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

1.1. Product identifier

Product Code  PM004
Product Name  Nickel Alloy Compacts

Synonyms  Nickel Alloy Compacts: - Alloy 10 Compacts, Alloy 230 Compacts, Alloy 230B Compacts, Alloy 617 Compacts, Alloy 625 Compacts, Alloy 625B Compacts, Alloy 718 Plus Compacts, Alloy 720 Compacts, Alloy 725 Compacts

Contains Cobalt, Nickel

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

Recommended Use  Nickel 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 product is an article and, as such, does not present a hazard to human health by inhalation or ingestion

2.1. Classification of the substance or mixture

Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Property</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin sensitisation</td>
<td>Category 1</td>
</tr>
<tr>
<td>Carcinogenicity</td>
<td>Category 2</td>
</tr>
<tr>
<td>Specific target organ toxicity — repeated exposure</td>
<td>Category 1</td>
</tr>
</tbody>
</table>

2.2. Label elements

Emergency Overview

Danger

Hazard statements

May cause an allergic skin reaction
Suspected of causing cancer
Causes damage to the respiratory tract through prolonged or repeated exposure if inhaled
Precautionary Statements - Prevention
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wear protective gloves

Precautionary Statements - Response
If skin irritation or rash occurs: 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, Soluble molybdenum compounds such as molybdenum trioxide may cause lung irritation.

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>EC No</th>
<th>CAS No</th>
<th>Weight-%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>231-111-4</td>
<td>7440-02-0</td>
<td>49-68</td>
</tr>
<tr>
<td>Chromium</td>
<td>231-157-5</td>
<td>7440-47-3</td>
<td>8-22</td>
</tr>
<tr>
<td>Iron</td>
<td>231-096-4</td>
<td>7439-89-6</td>
<td>0-19</td>
</tr>
<tr>
<td>Tungsten</td>
<td>231-143-9</td>
<td>7440-33-7</td>
<td>0 - 10</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>231-107-2</td>
<td>7439-98-7</td>
<td>0 - 10</td>
</tr>
<tr>
<td>Aluminium</td>
<td>231-072-3</td>
<td>7429-90-5</td>
<td>0 - 5,5</td>
</tr>
<tr>
<td>Titanium</td>
<td>231-142-3</td>
<td>7440-32-6</td>
<td>0 - 5,3</td>
</tr>
<tr>
<td>Niobium</td>
<td>231-113-5</td>
<td>7440-03-1</td>
<td>0 - 4,2</td>
</tr>
<tr>
<td>Tantalum</td>
<td>231-135-5</td>
<td>7440-25-7</td>
<td>0 - 3,5</td>
</tr>
<tr>
<td>Hafnium</td>
<td>231-166-4</td>
<td>7440-58-6</td>
<td>0-1</td>
</tr>
</tbody>
</table>

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.

Skin Contact
In the case of skin irritation or allergic reactions see a doctor.
Eye contact

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

Ingestion

Not an expected route of exposure.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms

May cause allergic skin reaction.

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) 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

5.2. Special hazards arising from the substance or mixture

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 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, 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.

6.2. Environmental precautions

Not applicable to massive product.

6.3. 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.
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 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 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 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.

