



# SAFETY DATA SHEET

Issue Date 17-Jul-2014

Revision Date 03-Jan-2019

Version \*

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

### Product identifier

**Product Name** Titanium Alloy With Cobalt Non-Respirable Powder

### Other means of identification

**Product Code** PM005

**Synonyms** Titanium Alloy With Cobalt Non-Respirable Powder: - TNM Co Powder

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

**Recommended Use** Titanium 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 considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Respiratory sensitization	Category 1B
Skin sensitization	Category 1
Carcinogenicity	Category 1B
Chronic aquatic toxicity	Category 3

### Label elements

#### Emergency Overview

#### **Danger**

#### **Hazard statements**

May cause allergy or asthma symptoms or breathing difficulties if inhaled

May cause an allergic skin reaction

May cause cancer

Harmful to aquatic life with long lasting effects



**Appearance** Powder

**Physical state** Solid

**Odor** Odorless

**Precautionary Statements - Prevention**

Do not handle until all safety precautions have been read and understood  
 Use personal protective equipment as required  
 Wear protective gloves  
 Avoid breathing dust/fume  
 In case of inadequate ventilation wear respiratory protection  
 Avoid release to the environment

**Precautionary Statements - Response**

Wash contaminated clothing before reuse  
 If skin irritation or rash occurs: Get medical advice/attention  
 If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician

**Precautionary Statements - Disposal**

Dispose of contents/container to an approved waste disposal plant

**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, Soluble molybdenum compounds such as molybdenum trioxide may cause lung irritation.

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

**Synonyms** Titanium Alloy With Cobalt Non-Respirable Powder: - TNM Co Powder.

Chemical Name	CAS No.	Weight-%
Titanium	7440-32-6	50 - 100
Aluminum	7429-90-5	0 - 40
Niobium (Columbium)	7440-03-1	0 - 27
Chromium	7440-47-3	0 - 10
Molybdenum	7439-98-7	0 - 10
Tungsten	7440-33-7	0 - 10
Zirconium	7440-67-7	0 - 5
Cobalt	7440-48-4	0.1 - 2
Boron	7440-42-8	0 - 1

**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 allergic reactions see a physician. Wash off immediately with soap and plenty of water.

**Inhalation** If excessive amounts of smoke, fume, or particulate are inhaled during processing, remove to fresh air and consult a qualified health professional. In the case of asthma symptoms or breathing difficulties call a physician.

**Ingestion** IF SWALLOWED. Call a POISON CENTER or doctor/physician if you feel unwell.

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

**Symptoms** May cause allergic skin reaction. May cause allergy or asthma symptoms or breathing

difficulties if inhaled.

**Indication of any immediate medical attention and special treatment needed**

**Note to physicians** Treat symptomatically.

**5. FIRE-FIGHTING MEASURES**

**Suitable extinguishing media**

Product not flammable in the form as distributed, flammable as finely divided particles or pieces resulting from processing of this product. Isolate large fires and allow to burn out. Smother small fires 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, 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**

Firefighters should wear self-contained breathing apparatus and full firefighting turnout 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. Follow Emergency Response Guidebook, Guide No. 171, EXCEPT for FIRE follow Emergency Response Guidebook, Guide No. 170.

