

PRESIDENT TITANIUM CO., INC.



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SAFETY DATA SHEET

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

Product Identifier / Product Name: Titanium & Titanium Alloys

Other means of identification: 6AL/4V Grade 5 / 6AL/4V Grade 23 (ELI) / CP-Grade 4 / CP-Grade 2

Recommended Use: Titanium & Titanium Alloy product manufacture (i.e. forging, casting, welding, cutting, etc. for aerospace, medical, military, and/or commercial applications).

Recommended Restrictions: None

Distributor Information: President Titanium Co., Inc. – 243 Franklin Street – Hanson, MA 02341 U.S.A.
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Emergency Information: CHEMTREC: 1-800-424-9300

2. HAZARDS IDENTIFICATION

Classification

This chemical is not considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Label Elements

Emergency Overview

| Appearance | Physical State | Odor |
|-----------------------|----------------|----------|
| various product forms | solid | odorless |

Hazards not otherwise classified (HNOC)

Not applicable

Other Information

When product is subjected to welding, burning, melting, sawing, brazing, grinding, buffing, polishing, and/or other similar heat-generating processes, airborne particles and/or fumes may cause general irritation of the eyes, nasal, and lungs. There is also the chance of the following potentially hazardous airborne particles and/or fumes that may be generated:

- titanium dioxide an IARC Group 2B carcinogen
- vanadium pentoxide (V2O5) affects eyes, skin, respiratory system

3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms (partial list):

6AL/4V Grade 5 Titanium, 6AL/4V ELI (Grade 23) Titanium, CP-Grade 4 Titanium, CP-Grade 2 Titanium

| Chemical Name | CAS No. | Weight-% |
|---------------|-----------|----------|
| Titanium (TI) | 7440-32-6 | 88 - 100 |
| Aluminum (AL) | 7429-90-5 | 0 - 6.75 |

| | | |
|--------------|-----------|---------|
| Vanadium (V) | 7440-62-2 | 0 - 4.5 |
| Iron (FE) | 7439-89-6 | < 0.5 |
| Oxygen (O) | 7782-44-7 | < 0.4 |
| Carbon (C) | 7440-44-0 | < 0.08 |
| Nitrogen (N) | 7727-37-9 | < 0.05 |
| Hydrogen (H) | 1333-74-0 | < 0.015 |
| Yttrium (Y) | 7440-65-5 | < 0.005 |
| Other | N/A | < 0.1 |

highlighted indicates < 1/2 % weight

4. FIRST AID MEASURES

First aid measures

| | |
|---------------------|---|
| Eye contact | In the case of particles coming in contact with eyes during processing, treat as with any foreign object. |
| Skin Contact | In the case of skin irritation or allergic reactions see a physician. |
| Inhalation | If excessive amounts of smoke, fume, or particulate are inhaled during processing, remove to fresh air and consult a qualified health professional. |
| Ingestion | Not an expected route of exposure. |

Most important symptoms and effects, both acute and delayed

| | |
|-----------------|-----------------------------------|
| Symptoms | May cause allergic skin reaction. |
|-----------------|-----------------------------------|

Indication of any immediate medical attention and special treatment needed

| | |
|---------------------------|------------------------|
| Note to physicians | Treat symptomatically. |
|---------------------------|------------------------|

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media

Not flammable in the form of this product as distributed, flammable as finely divided particles or pieces resulting from processing of this product. Smother with salt (NaCl) or class D dry powder fire extinguisher.

Unsuitable extinguishing media

Do not spray water on burning metal as an explosion may occur. This explosive characteristic is caused by the hydrogen and steam generated by the reaction of water with the burning material.

Specific hazards arising from the chemical

Intense heat. Very fine, high surface area material resulting from grinding, buffing, polishing, or similar processes of this product may ignite spontaneously at room temperature. WARNING: Fine particles resulting from grinding, buffing, polishing, or similar processes of this product may form combustible dust-air mixtures. Keep particles away from all ignition sources including heat, sparks, and flame. Prevent dust accumulations to minimize combustible dust hazard.

Hazardous combustion products

Titanium dioxide an IARC Group 2B carcinogen, Hexavalent Chromium (Chromium VI) may cause lung, nasal, and/or sinus cancer. Vanadium pentoxide (V₂O₅) affects eyes, skin, respiratory system, zinc, copper, magnesium, or cadmium fumes may cause metal fume fever. Soluble molybdenum compounds such as molybdenum trioxide may cause lung irritation.

Explosion data

| | |
|---|------|
| Sensitivity to Mechanical Impact | None |
| Sensitivity to Static Discharge | None |

Protective equipment and precautions for firefighters

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

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions Use personal protective equipment as required.
For emergency responders Use personal protective equipment as required.

Environmental precautions

Environmental precautions Not applicable to massive product.