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

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>European Union</th>
<th>United Kingdom</th>
<th>France</th>
<th>Spain</th>
<th>Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>-</td>
<td>STEL: 1.5 mg/m³</td>
<td>TWA: 1 mg/m³</td>
<td>TWA: 1 mg/m³</td>
<td>Skin</td>
</tr>
<tr>
<td>Chromium</td>
<td>TWA: 2 mg/m³</td>
<td>STEL: 1.5 mg/m³</td>
<td>TWA: 2 mg/m³</td>
<td>TWA: 2 mg/m³</td>
<td>TWA: 2 mg/m³</td>
</tr>
<tr>
<td>Iron</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tungsten</td>
<td>STEL: 10 mg/m³</td>
<td>TWA: 5 mg/m³</td>
<td>-</td>
<td>STEL: 10 mg/m³</td>
<td>TWA: 5 mg/m³</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>STEL: 10 mg/m³</td>
<td>TWA: 3 mg/m³</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Aluminium</td>
<td>STEL: 30 mg/m³</td>
<td>TWA: 10 mg/m³</td>
<td>TWA: 10 mg/m³</td>
<td>TWA: 10 mg/m³</td>
<td>TWA: 4 mg/m³</td>
</tr>
<tr>
<td>Titanium</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Niobium</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tantalum</td>
<td>STEL: 10 mg/m³</td>
<td>TWA: 5 mg/m³</td>
<td>TWA: 5 mg/m³</td>
<td>TWA: 5 mg/m³</td>
<td>TWA: 4 mg/m³</td>
</tr>
<tr>
<td>Hafnium</td>
<td>-</td>
<td>TWA: 0.5 mg/m³</td>
<td>TWA: 0.5 mg/m³</td>
<td>TWA: 0.5 mg/m³</td>
<td>-</td>
</tr>
<tr>
<td>Chemical Name</td>
<td>Italy</td>
<td>Portugal</td>
<td>Netherlands</td>
<td>Finland</td>
<td>Denmark</td>
</tr>
<tr>
<td>Nickel</td>
<td>TWA: 1.5 mg/m³</td>
<td>-</td>
<td>TWA: 1 mg/m³</td>
<td>TWA: 0.1 mg/m³</td>
<td>TWA: 0.05 mg/m³</td>
</tr>
<tr>
<td>Chromium</td>
<td>TWA: 0.5 mg/m³</td>
<td>TWA: 0.5 mg/m³</td>
<td>TWA: 0.5 mg/m³</td>
<td>TWA: 0.5 mg/m³</td>
<td>TWA: 0.5 mg/m³</td>
</tr>
</tbody>
</table>
Iron
7439-89-6
- - - - - -

Tungsten
7440-33-7
- STEL: 10 mg/m³ TWA: 5 mg/m³ - TWA: 5 mg/m³ TWA: 5 mg/m³

Molybdenum
7439-98-7
- TWA: 10 mg/m³ TWA: 3 mg/m³ - TWA: 0.5 mg/m³ -

Aluminium
7429-90-5
- TWA: 10 mg/m³ TWA: 0.05 mg/m³ TWA: 1.5 mg/m³ TWA: 5 mg/m³ TWA: 2 mg/m³

Titanium
7440-32-6
- - - - - -

Niobium
7440-03-1
- - - - - TWA: 5 mg/m³ TWA: 0.5 mg/m³

Tantalum
7440-25-7
- TWA: 5 mg/m³ - TWA: 5 mg/m³ TWA: 5 mg/m³

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: 2 mg/m³ TWA: 0.5 mg/m³ TWA: 0.5 mg/m³ TWA: 0.5 mg/m³

Chromium
7440-47-3
TWA: 0.5 mg/m³ TWA: 0.5 mg/m³ TWA: 1 mg/m³ TWA: 0.5 mg/m³ TWA: 2 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 TWA: 5 mg/m³ TWA: 10 mg/m³

Molybdenum
7439-98-7
STEL 20 mg/m³ TWA: 10 mg/m³ TWA: 5 mg/m³ STEL: 10 mg/m³ TWA: 0.5 mg/m³

Aluminium
7429-90-5
STEL 20 mg/m³ TWA: 10 mg/m³ TWA: 3 mg/m³ TWA: 2.5 mg/m³ STEL: 10 mg/m³ TWA: 1 mg/m³ TWA: 5 mg/m³

Titanium
7440-32-6
- - - - - -

Niobium
7440-03-1
STEL 10 mg/m³ STEL 1 mg/m³ TWA: 5 mg/m³ TWA: 0.5 mg/m³ TWA: 0.5 mg/m³ TWA: 0.5 mg/m³

Tantalum
7440-25-7
TWA: 5 mg/m³ TWA: 5 mg/m³ TWA: 5 mg/m³ - - TWA: 5 mg/m³ TWA: 10 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 STEL: 1.5 mg/m³ TWA: 0.5 mg/m³ TWA: 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. 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 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

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
<th>Remarks • Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Melting point/freezing point</td>
<td>1400-1540 °C / 2560-2800 °F</td>
<td></td>
</tr>
<tr>
<td>Boiling point / boiling range</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Flash point</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>-</td>
<td>Product not flammable in the form as distributed, flammable as finely divided particles or pieces resulting from processing of this product</td>
</tr>
<tr>
<td>Flammability Limit in Air</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper flammability limit</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Lower flammability limit</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Vapour density</td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>8.0-8.5</td>
<td></td>
</tr>
<tr>
<td>Water solubility</td>
<td>Insoluble</td>
<td></td>
</tr>
<tr>
<td>Solubility(ies)</td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Autoignition temperature</td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Kinematic viscosity</td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Dynamic viscosity</td>
<td>-</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>Oxidising properties</td>
<td>Not applicable</td>
<td></td>
</tr>
</tbody>
</table>

