SAFETY DATA SHEET

SECTION 1. IDENTIFICATION

Product Identifier: (5N) 99.999% Nickel Nanoparticles

Product Code: NI-M-05-NP

CAS Number: 7440-02-0

Relevant identified uses of the substance: Scientific research and development

Supplier details:

American Elements 10884 Weyburn Ave. Los Angeles, CA 90024 Tel: +1 310-208-0551 Fax: +1 310-208-0351 Emergency telephone number: Domestic, North America +1 800-424-9300 International +1 703-527-3887

SECTION 2. HAZARDS IDENTIFICATION

Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008
GHS02 Flame
Flam. Sol. 2 H228 Flammable solid.

GHS08 Health hazard

Carc. 2 H351 Suspected of causing cancer.

STOT RE 1 H372 Causes damage to the lung, the kidneys and the liver through prolonged or repeated exposure. Route of exposure: Inhalative.

GHS07
Skin Sens. 1 H317 May cause an allergic skin reaction.

Classification according to Directive 67/548/EEC or Directive 1999/45/EC

T; Toxic
R48/23: Toxic: danger of serious damage to health by prolonged exposure through inhalation.
Xn; Harmful
R40: Limited evidence of a carcinogenic effect.
Xi; Sensitizing
R43: May cause sensitization by skin contact.
F; Highly flammable
R11: Highly flammable.
R52/53: Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Carc. Cat. 3

Information concerning particular hazards for human and environment:
N/A
Hazard not otherwise classified
No data available.

**Label elements**
Labelling according to Regulation (EC) No 1272/2008
The substance is classified and labeled according to the CLP regulation.

**Hazard pictograms**

Signal word: Danger
Hazard statements
H228 Flammable solid.
H317 May cause an allergic skin reaction.
H351 Suspected of causing cancer.
H372 Causes damage to the lung, the kidneys and the liver through prolonged or repeated exposure.
Route of exposure: Inhalative.
Precautionary statements
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P260 Do not breathe dust/fume/gas/mist/vapors/spray.
P261 Avoid breathing dust/fume/gas/mist/vapors/spray.
P363 Wash contaminated clothing before reuse.
P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

**WHMIS classification**
B4 - Flammable solid
D2A - Very toxic material causing other toxic effects

**Classification system**
HMIS ratings (scale 0-4)
(Hazardous Materials Identification System)

<table>
<thead>
<tr>
<th>HEALTH</th>
<th>FIRE</th>
<th>REACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

Health (acute effects) = 1
Flammability = 3
Physical Hazard = 1

Other hazards

Results of PBT and vPvB assessment:
PBT: N/A.
vPvB: N/A.

---

**SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS**

Substances
CAS No. / Substance Name:
7440-02-0 Nickel
Identification number(s):
EC number: 231-111-4
Index number: 028-002-01-4
SECTION 4. FIRST AID MEASURES

Description of first aid measures
If inhaled:
Supply fresh air. If not breathing, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.
In case of skin contact:
Immediately wash with soap and water; rinse thoroughly.
Seek immediate medical advice.
In case of eye contact:
Rinse opened eye for several minutes under running water. Consult a physician.
If swallowed:
Seek medical treatment.
Information for doctor
Most important symptoms and effects, both acute and delayed
No information available.
Indication of any immediate medical attention and special treatment needed
No information available.

SECTION 5. FIREFIGHTING MEASURES

Extinguishing media
Suitable extinguishing media
Special powder for metal fires. Do not use water.
For safety reasons unsuitable extinguishing media
Carbon dioxide
Water
Special hazards arising from the substance or mixture
If this product is involved in a fire, the following can be released:
Nickel oxides
Advice for firefighters
Protective equipment:
Wear self-contained respirator.
Wear fully protective impervious suit.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures
Wear protective equipment. Keep unprotected persons away.
Ensure adequate ventilation
Keep away from ignition sources
Environmental precautions:
Do not allow material to be released to the environment without official permits.
Do not allow product to reach sewage system or any water course.
Do not allow to penetrate the ground/soil.
Methods and material for containment and cleanup:
Keep away from ignition sources.
Dispose of contaminated material as waste according to section 13.
Ensure adequate ventilation.
Prevention of secondary hazards:
SECTION 7. HANDLING AND STORAGE

