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Version 5

Section 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product Identifier

Product name Titanium Metal Powder

Synonyms Titanium metal powder produced using the Armstrong Process® technology.

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

Recommended Use Production of titanium metal components.

Uses advised against For use in industrial installations only

1.3. Details of the supplier of the safety data sheet

Manufacturer Cristal Metals Inc.
1501 Titanium Drive
Ottawa, IL 61350
+1.815.431.4340

For further information, please contact

E-mail address Regulatory.query@cristal.com

1.4. Emergency telephone number

Emergency telephone SGS (Europe): + 32 (0)9-575-5555
Chemtrec (USA) 1-800-424-9300

Emergency telephone - §45 - (EC)1272/2008	
Europe	112

Section 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

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Category 1	FLAMMABLE SOLIDS

FA - Flammable

R-code(s)
R11

2.2. Label Elements

Signal Word
DANGER

H228 - Flammable solid

Precautionary Statements - EU (§28, 1272/2008)

P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking

P240 - Ground/bond container and receiving equipment

P241 - Use explosion-proof electrical/ ventilating/ lighting/ equipment

P243 - Take precautionary measures against static discharge

P280 - Wear protective gloves and eye/face protection

P403 + P233 - Store in a well-ventilated place. Keep container tightly closed

P378 - Use dry sand, salt, soda ash, or Class D extinguisher to extinguish

2.3. Other Hazards

Minimum ignition energy: <3mJ (ASTM E-2019).

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Chemical name	EC No	CAS No	weight-%	Classification according to Directive 67/548/EEC or 1999/45/EC	Classification according to Regulation (EC) No. 1272/2008 [CLP]	REACH registration number
Titanium	231-142-3	7440-32-6	100%	-	-	No data available

Full text of R-phrases: see section 16

Section 4: FIRST AID MEASURES

4.1. Description of first aid measures

Inhalation	Remove from exposure, lie down. If symptoms persist, call a physician.
Skin contact	Wash off immediately with plenty of water. If skin irritation persists, call a physician.
Eye Contact	Rinse thoroughly with plenty of water, also under the eyelids. If eye irritation persists: Get medical advice/attention.
Ingestion	Rinse mouth. Call a physician or poison control center immediately.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms None known.

4.3. Indication of any immediate medical attention and special treatment needed

Note to physicians Treat symptomatically.

Section 5: FIRE FIGHTING MEASURES

5.1. Extinguishing media

Suitable Extinguishing Media Class D extinguishing agents on fines, dust or molten metal. Dry sand. Sodium chloride powder.

Unsuitable Extinguishing Media Do NOT use A-B-C fire extinguisher. Do not use halon type extinguisher. Do not use water, carbon dioxide or dry chemical extinguisher.

5.2. Special hazards arising from the substance or mixture

FLAMMABLE. Minimum ignition energy: <3mJ (ASTM E-2019). Once fire begins, product is difficult to extinguish.

5.3. Advice for firefighters

Special protective equipment for fire-fighters Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear. In the event of a fire, isolate from additional fuel (titanium metal powder).

Section 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Evacuate personnel to safe areas. Take precautionary measures against static discharges. Use personal protective equipment as required. Avoid contact with skin, eyes or clothing.

For emergency responders Remove all sources of ignition. Use personal protection recommended in Section 8.

6.2. Environmental precautions

Environmental Precautions Do not allow into any sewer, on the ground or into any body of water

6.3. Methods and material for containment and cleaning up

Methods for Containment Cover with dry sand/earth.

Methods for cleaning up Do not vacuum!. Avoid creating dust. Ground and bond containers when transferring material. Take precautionary measures against static discharges. Sweep up and shovel into suitable containers for disposal. Use clean non-sparking tools to collect absorbed material.

6.4. Reference to other sections

See section 13 for more information.

Section 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Advice on safe handling Keep away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity). Take precautionary measures against static discharges. Avoid generation of dust.

General hygiene considerations Use personal protective equipment as required. Handle in accordance with good industrial hygiene and safety practice.

7.2. Conditions for safe storage, including any incompatibilities

Storage Conditions Keep container tightly closed in a dry and well-ventilated place. Keep away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity). Incompatible with oxidizing agents. Be aware that building sprinkler systems may contribute to material hazard in the event of spilled powder fire. An H-3 occupancy rating is required for storage of flammable solids in quantities greater than 57kg based on International Building Code (IBC) and International Fire Code (IFC).

7.3. Specific end use(s)

Risk Management Methods (RMM) The information required is contained in this Safety Data Sheet.

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Chemical name	Poland	Norway	Ireland	Sweden
Titanium 7440-32-6	STEL: 30 mg/m ³ TWA: 10 mg/m ³	-	-	-

Derived No Effect Level (DNEL)

Oral 350 mg/kg bw/day

Predicted No Effect Concentration (PNEC)

No information available.

8.2. Exposure controls

Engineering controls Ensure adequate ventilation, especially in confined areas

Personal Protective Equipment

Eye/face Protection Wear safety glasses with side shields (or goggles)

Hand protection Wear protective gloves.

Skin and Body Protection Wear fire/flame resistant/retardant clothing.

Respiratory protection In case of inadequate ventilation wear respiratory protection.