9.2. Other information

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
<th>Remarks • Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Softening point</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Molecular weight</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>VOC Content (%)</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>Density</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Bulk density</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

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

Section 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Product Information

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Oral LD50</th>
<th>Dermal LD50</th>
<th>Inhalation LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>&gt; 9000 mg/kg bw</td>
<td>-</td>
<td>&gt; 10.2 mg/L</td>
</tr>
<tr>
<td>Chromium</td>
<td>&gt; 3400 mg/kg bw</td>
<td>-</td>
<td>&gt; 5.41 mg/L</td>
</tr>
<tr>
<td>Iron</td>
<td>98,600 mg/kg bw</td>
<td>-</td>
<td>&gt; 0.25 mg/L</td>
</tr>
<tr>
<td>Tungsten</td>
<td>&gt; 2000 mg/kg bw</td>
<td>&gt; 2000 mg/kg bw</td>
<td>&gt; 5.4 mg/L</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>&gt; 2000 mg/kg bw</td>
<td>&gt; 2000 mg/kg bw</td>
<td>&gt; 5.10 mg/L</td>
</tr>
<tr>
<td>Aluminium</td>
<td>15,900 mg/kg bw</td>
<td>-</td>
<td>&gt; 0.05 mg/L</td>
</tr>
<tr>
<td>Titanium</td>
<td>&gt; 5000 mg/kg bw</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Niobium</td>
<td>&gt; 10,000 mg/kg bw</td>
<td>&gt; 2000 mg/kg bw</td>
<td>-</td>
</tr>
<tr>
<td>Tantalum</td>
<td>&gt; 2000 mg/kg bw</td>
<td>&gt; 2000 mg/kg bw</td>
<td>&gt; 5.18 mg/L</td>
</tr>
<tr>
<td>Hafnium</td>
<td>&gt; 5000 mg/kg bw</td>
<td>-</td>
<td>&gt;4.3mg/L</td>
</tr>
</tbody>
</table>

Information on toxicological effects

Symptoms

May cause sensitisation 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.

Sensitisation

May cause sensitisation by skin contact.

Germ cell mutagenicity

Product not classified.

Carcinogenicity

May cause cancer by inhalation.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>IARC</th>
<th>NTP</th>
<th>OSHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td></td>
<td>Group 1</td>
<td>Known</td>
<td>X</td>
</tr>
<tr>
<td>7440-02-0</td>
<td></td>
<td>Group 2B</td>
<td>Reasonably Anticipated</td>
<td></td>
</tr>
<tr>
<td>Chromium</td>
<td></td>
<td>Group 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7440-47-3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reproductive toxicity
Section 12: ECOLOGICAL INFORMATION

12.1. Toxicity

This product as shipped is not classified for aquatic toxicity.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Algae/aquatic plants</th>
<th>Fish</th>
<th>Toxicity to microorganisms</th>
<th>Crustacea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>NOEC/EC10 values range from 12.3 µg/l for Scenedesmus accuminatus to 425 µg/l for Pseudokirchneriella subcapitata.</td>
<td>The 96h LC50s values range from 0.4 mg Ni/L for Pimephales promelas to 320 mg Ni/L for Brachydanio rerio.</td>
<td>The 30 min EC50 of nickel for activated sludge was 33 mg Ni/L.</td>
<td>The 48h LC50s values range from 0.013 mg Ni/L for Ceriodaphnia dubia to 4970 mg Ni/L for Daphnia magna.</td>
</tr>
<tr>
<td>Chromium</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td>-</td>
<td>The 96 h LC50 of 50% iron oxide black in water to Danio rerio was greater than 10,000 mg/L.</td>
<td>The 3 h EC50 of iron oxide for activated sludge was greater than 10,000 mg/L.</td>
<td>The 48 h EC50 of iron oxide to Daphnia magna was greater than 10 mg/L.</td>
</tr>
<tr>
<td>Tungsten</td>
<td>The 72 h EC50 of sodium tungstate to Pseudokirchneriella subcapitata was 31.0 mg of W/L.</td>
<td>The 96 h LC50 of sodium tungstate to Danio rerio was greater than 106 mg of W/L.</td>
<td>The 30 min EC50 of sodium tungstate for activated sludge were greater than 1000 mg/L.</td>
<td>The 48 h EC50 of sodium tungstate to Daphnia magna was greater than 96 mg of W/L.</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>The 72 h EC50 of sodium molybdate dihydrate to Pseudokirchneriella subcapitata was 362.9 mg of Mo/L.</td>
<td>The 96 h LC50 of sodium molybdate dihydrate to Pimephales promelas was 644.2 mg/L.</td>
<td>The 3 h EC50 of molybdenum trioxide for activated sludge was 820 mg/L.</td>
<td>The 48 h EC50 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.</td>
</tr>
<tr>
<td>Aluminium</td>
<td>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.</td>
<td>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</td>
<td>-</td>
<td>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.</td>
</tr>
<tr>
<td>Titanium</td>
<td>The 72 h EC50 of titanium dioxide to Pseudokirchneriella subcapitata was 61 mg of TiO2/L.</td>
<td>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.</td>
<td>The 3 h EC50 of titanium dioxide for activated sludge were greater than 1000 mg/L.</td>
<td>The 48 h EC50 of titanium dioxide to Daphnia Magna was greater than 1000 mg of TiO2/L.</td>
</tr>
<tr>
<td>Niobium</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tantalum</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hafnium</td>
<td>The 72 h EC50 of hafnium to Pseudokirchneriella subcapitata was greater than 8 ug of Hf/L (100% saturated solution).</td>
<td>The 96 h LC50 of Hafnium dioxide in water to Danio rerio was greater than the solubility limit of 0.007 mg Hf/L.</td>
<td>-</td>
<td>The 48 h EC50 of Hafnium dioxide to Daphnia magna was greater than the solubility limit of 0.007 mg Hf/L.</td>
</tr>
</tbody>
</table>

