



# SAFETY DATA SHEET

Issue Date 28-May-2015

Revision Date 21-Nov-2016

Version 1

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

**Product identifier**

**Product Name** Titanium and Titanium Alloys

**Other means of identification**

**Product Code** SAC008  
**Synonyms** All Titanium Base Alloys (Product #833)

**Recommended use of the chemical and restrictions on use**

**Recommended Use** Alloy product manufacture.  
**Uses advised against**

**Details of the supplier of the safety data sheet**

**Manufacturer Address**  
ATI, 1000 Six PPG Place, Pittsburgh, PA  
15222 USA

**Emergency telephone number**  
**Emergency Telephone** 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**

<b>Appearance</b> Various massive product forms	<b>Physical state</b> Solid	<b>Odor</b> Odorless
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**Hazards not otherwise classified (HNOC)**

Not applicable

**Other Information**

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.

Hexavalent Chromium (Chromium VI) may cause lung, nasal, and/or sinus cancer

Vanadium pentoxide (V<sub>2</sub>O<sub>5</sub>) affects eyes, skin, respiratory system

Soluble molybdenum compounds such as molybdenum trioxide may cause lung irritation

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

**Synonyms** All Titanium Base Alloys, (Product #833).

Chemical Name	CAS No.	Weight-%
Titanium	7440-32-6	50->99
Vanadium	7440-62-2	0-45
Molybdenum	7439-98-7	0-37
Zirconium	7440-67-7	0-35
Chromium	7440-47-3	0-18
Niobium (Columbium)	7440-03-1	0-15
Aluminum	7429-90-5	0-8
Tin	7440-31-5	0-8
Silicon	7440-21-3	0-3

#### 4. FIRST AID MEASURES

##### First aid measures

<b>Eye contact</b>	In the case of particles coming in contact with eyes during processing, treat as with any foreign object.
<b>Skin Contact</b>	None under normal use conditions.
<b>Inhalation</b>	If excessive amounts of smoke, fume, or particulate are inhaled during processing, remove to fresh air and consult a qualified health professional.
<b>Ingestion</b>	Not an expected route of exposure.

##### Most important symptoms and effects, both acute and delayed

**Symptoms** None anticipated.

##### 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. 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	-	-
Vanadium 7440-62-2	-	Ceiling: 0.5 mg/m <sup>3</sup> V2O5 respirable dust Ceiling: 0.1 mg/m <sup>3</sup> V2O5 fume
Molybdenum 7439-98-7	TWA: 10 mg/m <sup>3</sup> inhalable fraction TWA: 3 mg/m <sup>3</sup> respirable fraction	-
Zirconium 7440-67-7	STEL: 10 mg/m <sup>3</sup> STEL: 10 mg/m <sup>3</sup> Zr TWA: 5 mg/m <sup>3</sup> TWA: 5 mg/m <sup>3</sup> Zr	TWA: 5 mg/m <sup>3</sup> Zr (vacated) STEL: 10 mg/m <sup>3</sup> (vacated) STEL: 10 mg/m <sup>3</sup> Zr
Chromium 7440-47-3	TWA: 0.5 mg/m <sup>3</sup>	TWA: 1 mg/m <sup>3</sup>
Niobium (Columbium) 7440-03-1	-	-
Tin 7440-31-5	TWA: 2 mg/m <sup>3</sup> TWA: 2 mg/m <sup>3</sup> Sn except Tin hydride	TWA: 2 mg/m <sup>3</sup> Sn except oxides
Aluminum 7429-90-5	TWA: 1 mg/m <sup>3</sup> respirable fraction	TWA: 15 mg/m <sup>3</sup> total dust TWA: 5 mg/m <sup>3</sup> respirable fraction
Silicon	-	TWA: 15 mg/m <sup>3</sup> total dust

7440-21-3

TWA: 5 mg/m<sup>3</sup> respirable fraction**Appropriate engineering controls**

**Engineering Controls** Avoid generation of uncontrolled particles.

**Individual protection measures, such as personal protective equipment**

<b>Eye/face protection</b>	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.
<b>Skin and body protection</b>	Fire/flame resistant/retardant clothing may be appropriate during hot work with the product. Cut-resistant gloves and/or protective clothing may be appropriate when sharp surfaces are present.
<b>Respiratory protection</b>	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**