Methods and material for containment and cleaning up

Methods for containment Not applicable to massive product.
Methods for cleaning up Not applicable to massive product.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling Very fine, high surface area material resulting from grinding, buffing, polishing, or similar processes of this product may ignite spontaneously at room temperature.
WARNING: Fine particles resulting from grinding, buffing, polishing, or similar processes of this product may form combustible dust-air mixtures. Keep particles away from all ignition sources including heat, sparks, and flame. Prevent dust accumulations to minimize combustible dust hazard.

Conditions for safe storage, including any incompatibilities

Storage Conditions Keep chips, turnings, dust, and other small particles away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity).

Incompatible materials Dissolves in hydrofluoric acid / Ignites in the presence of fluorine.
When heated above 200°C, reacts exothermically with the following. Chlorine, bromine, halocarbons, carbon tetrachloride, carbon tetrafluoride, and freon.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines

| Chemical Name | ACGIH TLV | OSHA PEL |
|-----------------------|--|---|
| Titanium 7440-32-6 | | |
| 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 |
| Vanadium 7440-62-2 | | Ceiling: 0.5 mg/m ³ V2O5 respirable dust Ceiling: 0.1 mg/m ³ V2O5 fume |
| Iron 7439-89-6 | | |

Appropriate engineering controls

Engineering Controls Avoid generation of uncontrolled particles.

Individual protection measures, such as personal protective equipment

Eye/face protection When airborne particles may be present, appropriate eye protection is recommended. For example, tight-fitting goggles, foam-lined safety glasses or other protective equipment that shield the eyes from particles.

Skin and body protection Fire/flame resistant/retardant clothing may be appropriate during hot work with the product. Wear protective gloves. Cut-resistant gloves and/or protective clothing may be appropriate when sharp surfaces are present.

Respiratory protection When particulates/fumes/gases are generated and if exposure limits are exceeded or irritation is experienced, proper approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

General Hygiene Considerations

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 | Odor | Odorless |
| Appearance | Various massive product forms | Odor threshold | Not applicable |
| Color | metallic, gray or silver | | |

| <u>Property</u> | <u>Values</u> | <u>Remarks * Method</u> |
|--------------------------------------|---------------------------|--|
| Ph | Not applicable | |
| Melting point/freezing point | 1540-1670 °C 2800-3000 °F | |
| Boiling point / boiling range | ----- | Not applicable |
| Flash point | ----- | Not applicable |
| Evaporation rate | ----- | Not applicable |
| Flammability (solid, gas) | ----- | Not flammable in the form of this product as distributed, flammable as finely divided particles or pieces resulting from processing of product |
| Flammability Limit in Air | | |
| Upper flammability limit: | Not applicable | |
| Lower flammability limit: | Not applicable | |
| Vapor pressure | ----- | Not applicable |
| Vapor density | ----- | Not applicable |
| Specific Gravity | 4.5 | |
| Water solubility | Insoluble | Insoluble |
| Solubility in other solvents | ----- | Not applicable |
| Partition coefficient | ----- | Not applicable |
| Autoignition temperature | ----- | Not applicable |
| Decomposition temperature | ----- | Not applicable |
| Kinematic viscosity | ----- | Not applicable |
| Dynamic viscosity | ----- | Not applicable |
| Explosive properties | Not applicable | |
| Oxidizing properties | Not applicable | |
| <u>Other Information</u> | | |
| Softening point | Not applicable | |
| Molecular weight | Not applicable | |
| VOC Content (%) | Not applicable | |
| Density | ----- | |
| Bulk density | ----- | |

10. STABILITY AND REACTIVITY**Reactivity**

Not applicable

Chemical stability

Stable under normal conditions.

Possibility of Hazardous Reactions

None under normal processing.

| | |
|---------------------------------|--|
| Hazardous polymerization | Hazardous polymerization does not occur. |
|---------------------------------|--|

Conditions to avoid

Dust formation and dust accumulation.

Incompatible materials

Dissolves in hydrofluoric acid, ignites in the presence of fluorine.

When heated above 200°C, reacts exothermically with the following: chlorine, bromine, halocarbons, carbon tetrachloride, carbon tetrafluoride, and freon.

Hazardous Decomposition Products

When product is subjected to welding, burning, melting, sawing, brazing, grinding, buffing, polishing, or other similar heat-generating processes, the following potentially hazardous airborne particles and/or fumes may be generated:

- titanium dioxide an IARC Group 2B carcinogen
- Vanadium pentoxide (V₂O₅) affects eyes, skin, respiratory system

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information

- Inhalation Not an expected route of exposure for product in massive form.
- Eye contact Not an expected route of exposure for product in massive form.
- Skin Contact May cause sensitization by skin contact.
- Ingestion Not an expected route of exposure for product in massive form.

| Chemical Name | Oral LD50 | Dermal LD50 | Inhalation LC50 |
|-----------------------|-----------------|-------------|-----------------|
| Titanium 7440-32-6 | > 5000 mg/kg bw | -- | -- |
| Aluminum 7429-90-5 | 15,900 mg/kg bw | -- | > 1 mg/L |
| Vanadium 7440-62-2 | > 2000 mg/kg bw | -- | -- |
| Iron 7439-89-6 | 98,600 mg/kg bw | -- | > 0.25 mg/L |

Information on toxicological effects

Symptoms

May cause sensitization by skin contact.

