SAFETY DATA SHEET

Issue Date 28-May-2015 **Revision Date** 27-Apr-2021 **Version** 7

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

1.1. Product identifier

Product Code PM015
Product Name Nickel/Cobalt Alloy Non-Respirable Powder

UN/ID no 3077
Synonyms Nickel / Cobalt Alloy Non-Respirable Powder, including but not limited to: ATI Ni-15Co PM™ Powder, ATI 247LC™ Powder, ATI 718Plus® Alloy Powder, ATI LR PM™ Powder, ATI® Astroloy PM Powder, ATI 10 PM™ Powder, ATI Rene 95™ Powder, ATI 939 Alloy Powder, ATI 720 PM™Powder, ATI GTD-222™ Alloy Powder, Rene 65™ Alloy Powder, Rene 88DT Powder, ATI ME16 Powder, Waspalloy Powder, and MISC-N Powder

Contains Cobalt, Nickel

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

Recommended Use Alloy product manufacture

Uses advised against

1.3. Details of the supplier of the safety data sheet

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

1.4. Emergency telephone number

Emergency Telephone Chemtrec: +1-703-741-5970

Section 2: HAZARDS IDENTIFICATION

This material is classified per Regulation (EC) No 1272/2008.

2.1. Classification of the substance or mixture

Regulation (EC) No 1272/2008

Acute toxicity - Oral	Category 4
Serious eye damage/eye irritation	Category 2
Respiratory sensitisation	Category 1
Skin sensitisation	Category 1
Germ cell mutagenicity	Category 2
Carcinogenicity	Category 1B
Reproductive toxicity	Category 1B
Specific target organ toxicity — repeated exposure	Category 1
Acute aquatic toxicity	Category 1
Chronic aquatic toxicity	Category 1

2.2. Label elements

Emergency Overview

Danger

Hazard statements

Harmful if swallowed
Causes serious eye irritation
May cause allergy or asthma symptoms or breathing difficulties if inhaled
May cause an allergic skin reaction
May cause cancer
Suspected of causing genetic defects
May damage fertility or the unborn child
Causes damage to the respiratory tract through prolonged or repeated exposure if inhaled
Very toxic to aquatic life
Very toxic to aquatic life with long lasting effects

Appearance Powder **Physical state** Solid **Odour** Odourless

Precautionary Statements - Prevention
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wear protective gloves
Wash hands thoroughly after handling
Do not eat, drink or smoke when using this product
Avoid breathing dust/fume
In case of inadequate ventilation wear respiratory protection
Avoid release to the environment
IF ON SKIN: Wash with plenty of soap and water

Precautionary Statements - Response
Collect spillage
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
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention

Precautionary Statements - Disposal
Dispose of contents/container to an approved waste disposal plant

2.3 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 (V2O5) affects eyes, skin, respiratory system. Soluble molybdenum compounds such as molybdenum trioxide may cause lung irritation.

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms Nickel / Cobalt Alloy Non-Respirable Powder, including but not limited to: ATI Ni-15Co PM™ Powder, ATI 247LC™ Powder, ATI 718Plus® Alloy Powder, ATI LR PM™ Powder,

ATI® Astroloy PM Powder, ATI 10 PM™ Powder, ATI Rene 95™ Powder, ATI 939 Alloy Powder, ATI 720 PM™Powder, ATI GTD-222™ Alloy Powder, Rene 65™ Alloy Powder, Rene 88DT Powder, ATI ME16 Powder, Waspalloy Powder, and MISC-N Powder.

Chemical Name	EC No	CAS No	Weight-%
Nickel	231-111-4	7440-02-0	49 - 68
Chromium	231-157-5	7440-47-3	0 - 32
Cobalt	213-158-0	7440-48-4	2.5 - 25
Iron	231-096-4	7439-89-6	0 - 19
Tungsten	231-143-9	7440-33-7	0 - 10
Niobium	231-113-5	7440-03-1	0 - 10
Molybdenum	231-107-2	7439-98-7	0 - 10
Titanium	231-142-3	7440-32-6	0 - 6
Tantalum	231-135-5	7440-25-7	0 - 6
Aluminium	231-072-3	7429-90-5	0 - 6
Vanadium	231-171-1	7440-62-2	0 - 2
Hafnium	231-166-4	7440-58-6	0 - 2

Section 4: FIRST AID MEASURES

4.1. Description of first aid measures

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 doctor:

Skin Contact In the case of skin allergic reactions see a doctor. Wash off immediately with soap and plenty of water.