Environmental exposure controls Do not allow into any sewer, on the ground or into any body of water.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Physical State	solid	Odor	Odorless
Appearance	Powder		
Color	Silver or black		

<u>Property</u>	<u>Values</u>	<u>Remarks • Method</u>
pH		Not applicable
Melting point/freezing point	1662 °C / 3034 °F	-
Boiling point / boiling range	3287 °C / / 5949 °F	Not applicable
Flash Point		Not applicable

Evaporation Rate		Not applicable
Flammability (solid, gas)		Highly flammable
Flammability Limit in Air		
Upper flammability limit:		Not applicable
Lower flammability limit:		Not applicable
Vapor pressure		Not applicable
Vapor Density		Not applicable
Specific gravity		-
Water solubility	Insoluble in water	-
Solubility(ies)		-
Partition coefficient		No data available
Autoignition Temperature	450 °C / 842 °F	powder cloud
Decomposition temperature		Not applicable
Kinematic viscosity		Not applicable
Dynamic viscosity		Not applicable
Explosive properties	Kst = 9 bar.m/s (5-7% AD) Kst = 92 bar.m/s (15-25% AD) AD = Apparent density	
	Limiting Oxygen Concentration: 3.5% (+/- 1%)	
	Minimum Ignition Energy (MIE): <3mJ (ASTM E-2019)	

9.2. Other information

VOC content (%)	Not applicable
Bulk Density	4.5 g/cm ³

Section 10: STABILITY AND REACTIVITY

10.1. Reactivity

None known

10.2. Chemical stability

Stable under normal conditions. Will be easily ignited by heat, sparks or flames. Fire Hazard.

Sensitivity to Mechanical Impact Self-ignition may be triggered at temperatures above 450C and in the presence of oxygen.

Sensitivity to Static Discharge Fine dust dispersed in air, in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

10.3. Possibility of hazardous reactions

At temperatures >200°C, product is incompatible with halide acids, reducing acids, oxidizing agents, and halogens.

10.4. Conditions to avoid

Take precautionary measures against static discharges. Self-ignition may be triggered at temperatures above 450C and in the presence of oxygen.

10.5. Incompatible materials

Observe acid concentration and temperature limits. Avoid hydrogen fluoride solutions.

10.6. Hazardous decomposition products

None under normal use conditions

Section 11: TOXICOLOGICAL INFORMATION

Acute Toxicity

Inhalation	No data available.
Eye Contact	Contact with eyes may cause irritation.
Skin contact	No data available.
Ingestion	Not an expected route of exposure.

Component Information

Skin corrosion/irritation	No information available.
Serious eye damage/eye irritation	No information available.
Sensitization	No information available.
Germ Cell Mutagenicity	No information available.
Carcinogenicity	No information available
Reproductive Toxicity	No information available.
STOT - single exposure	No information available.
STOT - repeated exposure	No information available.
Aspiration Hazard	Not applicable.

Section 12: ECOLOGICAL INFORMATION**12.1. Toxicity**

None known

12.2. Persistence and degradability

No information available.

12.3. Bioaccumulative potential

Bioaccumulative potential.

12.4. Mobility in soil

Not mobile.

Mobility

Not mobile.

12.5. Results of PBT and vPvB assessment

No information available.

12.6. Other adverse effects

None known based on information supplied

Section 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste from residues/unused products	Disposal should be in accordance with applicable regional, national and local laws and regulations.
Contaminated packaging	Disposal should be in accordance with applicable regional, national and local laws and regulations.
Waste codes / waste designations according to EWC / AVV	Waste codes should be assigned by the user based on the application for which the product was used

Section 14: TRANSPORT INFORMATION

Material may be shipped under argon gas.

IMDG

UN/ID no	3089
Proper Shipping Name	Metal powder, flammable, n.o.s.
Hazard Class	4.1
Packing group	II

RID

UN/ID no	3089
Proper Shipping Name	Metal powder, flammable, n.o.s.
Hazard Class	4.1
Packing group	II

ADR

UN/ID no	3089
Proper Shipping Name	Metal powder, flammable, n.o.s.
Hazard Class	4.1
Packing group	II

ICAO (air)

UN/ID no	3089
Proper Shipping Name	Metal powder, flammable, n.o.s.
Hazard Class	4.1
Packing group	II

IATA

UN/ID no	3089
Proper Shipping Name	Metal powder, flammable, n.o.s.
Hazard Class	4.1
Packing group	II

Section 15: REGULATORY INFORMATION

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

European Union

Take note of Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work

International Inventories

TSCA	Complies
DSL	Complies
EINECS/ELINCS	Complies
ENCS	Complies
IECSC	Complies
KECL	Complies
PICCS	Complies
AICS	Complies
NZIC	Complies

Legend:

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL/NDL - Canadian Domestic Substances List/Non-Domestic Substances List

EINECS/ELINCS - European Inventory of Existing Chemical Substances/European 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

NIZIC - New Zealand Inventory of Chemicals

15.2. Chemical safety assessment

A Chemical Safety Assessment is not required for this substance

Section 16: OTHER INFORMATION
Key or legend to abbreviations and acronyms used in the safety data sheet**Legend - Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION**

TWA	TWA (time-weighted average)	STEL	STEL (Short Term Exposure Limit)
Ceiling	Maximum limit value		

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Revision note New format

Safety Data Sheet according to Regulation (EC) No. 1907/2006 (REACH)

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

The REACH registration number(s) referred to in sections 1 & 3 cover the volumes of the substance(s) that are placed on the European Economic Area (EEA) market by Cristal entities. EEA importers of the substances in Cristal products may have their own registration obligations under Regulation (EC) 1907/2006 (REACH).

End of Safety Data Sheet