Handling
Precautions for safe handling
Keep container tightly sealed.
Store in cool, dry place in tightly closed containers.
Ensure adequate ventilation.
Information about protection against explosions and fires:
Protect against electrostatic charges.
Conditions for safe storage, including any incompatibilities
Storage
Requirements to be met by storerooms and receptacles:
Store in a cool location.
Information about storage in one common storage facility:
Store away from oxidizing agents.
Store away from halogens.
Further information about storage conditions:
Keep container tightly sealed.
Store in cool, dry conditions in well-sealed containers.
Specific end use(s)
No information available.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Additional information about design of technical systems:
Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.
Control parameters
Components with limit values that require monitoring at the workplace:
7440-02-0 Nickel (100.0%)  
PEL (USA) Long-term value: 1 mg/m³  
REL (USA) Long-term value: 0.015 mg/m³ as Ni; See Pocket Guide App. A  
TLV (USA) Long-term value: 1.5* mg/m³ elemental, *inhalable fraction  
EL (Canada) Long-term value: 0.05 mg/m³ as Ni; ACIGH A1, IARC 1  
EV (Canada) Long-term value: 1* 0.2** 0.1*** mg/m³ inh.;*metal;**insol. compds.;***soluble compds.
Additional information: No data
Exposure controls
Personal protective equipment
Follow typical general protective and industrial hygiene measures for handling chemicals.
Keep away from foodstuffs, beverages and feed.
Remove all soiled and contaminated clothing immediately.
Wash hands before breaks and at the end of work.
Breathing equipment:
Use suitable respirator when high concentrations are present.
Recommended filter device for short term use:
Use a respirator with type P100 (USA) or P3 (EN 143) cartridges as a backup to engineering controls. Risk assessment should be performed to determine if air-purifying respirators are appropriate. Only use equipment tested and approved under appropriate government standards. Protection of hands: Impervious gloves
Inspect gloves prior to use.
Suitability of gloves should be determined both by material and quality, the latter of which may vary by manufacturer.
Material of gloves
Nitrile rubber, NBR
Penetration time of glove material (in minutes)
480
Glove thickness
0.11 mm
Eye protection: Safety glasses
Body protection: Protective work clothing.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties
Appearance:
Form: Powder or flakes
Color: Silver gray
Odor: Odorless
Odor threshold: No data available.
pH: N/A.
Melting point/range: 1455 °C (2651 °F)
Boiling point/range: 2732 °C (4950 °F)
Sublimation temperature / start: No data available.
Flammability (solid, gas): Highly flammable.
Ignition temperature: No data available.
Decomposition temperature: No data available.
Auto igniting: No data available.
Danger of explosion: Product does not present an explosion hazard.
Explosion limits:
Lower: No data available.
Upper: No data available.
Vapor pressure: N/A.
Density at 20 °C (68 °F): 8.908 g/cm³ (74.337 lbs/gal)
Relative density: No data available.
Vapor density: N/A.
Evaporation rate: N/A.
Solubility in Water (H₂O): Insoluble
Partition coefficient (n-octanol/water): No data available.
Viscosity:
Dynamic: N/A.
Kinematic: N/A.
Other information
No information available.
SECTION 10. STABILITY AND REACTIVITY

Reactivity
No data available.

Chemical stability
Stable under recommended storage conditions.

Thermal decomposition / conditions to be avoided:
Decomposition will not occur if used and stored according to specifications.

Possibility of hazardous reactions
No dangerous reactions known

Conditions to avoid
No information available.

Incompatible materials:
- Halogens
- Hazardous decomposition products:
  - Nickel oxides

SECTION 11. TOXICOLOGICAL INFORMATION

Information on toxicological effects

Acute toxicity:
The Registry of Toxic Effects of Chemical Substances (RTECS) contains acute toxicity data for this substance.
LD/LC50 values that are relevant for classification: No data
Skin irritation or corrosion: May cause irritation
Eye irritation or corrosion: Irritating effect.
Sensitization: May cause an allergic skin reaction.

Germ cell mutagenicity:
The Registry of Toxic Effects of Chemical Substances (RTECS) contains mutation data for this substance.

Carcinogenicity: Suspected of causing cancer.
IARC-2B: Possibly carcinogenic to humans: limited evidence in humans in the absence of sufficient evidence in experimental animals.
NTP-R: Reasonably anticipated to be a carcinogen: limited evidence from studies in humans or sufficient evidence from studies in experimental animals.
ACGIH A5: Not suspected as a human carcinogen: Not suspected as a human carcinogen on the basis of properly conducted epidemiologic studies in humans.

Studies have sufficiently long follow-up, reliable exposure histories, sufficiently high dose, and adequate statistical power to conclude that exposure to the agent does not convey a significant risk of cancer to humans. Evidence suggesting a lack of carcinogenicity in experimental animals will be considered if it is supported by other relevant data.
The Registry of Toxic Effects of Chemical Substances (RTECS) contains tumorigenic and/or carcinogenic and/or neoplastic data for this substance.