Eye contact In the case of particles coming in contact with eyes during processing, treat as with any foreign object.

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

4.2. 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. May cause acute gastrointestinal effects if swallowed.

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

Note to doctors Treat symptomatically.

Section 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

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).

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

5.2. Special hazards arising from the substance or mixture

Intense heat. Very fine, high surface area material resulting from processing this product may ignite spontaneously at room temperature WARNING: Fine particles 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 minimise 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.

5.3. Advice for firefighters

Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear.

Section 6: ACCIDENTAL RELEASE MEASURES

6.1. 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.

6.2. Environmental precautions

Collect spillage to prevent release to the environment.

6.3. 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.

6.4. Reference to other sections

See Section 12: ECOLOGICAL INFORMATION.

Section 7: HANDLING AND STORAGE

7.1. 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 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 minimise combustible dust hazard.

General Hygiene Considerations
Handle in accordance with good industrial hygiene and safety practice.

7.2. 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.

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	European Union	United Kingdom	France	Spain	Germany
Nickel 7440-02-0	-	STEL: 1.5 mg/m³ TWA: 0.5 mg/m³	TWA: 1 mg/m³	TWA: 1 mg/m³	Skin
Chromium 7440-47-3	TWA: 2 mg/m³	STEL: 1.5 mg/m³ TWA: 0.5 mg/m³	TWA: 2 mg/m³	TWA: 2 mg/m³	TWA: 2 mg/m³
Cobalt 7440-48-4	-	STEL: 0.3 mg/m³ TWA: 0.1 mg/m³	-	TWA: 0.02 mg/m³	Skin
Iron 7439-89-6	-	-	-	-	-
Tungsten 7440-33-7	-	STEL: 10 mg/m³ TWA: 5 mg/m³	-	STEL: 10 mg/m³ TWA: 5 mg/m³	-
Niobium 7440-03-1	-	-	-	-	-
Molybdenum 7439-98-7	-	-	-	TWA: 10 mg/m³ TWA: 3 mg/m³	-
Titanium 7440-32-6	-	-	-	-	-
Tantalum 7440-25-7	-	STEL: 10 mg/m³ TWA: 5 mg/m³	TWA: 5 mg/m³	TWA: 5 mg/m³	TWA: 4 mg/m³ TWA: 1.5 mg/m³
Aluminium 7429-90-5	-	STEL: 30 mg/m³ STEL: 12 mg/m³ TWA: 10 mg/m³ TWA: 4 mg/m³	TWA: 10 mg/m³ TWA: 5 mg/m³	TWA: 10 mg/m³ TWA: 5 mg/m³	TWA: 4 mg/m³ TWA: 1.5 mg/m³
Vanadium 7440-62-2	-	-	-	-	Skin
Hafnium 7440-58-6	-	-	TWA: 0.5 mg/m³	TWA: 0.5 mg/m³	-
Chemical Name	**Italy**	**Portugal**	**Netherlands**	**Finland**	**Denmark**
Nickel 7440-02-0	-	TWA: 1.5 mg/m³	-	TWA: 1 mg/m³ TWA: 0.1 mg/m³	TWA: 0.05 mg/m³
Chromium 7440-47-3	TWA: 0.5 mg/m³	TWA: 0.5 mg/m³	TWA: 0.5 mg/m³	TWA: 0.5 mg/m³	TWA: 0.5 mg/m³
Cobalt 7440-48-4	-	TWA: 0.02 mg/m³	TWA: 0.02 mg/m³	TWA: 0.02 mg/m³	TWA: 0.01 mg/m³
Iron 7439-89-6	-	-	-	-	-
Tungsten 7440-33-7	-	STEL: 10 mg/m³ TWA: 5 mg/m³	-	TWA: 5 mg/m³	TWA: 5 mg/m³
Niobium 7440-03-1	-	-	-	-	TWA: 5 mg/m³ TWA: 0.5 mg/m³
Molybdenum 7439-98-7	-	TWA: 10 mg/m³ TWA: 3 mg/m³	-	TWA: 0.5 mg/m³	-
Titanium 7440-32-6	-	-	-	-	-
Tantalum 7440-25-7	-	TWA: 5 mg/m³	-	TWA: 5 mg/m³	TWA: 5 mg/m³
Aluminium 7429-90-5	-	TWA: 10 mg/m³ TWA: 5 mg/m³	TWA: 0.05 mg/m³	TWA: 1.5 mg/m³	TWA: 5 mg/m³ TWA: 2 mg/m³
Vanadium 7440-62-2	-	-	-	-	-
Hafnium 7440-58-6	-	TWA: 0.5 mg/m³	-	TWA: 0.5 mg/m³	TWA: 0.5 mg/m³
Chemical Name	**Austria**	**Switzerland**	**Poland**	**Norway**	**Ireland**
Nickel 7440-02-0	-	TWA: 0.5 mg/m³	TWA: 0.25 mg/m³	TWA: 0.05 mg/m³ STEL: 0.15 mg/m³	TWA: 0.5 mg/m³
Chromium 7440-47-3	TWA: 2 mg/m³	TWA: 0.5 mg/m³	TWA: 0.5 mg/m³	TWA: 0.5 mg/m³ STEL: 1.5 mg/m³	TWA: 2 mg/m³
Cobalt 7440-48-4	Skin	Skin TWA: 0.05 mg/m³	STEL: 0.2 mg/m³ TWA: 0.02 mg/m³	TWA: 0.02 mg/m³ STEL: 0.06 mg/m³	TWA: 0.1 mg/m³
Iron 7439-89-6	-	-	-	-	-
Tungsten	STEL 10 mg/m³	TWA: 5 mg/m³	TWA: 5 mg/m³	TWA: 5 mg/m³	TWA: 5 mg/m³