**Environmental precautions**

**Environmental precautions** Collect spillage to prevent release to the environment.

**Methods and material for containment and cleaning up**

**Methods for containment** Prevent further leakage or spillage if safe to do so.

**Methods for cleaning up** Sweep or shovel material into dry containers. Avoid creating uncontrolled dust.

**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 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**

Chemical Name	ACGIH TLV	OSHA PEL
Titanium 7440-32-6	-	-
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
Niobium (Columbium) 7440-03-1	-	-
Tungsten 7440-33-7	STEL: 10 mg/m <sup>3</sup> STEL: 10 mg/m <sup>3</sup> W TWA: 5 mg/m <sup>3</sup> TWA: 5 mg/m <sup>3</sup> W	(vacated) STEL: 10 mg/m <sup>3</sup> (vacated) STEL: 10 mg/m <sup>3</sup> W
Molybdenum 7439-98-7	TWA: 10 mg/m <sup>3</sup> inhalable fraction TWA: 3 mg/m <sup>3</sup> respirable fraction	-
Chromium 7440-47-3	TWA: 0.5 mg/m <sup>3</sup>	TWA: 1 mg/m <sup>3</sup>
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
Cobalt 7440-48-4	TWA: 0.02 mg/m <sup>3</sup> TWA: 0.02 mg/m <sup>3</sup> Co	TWA: 0.1 mg/m <sup>3</sup> dust and fume
Boron 7440-42-8	-	-

**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** Wear protective gloves. Fire/flame resistant/retardant clothing may be appropriate during hot work with the product.

**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**

<b>Physical state</b>	Solid	<b>Odor</b>	Odorless
<b>Appearance</b>	Powder	<b>Odor threshold</b>	Not applicable
<b>Color</b>	metallic gray or silver		

<u>Property</u>	<u>Values</u>	<u>Remarks • Method</u>
pH	-	
Melting point/freezing point	1400 - 1540 °C / 2560-2800 °F	
Boiling point / boiling range	-	
Flash point	-	
Evaporation rate	-	
Flammability (solid, gas)	-	Product not flammable in the form as distributed, flammable as finely divided particles or pieces resulting from processing of this product
<b>Flammability Limit in Air</b>		Not applicable
Upper flammability limit:	-	
Lower flammability limit:	-	
Vapor pressure	-	Not applicable
Vapor density	-	Not applicable
Specific Gravity	8.0-8.5	
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><u>Other Information</u></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. Soluble molybdenum compounds such as molybdenum trioxide may cause lung irritation.

**11. TOXICOLOGICAL INFORMATION**

Information on likely routes of exposure

**Product Information**

**Inhalation** Cobalt-containing alloys may cause sensitization by inhalation. May cause cancer by inhalation.

**Eye contact** Product not classified.

**Skin Contact** Nickel or Cobalt containing alloys may cause sensitization by skin contact.

**Ingestion** Product not classified.

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
Niobium (Columbium) 7440-03-1	> 10,000 mg/kg bw	> 2000 mg/kg bw	-
Tungsten 7440-33-7	> 2000 mg/kg bw	> 2000 mg/kg bw	> 5.4 mg/L
Molybdenum 7439-98-7	> 2000 mg/kg bw	> 2000 mg/kg bw	> 5.10 mg/L
Chromium 7440-47-3	> 3400 mg/kg bw	-	> 5.41 mg/L
Zirconium 7440-67-7	> 5000 mg/kg bw	-	>4.3 mg/L
Cobalt 7440-48-4	550 mg/kg bw	>2000 mg/kg bw	<0.05 mg/L
Boron 7440-42-8	> 2000 mg/kg bw	-	> 5.08 mg/L

Information on toxicological effects

**Symptoms** Nickel or Cobalt containing alloys may cause sensitization by skin contact. May cause allergy or asthma symptoms or breathing difficulties if inhaled.

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

**Acute toxicity** Cobalt-containing powders may be harmful if inhaled.

**Skin corrosion/irritation** Product not classified.

**Serious eye damage/eye irritation** Product not classified.

**Sensitization** Nickel or Cobalt containing alloys may cause sensitization by skin contact. Cobalt-containing alloys may cause sensitization by inhalation.

**Germ cell mutagenicity** Product not classified.

**Carcinogenicity** May cause cancer by inhalation.

Chemical Name	ACGIH	IARC	NTP	OSHA
Chromium 7440-47-3		Group 3		
Cobalt 7440-48-4	A3	Group 2A Group 2B	Known	X

