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

1.1. Product identifier

Product Code  SAC042
Product Name  Niobium Hydride Powder (flammable)
UN/ID no  3089
Synonyms  Niobium Hydride Powder (flammable); Columbium Hydride Powder (flammable)

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

<table>
<thead>
<tr>
<th>Flammable solids</th>
<th>Category 1</th>
</tr>
</thead>
</table>

2.2. Label elements

Danger

Hazard statements  H228 - Flammable solid

Precautionary Statements - Prevention

Appearance  Powder  Physical state  Solid  Odour  Odourless
Wear protective gloves/protective clothing/eye protection
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Ground/bond container and receiving equipment
If dust clouds can occur, use explosion-proof electrical/ ventilating/lighting/equipment

Precautionary Statements - Response
In case of fire: Use salt (NaCl) for extinction

2.3 Hazards not otherwise classified (HNOC)
Not applicable

Other Information

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances
Synonyms

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>EC No</th>
<th>CAS No</th>
<th>Weight-%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Niobium Hydride</td>
<td>-</td>
<td>13981-86-7</td>
<td>&gt; 99</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
None under normal use conditions.

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
None anticipated.

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
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** Evolves hydrogen gas when heated above 250°C.

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. 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 using non-sparking tools. 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). For long-term storage, keep sealed in argon-filled steel drums.

**Incompatible materials**
Dissolves in hydrofluoric acid.

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>Niobium Hydride</td>
<td>-</td>
<td>-</td>
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<td>-</td>
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</tr>
<tr>
<td>13981-86-7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Italy</th>
<th>Portugal</th>
<th>Netherlands</th>
<th>Finland</th>
<th>Denmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Niobium Hydride</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>13981-86-7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Austria</th>
<th>Switzerland</th>
<th>Poland</th>
<th>Norway</th>
<th>Ireland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Niobium Hydride</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>13981-86-7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Derived No Effect Level (DNEL) - No DNELs are available for this product

Predicted No Effect Concentration (PNEC) - No PNECs are available for this product.

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/flare 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 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</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Solid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appearance</td>
<td>Powder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colour</td>
<td>metallic, grey or Silver</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Odour</td>
<td>Odourless</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Odour threshold</td>
<td>Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>-</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>Melting point / freezing point</td>
<td>Evolves hydrogen above 250 °C / 482 °F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boiling point / boiling range</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flash point</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>-</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Flammable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flammability Limit in Air</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Upper flammability limit:</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower flammability limit:</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>-</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>Vapour density</td>
<td>-</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>7.68</td>
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</tr>
<tr>
<td>Water solubility</td>
<td>Insoluble</td>
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</tr>
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<td>Solubility(i(es))</td>
<td></td>
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<td></td>
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<tr>
<td>Partition coefficient</td>
<td>-</td>
<td>Not applicable</td>
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</tr>
<tr>
<td>Autoignition temperature</td>
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<td>Not applicable</td>
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</tr>
<tr>
<td>Decomposition temperature</td>
<td>250°C / 482°F</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9.2. Other information

Softening point
- 
Molecular weight
93.92
VOC Content (%)
Not applicable
Density
- 
Bulk density
~270 lb/ft³

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
May be ignited by heat, sparks or flames.

10.3. Possibility of hazardous reactions

Hazardous polymerisation
Hazardous polymerisation does not occur.

Possibility of Hazardous Reactions
At temperatures above 200°C, this product reacts vigorously with halogen gases and with halocarbons to produce flammable hydrogen gas and toxic oxides of nitrogen or other corrosive gases.

10.4. Conditions to avoid

Dust formation and dust accumulation.

10.5. Incompatible materials

Dissolves in hydrofluoric acid.

10.6. Hazardous decomposition products

Evolves hydrogen gas when heated above 250°C.

Section 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Product Information

<table>
<thead>
<tr>
<th>Inhalation</th>
<th>Product not classified.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye contact</td>
<td>Product not classified.</td>
</tr>
<tr>
<td>Skin Contact</td>
<td>Product not classified.</td>
</tr>
<tr>
<td>Ingestion</td>
<td>Product not classified.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Oral LD50</th>
<th>Dermal LD50</th>
<th>Inhalation LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Niobium Hydride</td>
<td>&gt; 2000 mg/kg bw</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

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.

Sensitisation

Product not classified.

Germ cell mutagenicity

Product not classified.

Carcinogenicity

Product not classified.

Reproductive toxicity

Product not classified.

STOT - single exposure

Product not classified.

STOT - repeated exposure

Product not classified.

Aspiration hazard

Product not classified.

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>Niobium Hydride</td>
<td>-</td>
<td>-</td>
<td>The 3 h EC50 of Niobium hydride for activated sludge was greater than 1,000 mg/L.</td>
<td>-</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

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 3089
14.2 Proper shipping name Metal powder, flammable, n.o.s. (Niobium Hydride)
14.3 Hazard Class 4.1
14.4 Packing Group II
14.5 Marine pollutant Not applicable
14.6 Special Provisions IB8, IP2, IP4, T3, TP33
14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code Not applicable

RID
14.1 UN/ID no 3089
14.2 Proper shipping name Metal powder, flammable, n.o.s. (Niobium Hydride)
14.3 Hazard Class 4.1
14.4 Packing Group II
14.5 Environmental hazard Not applicable
14.6 Special Provisions IB8, IP2, IP4, T3, TP33

ADR
14.1 UN/ID no 3089
14.2 Proper shipping name Metal powder, flammable, n.o.s. (Niobium Hydride)
14.3 Hazard Class 4.1
14.4 Packing Group II
14.5 Environmental hazard Not applicable
14.6 Special Provisions IB8, IP2, IP4, T3, TP33

ICAO (air)
14.1 UN/ID no 3089
14.2 Proper shipping name Metal powders, flammable, n.o.s. (Niobium Hydride)
14.3 Hazard Class 4.1
14.4 Packing Group II
14.5 Environmental hazard Not applicable
14.6 Special Provisions IB8, IP2, IP4, T3, TP33

IATA
14.1 UN/ID no 3089
14.2 Proper shipping name Metal powders, flammable, n.o.s. (Niobium Hydride)
14.3 Hazard Class 4.1
14.4 Packing Group II
14.5 Description Not applicable
14.6 Special Provisions IB8, IP2, IP4, T3, TP33 170

ERG Code

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>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Niobium Hydride</td>
<td>13981-86-7</td>
<td>-</td>
</tr>
</tbody>
</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>Inventory</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSL/NDSL</td>
<td>Complies</td>
</tr>
<tr>
<td>EINECS/ELINCS</td>
<td>Complies</td>
</tr>
<tr>
<td>ENCS</td>
<td>Not Listed</td>
</tr>
<tr>
<td>IECSC</td>
<td>Not Listed</td>
</tr>
<tr>
<td>KECL</td>
<td>Complies</td>
</tr>
<tr>
<td>PICCS</td>
<td>Not Listed</td>
</tr>
<tr>
<td>AICS</td>
<td>Not Listed</td>
</tr>
</tbody>
</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>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issue Date</td>
<td>02-Jan-2020</td>
</tr>
<tr>
<td>Revision Date</td>
<td>02-Jan-2020</td>
</tr>
<tr>
<td>Revision Note</td>
<td>Updated to comply with GHS.</td>
</tr>
</tbody>
</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.

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

End of Safety Data Sheet