7440-33-7	TWA: 5 mg/m³			STEL: 10 mg/m³	STEL: 10 mg/m³
Niobium 7440-03-1	STEL 10 mg/m³ STEL 1 mg/m³ TWA: 5 mg/m³ TWA: 0.5 mg/m³	-	-	-	-
Molybdenum 7439-98-7	STEL 20 mg/m³ TWA: 10 mg/m³	TWA: 10 mg/m³	STEL: 10 mg/m³ TWA: 4 mg/m³	-	TWA: 0.5 mg/m³
Titanium 7440-32-6	-	-	STEL: 30 mg/m³ TWA: 10 mg/m³	-	-
Tantalum 7440-25-7	TWA: 5 mg/m³	TWA: 5 mg/m³	TWA: 5 mg/m³	-	TWA: 5 mg/m³ STEL: 10 mg/m³
Aluminium 7429-90-5	STEL 20 mg/m³ TWA: 10 mg/m³	TWA: 3 mg/m³	TWA: 2.5 mg/m³ TWA: 1.2 mg/m³	TWA: 5 mg/m³ STEL: 10 mg/m³	TWA: 1 mg/m³ TWA: 5 mg/m³
Vanadium 7440-62-2	STEL 1 mg/m³ TWA: 0.5 mg/m³	-	-	TWA: 0.2 mg/m³ Ceiling: 0.05 mg/m³ STEL: 0.6 mg/m³	-
Hafnium 7440-58-6	STEL 5 mg/m³ TWA: 0.5 mg/m³	TWA: 0.5 mg/m³	TWA: 0.5 mg/m³	TWA: 0.5 mg/m³ STEL: 1.5 mg/m³	TWA: 0.5 mg/m³ STEL: 1.5 mg/m³

Derived No Effect Level (DNEL) No DNELs are available for this product as a whole

Predicted No Effect Concentration (PNEC) No PNECs are available for this product as a whole.