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

This product as shipped is not classified for environmental endpoints. However, when subjected to sawing or grinding, particles may be generated that are classified for aquatic chronic toxicity

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
None anticipated.

Section 14: TRANSPORT INFORMATION

IMDG
14.1 UN/ID no
Not regulated
14.2 Proper shipping name
Not regulated
14.3 Hazard Class
Not regulated
14.4 Packing Group
Not regulated
14.5 Marine pollutant
Not applicable
14.6 Special Provisions
None
14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code
Not applicable

RID
14.1 UN/ID no
Not regulated
14.2 Proper shipping name
Not regulated
14.3 Hazard Class
Not regulated
14.4 Packing Group
Not regulated
14.5 Environmental hazard
Not applicable
14.6 Special Provisions
None

ADR
14.1 UN/ID no
Not regulated
14.2 Proper shipping name
Not regulated
14.3 Hazard Class
Not regulated
14.4 Packing Group
Not regulated
14.5 Environmental hazard
Not applicable
14.6 Special Provisions
None

ICAO (air)
14.1 UN/ID no
Not regulated
14.2 Proper shipping name
Not regulated
14.3 Hazard Class
Not regulated
14.4 Packing Group
Not applicable
14.5 Environmental hazard
Not applicable
14.6 Special Provisions
None
IATA
14.1 UN/ID no Not regulated
14.2 Proper shipping name Not regulated
14.3 Hazard Class Not regulated
14.4 Packing Group Not regulated
14.5 Environmental hazard Not applicable
14.6 Special Provisions None

Section 15: REGULATORY INFORMATION

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

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>French RG number</th>
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<tbody>
<tr>
<td>Nickel</td>
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<tr>
<td>Chromium</td>
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<td>7440-47-3</td>
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<td>Iron</td>
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<td>Tungsten</td>
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<td>7440-33-7</td>
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<td>Molybdenum</td>
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<td>Aluminium</td>
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<tr>
<td>7429-90-5</td>
<td>RG 16,RG 16bis</td>
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<tr>
<td>Titanium</td>
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<tr>
<td>7440-32-6</td>
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<td>Niobium</td>
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<tr>
<td>Tantalum</td>
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<td>Hafnium</td>
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</table>

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 does not contain substances subject to restriction (Regulation (EC) No. 1907/2006 (REACH), Annex XVII).

International Inventories

<table>
<thead>
<tr>
<th>DSL/NDSL</th>
<th>EINECS/ELINCS</th>
<th>ENCS</th>
<th>IECSC</th>
<th>KECL</th>
<th>PICCS</th>
<th>AICS</th>
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</table>

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

<table>
<thead>
<tr>
<th>Issue Date</th>
<th>28-May-2015</th>
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<tr>
<td>Revision Date</td>
<td>05-Nov-2018</td>
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<tr>
<td>Revision Note</td>
<td>Updated Section(s): 5, 9, 15.</td>
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</table>

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