Reproductive toxicity:
The Registry of Toxic Effects of Chemical Substances (RTECS) contains reproductive data for this substance.

Specific target organ system toxicity - repeated exposure:
Causes damage to the lung, the kidneys and the liver through prolonged or repeated exposure. Route of exposure: Inhalative.

Specific target organ system toxicity - single exposure: N/A
Aspiration hazard: N/A

Subacute to chronic toxicity:
The Registry of Toxic Effects of Chemical Substances (RTECS) contains multiple dose toxicity data for
this substance.
Additional toxicological information:
To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.
Carcinogenic categories
OSHA-Ca (Occupational Safety & Health Administration)
Substance is not listed.

SECTION 12. ECOLOGICAL INFORMATION

Toxicity
Aquatic toxicity:
No information available.
Persistence and degradability:
No information available.
Bioaccumulative potential:
No information available.
Mobility in soil:
No information available.
Ecotoxicological effects:
Remark:
Harmful to aquatic organisms
Additional ecological information:
General notes:
Do not allow product to reach ground water, water course or sewage system.
Do not allow material to be released to the environment without official permits.
Danger to drinking water if even small quantities leak into the ground.
May cause long lasting harmful effects to aquatic life.
Avoid transfer into the environment.
Harmful to aquatic organisms
Results of PBT and vPvB assessment:
PBT: N/A.
vPvB: N/A.
Other adverse effects
No information available.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste treatment methods
Recommendation:
Consult state, local or national regulations to ensure proper disposal.
Uncleaned packagings:
Recommendation:
Disposal must be made according to official regulations.

SECTION 14. TRANSPORT INFORMATION

UN-Number
DOT, IMDG, IATA
UN3089
UN proper shipping name
DOT
RO Metal powders, flammable, n.o.s. (Nickel powder)
IMDG, IATA
METAL POWDER, FLAMMABLE, N.O.S. (Nickel powder)
Transport hazard class(es)
DOT
Class
4.1 Flammable solids, self-reactive substances and solid desensitised explosives.
Label
4.1
Class
4.1 (F3) Flammable solids, self-reactive substances and solid desensitised explosives
Label
4.1
IMDG, IATA
Class
4.1 Flammable solids, self-reactive substances and solid desensitised explosives.
Label
4.1
Packing group
DOT, IMDG, IATA
II
Environmental hazards:
N/A.
Special precautions for user
Warning: Flammable solids, self-reactive substances and solid desensitised explosives
EMS Number:
F-G,S-G
Segregation groups
Heavy metals and their salts (including their organometallic compounds), powdered metals
Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
N/A.
Transport/Additional information:
DOT
Hazardous substance:
100 lbs, 45.4 kg
Marine Pollutant (DOT):
No
UN "Model Regulation":
UN3089, Metal powders, flammable, n.o.s. (Nickel powder), 4.1, II

SECTION 15. REGULATORY INFORMATION

Safety, health and environmental regulations/legislation specific for the substance or mixture
National regulations
All components of this product are listed in the U.S. Environmental Protection Agency Toxic
Substances Control Act Chemical substance Inventory.
All components of this product are listed on the Canadian Domestic Substances List (DSL).
SARA Section 313 (specific toxic chemical listings)
7440-02-0 Nickel
California Proposition 65
Prop 65 - Chemicals known to cause cancer
7440-02-0 Nickel
Prop 65 - Developmental toxicity
Substance is not listed.
Prop 65 - Developmental toxicity, female
Substance is not listed.
Prop 65 - Developmental toxicity, male
Substance is not listed.
Information about limitation of use:
For use only by technically qualified individuals.
Other regulations, limitations and prohibitive regulations
Substance of Very High Concern (SVHC) according to the REACH Regulations (EC) No. 1907/2006.
Substance is not listed.
The conditions of restrictions according to Article 67 and Annex XVII of the Regulation (EC) No 1907/2006 (REACH) for the manufacturing, placing on the market and use must be observed.
Substance is not listed.
Annex XIV of the REACH Regulations (requiring Authorisation for use)
Substance is not listed.
REACH - Pre-registered substances
Substance is listed.
Chemical safety assessment:
A Chemical Safety Assessment has not been carried out.

16. OTHER INFORMATION

Safety Data Sheet according to Regulation (EC) No. 1907/2006 (REACH). The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. American Elements shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. COPYRIGHT 1997-2016 AMERICAN ELEMENTS. LICENSED GRANTED TO MAKE UNLIMITED PAPER COPIES FOR INTERNAL USE ONLY.