8.2. Exposure controls

Engineering Controls Avoid generation of uncontrolled particles.

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.

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 contaminate concentrations. Respiratory protection must be provided in accordance with current local regulations.

Environmental exposure controls Section 6: ACCIDENTAL RELEASE MEASURES.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Physical state	Solid		
Appearance	Powder	**Odour**	Odourless
Colour	metallic grey or Silver	**Odour threshold**	Not applicable

Property	**Values**	**Remarks • Method**
pH	-	Not applicable
Melting point / freezing point	1400-1540 °C / 2560-2800 °F	
Boiling point / boiling range	-	
Flash point	-	
Evaporation rate	-	Not applicable
Flammability (solid, gas)	-	Product not flammable in the form as distributed, flammable as finely divided particles or pieces resulting from processing of this product
Flammability Limit in Air		
Upper flammability limit:		-
Lower flammability limit		-
Vapour pressure	-	Not applicable
Vapour density	-	Not applicable

Specific Gravity	8.0-8.5	
Water solubility	Insoluble	
Solubility(ies)		
Partition coefficient	-	Not applicable
Autoignition temperature	-	Not applicable
Decomposition temperature	-	Not applicable
Kinematic viscosity	-	Not applicable
Dynamic viscosity	-	Not applicable
Explosive properties	Not applicable	
Oxidising properties	Not applicable	

9.2. Other information

Softening point	-
Molecular weight	-
VOC Content (%)	Not applicable
Density	-
Bulk density	-

Section 10: STABILITY AND REACTIVITY

10.1. Reactivity

Not applicable

10.2. Chemical stability

Stable under normal conditions.

Explosion data

Sensitivity to Mechanical Impact	None.
Sensitivity to Static Discharge	None.

10.3. Possibility of hazardous reactions

Hazardous polymerisation
Hazardous polymerisation does not occur.

Possibility of Hazardous Reactions
None under normal processing.

10.4. Conditions to avoid

Dust formation and dust accumulation.

10.5. 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.

10.6. 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_2O_5) affects eyes, skin, respiratory system. Soluble molybdenum compounds such as molybdenum trioxide may cause lung irritation.

Section 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Product Information

Inhalation May cause cancer. Cobalt-containing alloys may cause sensitization by inhalation. Causes damage to the respiratory tract through prolonged or repeated exposure if inhaled.

Eye contact Causes serious eye irritation.

Skin Contact May cause sensitisation by skin contact.

Ingestion Harmful if swallowed.

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
Nickel	> 9000 mg/kg bw	-	> 10.2 mg/L
Chromium	> 3400 mg/kg bw	-	> 5.41 mg/L
Cobalt	550 mg/kg bw	>2000 mg/kg bw	<0.05 mg/L
Iron	98,600 mg/kg bw	-	> 0.25 mg/L
Tungsten	> 2000 mg/kg bw	> 2000 mg/kg bw	> 5.4 mg/L
Niobium	> 10,000 mg/kg bw	> 2000 mg/kg bw	-
Molybdenum	> 2000 mg/kg bw	> 2000 mg/kg bw	> 5.10 mg/L
Titanium	> 5000 mg/kg bw	-	-
Tantalum	> 2000 mg/kg bw	> 2000 mg/kg bw	> 5.18 mg/L
Aluminium	15,900 mg/kg bw	-	> 1 mg/L
Vanadium	> 2000 mg/kg bw	-	-
Hafnium	> 5000 mg/kg bw	-	>4.3mg/L

Information on toxicological effects

Symptoms May cause sensitisation by skin contact. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause acute gastrointestinal effects if swallowed.

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

Acute toxicity Harmful if swallowed. Cobalt-containing powders may be fatal if inhaled.

Skin corrosion/irritation Product not classified.

Serious eye damage/eye irritation Causes serious eye irritation.

Sensitisation May cause sensitisation by skin contact. Cobalt-containing alloys may cause sensitization by inhalation.

Germ cell mutagenicity Contains a suspected mutagen.

Carcinogenicity May cause cancer.