**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 classified for aquatic chronic 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.
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 µg/L, respectively, for dissolved Al.	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.
Niobium (Columbium) 7440-03-1	-	-	-	-
Tungsten 7440-33-7	The 72 h EC50 of sodium tungstate to <i>Pseudokirchnerella subcapitata</i> was 31.0 mg of W/L.	The 96 h LC50 of sodium tungstate to <i>Danio rerio</i> was greater than 106 mg of W/L.	The 30 min EC50 of sodium tungstate for activated sludge were greater than 1000 mg/L.	The 48 h EC50 of sodium tungstate to <i>Daphnia magna</i> was greater than 96 mg of W/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.
Chromium 7440-47-3	-	-	-	-
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.
Cobalt 7440-48-4	The 72 h EC50 of cobalt dichloride to <i>Pseudokirchnerella subcapitata</i> was 144 µg of Co/L.	The 96h LC50 of cobalt dichloride ranged from 1.5 mg Co/L for <i>Oncorhynchus mykiss</i> to 85 mg Co/L for <i>Danio rerio</i> .	The 3 h EC50 of cobalt dichloride for activated sludge was 120 mg of Co/L.	The 48 h LC50 of cobalt dichloride ranged from 0.61 mg Co/L for <i>Ceriodaphnia dubia</i> tested in soft, DOM-free water to >1800mg Co/L for <i>Tubifex tubifex</i> in very hard water.
Boron 7440-42-8	The 72-h EC50 value for reduction of biomass of <i>Pseudokirchnerella subcapitata</i> exposed to Boric acid at pH 7.5 to 8.3 was 40.2 mg/L.	The 96-hr LC50 for <i>Pimephales promelas</i> exposed to Boric acid (82%)/borax (18%) mixture was 79.7 mg/L with water hardness of 91 mg/L and water pH of 8.0.	The 3 h NOEC of boric acid for activated sludge ranged from 17.5 to 20 mg/L.	The 48-hr LC50 for <i>Ceriodaphnia dubia</i> exposed to Boric acid/borax mixture ranged from 91 to 165 mg/L with pH ranging from 6.7 to 8.4.

**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** Disposal should be in accordance with applicable regional, national and local laws and regulations.

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** Regulated per 49 CFR, if quantity in an individual package equals or exceeds the reportable quantity(RQ) of 5000 pounds of chromium, 5000 pounds of copper, 100 pounds of nickel

**Proper shipping name** UN/ID No. 3077 Environmentally hazardous substance, solid, n.o.s. (nickel alloy powder), RQ

**Hazard Class** 9

**Packing Group** III

**Special Provisions** 8, 146, 335, A112, B54, B120, IB8, IP3, N20, N91, T1, TP33

**Emergency Response Guide Number** Guide No. 171, Except for FIRE follow Guide No. 170

**15. REGULATORY INFORMATION**

**International Inventories**

**TSCA** Complies

**DSL/NDSL** Complies

**EINECS/ELINCS** Complies

**ENCS** Complies

**IECSC** Complies

**KECL** Complies

**PICCS** Not Listed

**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 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 - 10	1.0



Cobalt - 7440-48-4	7440-48-4	0.1 - 2	0.1
--------------------	-----------	---------	-----

**SARA 311/312 Hazard Categories**

Acute health hazard	Yes
Chronic Health Hazard	Yes
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 contains the Proposition 65 chemicals listed below. Proposition 65 warning label available at ATImetals.com.

Chemical Name	California Proposition 65
Cobalt - 7440-48-4	Carcinogen

**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
Tungsten 7440-33-7	X	X	X
Molybdenum 7439-98-7	X	X	X
Chromium 7440-47-3	X	X	X
Zirconium 7440-67-7	X	X	X
Cobalt 7440-48-4	X	X	X

**U.S. EPA Label Information**

EPA Pesticide Registration Number Not applicable

**16. OTHER INFORMATION**

<b>NFPA</b>	Health hazards 1	Flammability 0	Instability 0	Physical and Chemical Properties -
<b>HMIS</b>	Health hazards 2*	Flammability 1	Physical hazards 0	Personal protection X
<i>Chronic Hazard Star Legend</i>	<i>* = Chronic Health Hazard</i>			

Issue Date 17-Jul-2014

**Revision Date** 03-Jan-2019

**Revision Note**

Updated Section(s): 2, 3, 4, 5, 7, 8, 9, 15

**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](http://ATImetals.com)