<b>Physical state</b>	Solid	<b>Odor</b>	Odorless
<b>Appearance</b>	Various massive product forms	<b>Odor threshold</b>	Not applicable
<b>Color</b>	Grey silver		
<b>Property</b>	<b>Values</b>	<b>Remarks • Method</b>	
pH	-		
Melting point/freezing point	1850 °C / 3370 °F		
Boiling point / boiling range	-		
Flash point	-		
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 this product	
<b>Flammability Limit in Air</b>			
Upper flammability limit:	-		
Lower flammability limit:	-		
Vapor pressure	-	Not applicable	
Vapor density	-	Not applicable	
Specific Gravity	6.49		
Water solubility	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		
<b>Other Information</b>			
Softening point	-		
Molecular weight	-		
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. Hexavalent Chromium (Chromium VI) may cause lung, nasal, and/or sinus cancer. Vanadium pentoxide (V<sub>2</sub>O<sub>5</sub>) affects eyes, skin, respiratory system. Soluble molybdenum compounds such as molybdenum trioxide may cause lung irritation.

## 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** Product not classified.

**Ingestion** Product not classified. 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	-	-
Vanadium 7440-62-2	> 2000 mg/kg bw	-	-
Molybdenum 7439-98-7	> 2000 mg/kg bw	> 2000 mg/kg bw	> 5.10 mg/L
Zirconium 7440-67-7	5000 mg/kg bw	-	>4.3 mg/L
Chromium 7440-47-3	> 3400 mg/kg bw	-	> 5.41 mg/L
Niobium (Columbium) 7440-03-1	> 10,000 mg/kg bw	> 2000 mg/kg bw	-
Tin 7440-31-5	> 2000 mg/kg bw	> 2000 mg/kg bw	> 4.75 mg/L
Aluminum 7429-90-5	15,900 mg/kg bw	-	> 1 mg/L
Silicon 7440-21-3	> 5000 mg/kg bw	> 5000 mg/kg bw	> 2.08 mg/L

**Information on toxicological effects**

**Symptoms** None known.

**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** Product not classified.  
**Germ cell mutagenicity** Product not classified.  
**Carcinogenicity** Product not classified.

Chemical Name	ACGIH	IARC	NTP	OSHA
Chromium 7440-47-3		Group 3		

**Reproductive toxicity** Product not classified.  
**STOT - single exposure** Product not classified.  
**STOT - repeated exposure** Product not classified.  
**Aspiration hazard** Product not classified.

## 12. ECOLOGICAL INFORMATION

**Ecotoxicity**

This product as shipped is not classified for aquatic toxicity.

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 <sub>2</sub> /L.	The 96 h LC50 of titanium dioxide to <i>Cyprinodon variegatus</i> was greater than 10,000 mg of TiO <sub>2</sub> /L. The 96 h LC50 of titanium dioxide to <i>Pimephales promelas</i> was greater than 1,000 mg of TiO <sub>2</sub> /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 <sub>2</sub> /L.
Vanadium 7440-62-2	The 72 h EC50 of vanadium pentoxide to <i>Desmodesmus subspicatus</i> was 2,907 ug of V/L.	The 96 h LC50 of vanadium pentoxide to <i>Pimephales promelas</i> was 1,850 ug 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 ug of V/L.
Molybdenum 7439-98-7	The 72 h EC50 of sodium molybdate dihydrate to <i>Pseudokirchnerella subcapitata</i> was 362.9 mg of Mo/L.	The 96 h LC50 of sodium molybdate dihydrate to <i>Pimephales promelas</i> was 644.2 mg/L.	The 3 h EC50 of molybdenum trioxide for activated sludge was 820 mg/L.	The 48 h LC50 of sodium molybdate dihydrate to <i>Ceriodaphnia dubia</i> was 1,015 mg/L. The 48 h LC50 of sodium molybdate dihydrate to <i>Daphnia magna</i> was greater than 1,727.8 mg/L.
Zirconium 7440-67-7	The 14 d NOEC of zirconium dichloride oxide to <i>Chlorella vulgaris</i> was greater than 102.5 mg of Zr/L.	The 96 h LL50 of zirconium to <i>Danio rerio</i> was greater than 74.03 mg/L.	-	The 48 h EC50 of zirconium dioxide to <i>Daphnia magna</i> was greater than 74.03 mg of Zr/L.
Chromium 7440-47-3	-	-	-	-
Niobium (Columbium) 7440-03-1	-	-	-	-
Tin 7440-31-5	The 72 h EC50 of tin chloride pentahydrate to <i>Pseudokirchnerella subcapitata</i> was 9,846 ug of Sn/L.	The 7 d LOEC of tin chloride pentahydrate to <i>Pimephales promelas</i> was 827.9 ug of Sn/L.	-	The 7 d LC50 of tin chloride pentahydrate to <i>Ceriodaphnia dubia</i> was greater than 3,200 ug of Sn/L.
Aluminum	The 96-h EC50 values for	The 96 h LC50 of aluminum	-	The 48-hr LC50 for