Chemical Name	ACGIH	IARC	NTP	OSHA
Nickel 7440-02-0		Group 1 Group 2B	Known Reasonably Anticipated	X
Chromium 7440-47-3		Group 3		
Cobalt 7440-48-4	A3	Group 2A Group 2B	Known	X

Reproductive toxicity Contains a known or suspected reproductive toxin.

STOT - single exposure Product not classified.

STOT - repeated exposure Causes disorder and damage to the: Respiratory System.

Aspiration hazard Product not classified.

Section 12: ECOLOGICAL INFORMATION

12.1. Toxicity

This material meets the definition of a marine pollutant.

This product as shipped is classified for aquatic acute toxicity. This product as shipped is classified for aquatic chronic toxicity.

Chemical Name	Algae/aquatic plants	Fish	Toxicity to microorganisms	Crustacea
Nickel	NOEC/EC10 values range from 12.3 µg/l for Scenedesmus accuminatus to 425 µg/l for Pseudokirchneriella subcapitata.	The 96h LC50s values range from 0.4 mg Ni/L for Pimephales promelas to 320 mg Ni/L for Brachydanio rerio.	The 30 min EC50 of nickel for activated sludge was 33 mg Ni/L.	The 48h LC50s values range from 0.013 mg Ni/L for Ceriodaphnia dubia to 4970 mg Ni/L for Daphnia magna.
Chromium	-	-	-	-
Cobalt	The 72 h EC50 of cobalt dichloride to Pseudokirchneriella subcapitata was 144 ug of Co/L.	The 96h LC50 of cobalt dichloride ranged from 1.5 mg Co/L for Oncorhynchus mykiss to 85 mg Co/L for Danio rerio.	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 Ceriodaphnia dubia tested in soft, DOM-free water to >1800mg Co/L for Tubifex tubifex in very hard water.
Iron	-	The 96 h LC50 of 50% iron oxide black in water to Danio rerio 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 Daphnia magna was greater than 100 mg/L.
Tungsten	The 72 h EC50 of sodium tungstate to Pseudokirchnerella subcapitata was 31.0 mg of W/L.	The 96 h LC50 of sodium tungstate to Danio rerio 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 Daphnia magna was greater than 96 mg of W/L.
Niobium	-	-	-	-
Molybdenum	The 72 h EC50 of sodium molybdate dihydrate to Pseudokirchneriella subcapitata was 362.9 mg of Mo/L.	The 96 h LC50 of sodium molybdate dihydrate to Pimephales promelas 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 Ceriodaphnia dubia was 1,015 mg/L. The 48 h LC50 of sodium molybdate dihydrate to Daphnia magna was greater than 1,727.8 mg/L.
Titanium	The 72 h EC50 of titanium dioxide to Pseudokirchnerella subcapitata was 61 mg of TiO2/L.	The 96 h LC50 of titanium dioxide to Cyprinodon variegatus was greater than 10,000 mg of TiO2/L. The 96 h LC50 of titanium dioxide to Pimephales promelas was greater than 1,000 mg of TiO2/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 Daphnia Magna was greater than 1000 mg of TiO2/L.
Tantalum	-	-	-	-
Aluminium	The 96-h EC50 values for 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.	The 96 h LC50 of aluminum 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	-	The 48-hr LC50 for 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.
Vanadium	The 72 h EC50 of vanadium pentoxide to Desmodesmus subspicatus was 2,907 ug of V/L.	The 96 h LC50 of vanadium pentoxide to Pimephales promelas 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 Daphnia magna was 2,661 ug of V/L.
Hafnium	The 72 h EC50 of hafnium to Pseudokirchneriella subcapitata was great than 8 ug of Hf/L (100% saturated solution).	The 96 h LC50 of Hafnium dioxide in water to Danio rerio was greater than the solubility limit of 0.007 mg Hf/L .	-	The 48 h EC50 of Hafnium dioxide to Daphnia magna was greater than the solubility limit of 0.007 mg Hf/L.

12.2. Persistence and degradability

12.3. Bioaccumulative potential

12.4. Mobility in soil

12.5. Results of PBT and vPvB assessment

The PBT and vPvB criteria do not apply to inorganic substances.

