ACGIH (9) IARC (10) HSFS

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☐ Carbon

IUCLID, HSDB, Registered Substance Information DB

☐ Copper

HSDB, IUCLID, US EPA Ecotox Database

☐ Molybdenum

IUCLID, HSDB, ACGIH documentation

☐ Vanadium

HSDB, RTECS, official toxicity databases

☐ Aluminum

IUCLID, HSDB, KOSHA Substance Information

☐ Calcium

IUCLID, ECHA (oral, ecotoxicity), KOSHA Substance Information

☐ Niobium

ECHA Registered Substance Information (oral)

☐ Phosphorus

IUCLID, ECHA (oral, fish ecotoxicity)

☐ Sulfur

KOSHA MSDS, ECHA Database (oral, dermal, inhalation, skin irritation, ecotoxicity)

☐ Titanium

IUCLID, ECHA (oral)

☐ Magnesium

ECHA Database, US EPA ECOSAR (oral, ecotoxicity)

b. Date of initial preparation: June 30, 2009

c. Number of Revisions and Date of Last Revision

☐ Number of revisions: 1

☐ Date of last revision: 2026.08.12

d. Other

☐ No special notes