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

| | |
|-----------------------------------|--|
| Acute toxicity | Product not classified. |
| Skin corrosion/irritation | Product not classified. |
| Serious eye damage/eye irritation | Product not classified. |
| Sensitization | May cause sensitization by skin contact. |
| Germ cell mutagenicity | Product not classified. |
| Carcinogenicity | Product not classified. |

12. ECOLOGICAL INFORMATION

Ecotoxicity

This product contains a chemical which is listed as a severe marine pollutant according to DOT

| Chemical Name | Algae/aquatic plants | Fish | Toxicity to microorganisms | Crustacea |
|-----------------------|---|--|---|--|
| Titanium 7440-32-6 | The 72 h EC50 of titanium dioxide to <i>Pseudokirchnerella subcapitata</i> was 61 mg of TiO ₂ /L | The 96 h LC50 of titanium dioxide to <i>Cyprinodon variegatus</i> was greater than 10,000 mg of TiO ₂ /L. The 96 h LC50 of titanium dioxide to <i>Pimephales promelas</i> was greater than 1,000 mg of TiO ₂ /L | The 3 h EC50 of titanium dioxide for activated sludge were greater than 1000 mg/L | The 48 h EC50 of titanium dioxide to <i>Daphnia Magna</i> was greater than 1000 mg of TiO ₂ /L |
| Aluminum 7429-90-5 | The 96-h EC50 values for reduction of biomass of <i>Pseudokirchnerella subcapitata</i> in AAP-Medium at pH 6, 7, and 8 were estimated as 20.1, 5.4, and 150.6 | The 96 h LC50 of aluminum to <i>Oncorhynchus mykiss</i> was 7.4 mg of Al/L at pH 6.5 and 14.6 mg of Al/L at pH 7.5 | -- | The 48-hr LC50 for <i>Ceriodaphnia dubia</i> exposed to Aluminum chloride increased from 0.72 to greater than 99.6 mg/L with water hardness increasing from 25 to 200 mg/L |

| | | | | |
|-----------------------|---|---|--|---|
| | µg/L, respectively, for dissolved Al | | | |
| Vanadium 7440-62-2 | The 72 h EC50 of vanadium pentoxide to <i>Desmodesmus subspicatus</i> was 2,907 µg of V/L | The 96 h LC50 of vanadium pentoxide to <i>Pimephales promelas</i> was 1,850 µg of V/L | The 3 h EC50 of sodium metavanadate for activated sludge was greater than 100 mg/L | The 48 h EC50 of sodium vanadate to <i>Daphnia magna</i> was 2,661 µg of V/L |
| Iron 7439-89-6 | -- | The 96 h LC50 of 50% iron oxide black in water to <i>Danio rerio</i> was greater than 10,000 mg/L | The 3 h EC50 of iron oxide for activated sludge was greater than 10,000 mg/L | The 48 h EC50 of iron oxide to <i>Daphnia magna</i> was greater than 100 mg/L |

Persistence and degradability

Bioaccumulation

Other adverse effects

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 None anticipated.

Disposal: Scrap should be recycled whenever possible. Product dusts and fumes from processing operations should also be recycled or classified by a competent environmental professional and disposed of in accordance with applicable federal, state or local regulations.

Container Cleaning and Disposal: This product as supplied does not possess characteristics which qualify as hazardous waste. Following processing and use, resulting titanium powders, fines and/or swarf will impact cleaning and disposal and should be evaluated by a competent environmental professional.

14. TRANSPORT INFORMATION

DOT Not regulated

15. REGULATORY INFORMATION

International Inventories

| | |
|----------------------|----------|
| TSCA | Complies |
| DSL/NDSL | Complies |
| EINECS/ELINCS | Complies |
| ENCS | Complies |
| 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 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

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains no chemical or 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 which are listed as regulated pollutants, pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA

This material, as supplied, contains none of the substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

US State Regulations

California Proposition 65 - This product contains none of the Proposition 65 chemicals

U.S. State Right-to-Know Regulations

| Chemical Name | New Jersey | Massachusetts | Pennsylvania |
|-----------------------|-------------------|----------------------|---------------------|
| Titanium 7440-32-6 | X | | |
| Aluminum 7429-90-5 | X | X | X |
| Vanadium 7440-62-2 | X | X | X |

U.S. EPA Label Information

EPA Pesticide Registration Number Not applicable

16. OTHER INFORMATION

NFPA **Health hazards** – 0 **Flammability** – 0 **Instability** – 0 **Physical and Chemical Properties** – n/a
HMIS **Health hazards** – 1* **Flammability** – 0 **Physical Hazards** – 0 **Personal Protection** – X
*Chronic Hazard Star Legend * = Chronic Health Hazard*

Note:

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.