12.6. Other adverse effects

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.

Section 14: TRANSPORT INFORMATION

IMDG

14.1 UN/ID no	3077
14.2 Proper shipping name	Environmentally hazardous substance, solid, n.o.s. (cobalt alloy powder)
14.3 Hazard Class	9
14.4 Packing Group	III
14.5 Marine pollutant	This material meets the definition of a marine pollutant.
Environmental hazard	Yes
14.6 Special Provisions	8, 146, 335, A112, B54, B120, IB8, IP3, N20, N91, T1, TP33
14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code	-

RID

14.1 UN/ID no	3077
14.2 Proper shipping name	Environmentally hazardous substance, solid, n.o.s. (cobalt alloy powder)
14.3 Hazard Class	9
14.4 Packing Group	III
14.5 Environmental hazard	Yes
14.6 Special Provisions	8, 146, 335, A112, B54, B120, IB8, IP3, N20, N91, T1, TP33

ADR

14.1 UN/ID no	3077
14.2 Proper shipping name	Environmentally hazardous substance, solid, n.o.s. (cobalt alloy powder)
14.3 Hazard Class	9
Subsidiary hazard class	6.1
14.4 Packing Group	III
14.5 Environmental hazard	Yes
14.6 Special Provisions	8, 146, 335, A112, B54, B120, IB8, IP3, N20, N91, T1, TP33

ICAO (air)

14.1 UN/ID no	3077
14.2 Proper shipping name	Environmentally hazardous substance, solid, n.o.s. (cobalt alloy powder)
14.3 Hazard Class	9
14.4 Packing Group	III

14.5 Environmental hazard Yes
14.6 Special Provisions 8, 146, 335, A112, B54, B120, IB8, IP3, N20, N91, T1, TP33

IATA
14.1 UN/ID no 3077
14.2 Proper shipping name Environmentally hazardous substance, solid, n.o.s. (cobalt alloy powder)
14.3 Hazard Class 9
14.4 Packing Group III
Description -
14.5 Environmental hazard Yes
14.6 Special Provisions 8, 146, 335, A112, B54, B120, IB8, IP3, N20, N91, T1, TP33 171, EXCEPT for Fire follow ERG 170 **ERG Code**

Section 15: REGULATORY INFORMATION

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

Chemical Name	French RG number	Title
Nickel 7440-02-0	RG 37ter	-
Chromium 7440-47-3	RG 10	-
Cobalt 7440-48-4	RG 65,RG 70,RG 70bis,RG 70ter	-
Iron 7439-89-6	RG 44,RG 44bis,RG 94	-
Tungsten 7440-33-7	-	-
Niobium 7440-03-1	-	-
Molybdenum 7439-98-7	-	-
Titanium 7440-32-6	-	-
Tantalum 7440-25-7	-	-
Aluminium 7429-90-5	RG 32 RG 16,RG 16bis	-
Vanadium 7440-62-2	RG 66	-
Hafnium 7440-58-6	-	-

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

Authorisations and/or restrictions on use:
This product does not contain substances subject to authorisation (Regulation (EC) No. 1907/2006 (REACH), Annex XIV). This product contains one or more substance(s) subject to restriction (Regulation (EC) No. 1907/2006 (REACH), Annex XVII): Non-articles restricted to professional users.

Chemical Name	Restricted substance per REACH Annex XVII	Substance subject to authorisation per REACH Annex XIV
Cobalt - 7440-48-4	Cobalt - 231-158-0	

International Inventories
DSL/NDSL Complies
EINECS/ELINCS Complies
ENCS Complies

IECSC	Complies
KECL	Complies
PICCS	Not Listed
AICS	Not Listed

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

15.2. Chemical safety assessment

No chemical safety assessment has been performed for this product.

Section 16: OTHER INFORMATION

Issue Date	28-May-2015
Revision Date	27-Apr-2021
Revision Note	SDS sections updated: 1, 2, 3, 11, 14.

This material safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006

Note:
The information provided in this Material 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