



Safety Data Sheet

Issue date 06-Oct-2010

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Version 9

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product Identifier

Product name Titanium Alloy Powder
UN/ID no UN3089
Synonyms Titanium metal powder produced using the Armstrong Process® technology.

Recommended use of the chemical and restrictions on use

Recommended Use Production of titanium metal components.
Uses advised against For use in industrial installations only

Details of the supplier of the safety data sheet

Manufacturer Address 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

24 Hour Emergency Phone Number

Emergency telephone Chemtrec (USA) 1-800-424-9300

2. HAZARDS IDENTIFICATION

Classification

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OSHA Regulatory Status

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

FLAMMABLE SOLIDS

Label Elements

EMERGENCY OVERVIEW

DANGER

Physical Hazards Flammable Solid



Appearance Powder **Physical State** Solid **Odor** Odorless

Precautionary Statements - Prevention

Keep away from heat/sparks/open flames/hot surfaces. — No smoking
 Ground/bond container and receiving equipment
 Ventilate affected area
 Wear protective gloves/protective clothing/eye protection/face protection

Precautionary Statements - Response

Call a POISON CENTER or doctor/physician if you feel unwell
 In case of fire: Use dry sand, salt, soda ash, or Class D extinguisher for extinction

Hazards not otherwise classified (HNOC)

Airborne dust is extremely sensitive to ignition.
 Minimum ignition energy: <3mJ (ASTM E-2019).

Other Information

Other Hazards None.

Unknown acute toxicity No information available

3. COMPOSITION/INFORMATION ON INGREDIENTS

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

Chemical name	CAS No	weight-%	Trade secret
Titanium	7440-32-6	88 - 96%	
Vanadium	7440-62-2	2 - 5%	
Aluminum	7429-90-5	2 - 7%	

4. FIRST AID MEASURES

FIRST AID MEASURES

Eye Contact Rinse thoroughly with plenty of water, also under the eyelids. If eye irritation persists: Get medical advice/attention.

Skin contact Wash off immediately with plenty of water. If skin irritation persists, call a physician.

Inhalation Remove from exposure, lie down. If symptoms persist, call a physician.

Ingestion Rinse mouth. Call a physician or poison control center immediately.

Most important symptoms and effects, both acute and delayed

Symptoms No information available.

Indication of any immediate medical attention and special treatment needed

Note to physicians Treat symptomatically.

5. FIRE-FIGHTING MEASURES

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.

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

Explosion data

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.

Protective equipment and precautions for firefighters As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

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.

Environmental Precautions

Environmental Precautions See Section 12 for additional Ecological Information.

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

7. HANDLING AND STORAGE

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

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).

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure guidelines This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Chemical name	ACGIH TLV	OSHA PEL	NIOSH
Vanadium 7440-62-2	-	(vacated) TWA: 0.05 mg/m ³ V ₂ O ₅ respirable dust (vacated) TWA: 0.05 mg/m ³ V ₂ O ₅ fume Ceiling: 0.5 mg/m ³ V ₂ O ₅ respirable dust Ceiling: 0.1 mg/m ³ V ₂ O ₅ fume	Ceiling: 0.05 mg/m ³ V dust and fume 15 min TWA: 1 mg/m ³ STEL: 3 mg/m ³ Ferrovandium dust
Aluminum 7429-90-5	TWA: 1 mg/m ³ respirable fraction	TWA: 15 mg/m ³ total dust TWA: 5 mg/m ³ respirable fraction (vacated) TWA: 15 mg/m ³ total dust (vacated) TWA: 5 mg/m ³ respirable fraction (vacated) TWA: 5 mg/m ³ Al Aluminum	TWA: 10 mg/m ³ total dust TWA: 5 mg/m ³ respirable dust TWA: 5 mg/m ³ Al

Appropriate engineering controls

Engineering controls Ensure adequate ventilation, especially in confined areas

Individual protection measures, such as personal protective equipment

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

Skin and Body Protection Wear suitable protective clothing.

Respiratory protection In case of insufficient ventilation, wear suitable respiratory equipment.

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical State	Solid	Appearance	Powder
Odor	Odorless	Color	Silver or black
Odor threshold	No information available		

<u>Property</u>	<u>Values</u>	<u>Remarks • Method</u>
pH		
Melting point/freezing point	1649 °C / 3000 °F	
Boiling point / boiling range	3287 °C / 5949 °F	Not applicable

Flash Point		
Evaporation Rate		
Flammability (solid, gas)		Highly flammable
Flammability Limit in Air		Not applicable
Upper flammability limit:		
Lower flammability limit:		
Vapor pressure		
Vapor Density		
Specific gravity		
Water solubility	Insoluble in water	
Solubility in other solvents		
Partition coefficient		
Autoignition Temperature	480 °C / 896 °F	powder cloud
Decomposition temperature		
Kinematic viscosity		
Dynamic viscosity		
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)	

Other Information

VOC content (%)	No information available
Bulk Density	4.5 g/cm ³

10. STABILITY AND REACTIVITY

Reactivity	None known based on information supplied
Stability	Stable under normal conditions. Will be easily ignited by heat, sparks or flames. Fire Hazard.
Possibility of hazardous reactions	At temperatures >200°C, product is incompatible with halide acids, reducing acids, oxidizing agents, and halogens
Hazardous polymerization	None under normal processing
Conditions to Avoid	Take precautionary measures against static discharges Self-ignition may be triggered at temperatures above 450C and in the presence of oxygen.
Incompatible Materials	Observe acid concentration and temperature limits Avoid hydrogen fluoride solutions.
Hazardous decomposition products	None known based on information supplied

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information	No data available
Inhalation	No data available.
Eye Contact	Contact with eyes may cause irritation.
Skin contact	No data available.

Ingestion Not an expected route of exposure.

Information on toxicological effects

Symptoms No information available.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

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 There are no known carcinogenic chemicals in this product.

Reproductive Toxicity No information available.

STOT - single exposure No information available

STOT - repeated exposure No information available.

Aspiration Hazard No information available.

Numerical measures of toxicity

Unknown acute toxicity No information available

12. ECOLOGICAL INFORMATION

Ecotoxicity None known

Persistence and degradability No information available.

Bioaccumulation Bioaccumulative potential.

Mobility Not mobile.

Other adverse effects None known based on information supplied.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal of wastes 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.

Chemical name	California Hazardous Waste Status
Titanium 7440-32-6	Ignitable powder

Aluminum 7429-90-5	Ignitable powder
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14. TRANSPORT INFORMATION

Note: Material may be shipped under argon gas.

DOT

UN/ID no	UN3089
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

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

15. REGULATORY INFORMATION

International Inventories

TSCA	Complies
DSL/NDSL	Complies
EINECS/ELINCS	Complies
ENCS	Does not comply
IECSC	Complies
KECL	Complies
PICCS	Complies
AICS	Complies
NIZIC	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 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

US 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

CWA (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

US State Regulations

California Proposition 65

This product does not contain any Proposition 65 chemicals

16. OTHER INFORMATION

Issue date	06-Oct-2010
Revision date	14-May-2015
Revision note	New format
Other Information	No information available

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.

End of Safety Data Sheet