7429-90-5	reduction of biomass of Pseudokirchneriella subcapitata in AAP-Medium at pH 6, 7, and 8 were estimated as 20.1, 5.4, and 150.6 µg/L, respectively, for dissolved Al.	to Oncorhynchus mykiss was 7.4 mg of Al/L at pH 6.5 and 14.6 mg of Al/L at pH 7.5		Ceriodaphnia dubia exposed to Aluminium chloride increased from 0.72 to greater than 99.6 mg/L with water hardness increasing from 25 to 200 mg/L.
Silicon 7440-21-3	The 72 h EC50 of sodium metasilicate pentahydrate to Pseudokirchnerella subcapitata was greater than 250 mg/L.	-	-	-

**Persistence and degradability**

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**Bioaccumulation**

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**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.

Chemical Name	RCRA - D Series Wastes
Chromium 7440-47-3	5.0 mg/L regulatory level

This product contains one or more substances that are listed with the State of California as a hazardous waste.

**14. TRANSPORT INFORMATION**

**DOT** Not regulated

**15. REGULATORY INFORMATION****International Inventories**

<b>TSCA</b>	Complies
<b>DSL/NDL</b>	Complies
<b>EINECS/ELINCS</b>	Complies
<b>ENCS</b>	Complies
<b>IECSC</b>	Complies
<b>KECL</b>	Complies
<b>PICCS</b>	Complies
<b>AICS</b>	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

**US Federal Regulations****SARA 313**

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical Name	CAS No.	Weight-%	SARA 313 - Threshold Values %
Chromium - 7440-47-3	7440-47-3	0-18	1.0

**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 contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

Chemical Name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Chromium 7440-47-3		X	X	

**CERCLA**

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Chemical Name	Hazardous Substances RQs
Chromium 7440-47-3	5000 lb

**US State Regulations****California Proposition 65**

This product does not contain any Proposition 65 chemicals

**U.S. State Right-to-Know Regulations**

Chemical Name	New Jersey	Massachusetts	Pennsylvania
Titanium 7440-32-6	X		
Vanadium 7440-62-2	X	X	X
Molybdenum 7439-98-7	X	X	X
Zirconium 7440-67-7	X	X	X
Chromium 7440-47-3	X	X	X
Tin 7440-31-5	X	X	X
Aluminum 7429-90-5	X	X	X
Silicon 7440-21-3	X	X	X

**U.S. EPA Label Information**

EPA Pesticide Registration Number Not applicable



<b>16. OTHER INFORMATION</b>
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<b>NFPA</b>	Health hazards 0	Flammability 0	Instability 0	Physical and Chemical Properties -
<b>HMIS</b>	Health hazards 1*	Flammability 0	Physical hazards 0	Personal protection X
<i>Chronic Hazard Star Legend</i>	<i>* = Chronic Health Hazard</i>			

**Issue Date** 28-May-2015

**Revision Date** 21-Nov-2016

**Revision Note**

SDS sections updated: 6, 7

**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.

**End of Safety Data Sheet**

**Additional information available from:** Safety data sheets and labels available at ATImetals.com