NICKEL METAL
SAFETY DATA SHEET

Teck

SECTION 1. IDENTIFICATION

Product Identity: Nickel Metal
Trade Names and Synonyms: Nickel Plating Anode, Nickel Pellets, Nickel Rounds

Manufacturer:
Teck Advanced Materials, Inc.
13670 Danielson Street
Suite H & I
Poway, CA 9206
Emergency Telephone: (858) 391-2935

Supplier:
Teck Advanced Materials, Inc.
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Preparer:
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Vancouver, British Columbia
V6C 0B3

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Product Use: Nickel is used in metal surface treatment by electroplating or electroforming technologies. Also used in thin film deposition by electro-deposition, evaporation or sputtering techniques.

This product has been classified in accordance with the hazard criteria of the Hazardous Products Regulation SOR/2015-17 and this SDS contains all the information required by both the HPR and the OSHA Hazard Communication Standard of 2012 (29 CFR 1910.1200(g) and Appendix D. This SDS describes the health hazards of the product as supplied. If user operations transform it into other physical or chemical forms then the possible health hazards of such forms must be determined by the user.

SECTION 2. HAZARDS IDENTIFICATION

CLASSIFICATION:

Health		Physical	Environmental
Acute Toxicity (Oral, Inhalation)	– does not meet criteria	Does not meet criteria for any Physical Hazard	Does not meet criteria for Aquatic Toxicity
Skin Corrosion/Irritation	– does not meet criteria		
Eye Damage/Eye Irritation	– does not meet criteria		
Respiratory or Skin Sensitization	**– Category 1**		
Mutagenicity	– does not meet criteria		
Carcinogenicity	**– Category 2**		
Reproductive Toxicity	– does not meet criteria		
Specific Target Organ Toxicity			
Acute Exposure	– does not meet criteria		
Chronic Exposure	– does not meet criteria		

LABEL:

Symbols:

Signal Word:

WARNING

Hazard Statements	**Precautionary Statements:**
WARNING May cause an allergic skin reaction. Suspected of causing cancer.	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/clothing/eye protection. Avoid breathing dust/fumes. Contaminated work clothing should not be allowed out of the workplace and should be washed before reuse IF on SKIN: Wash with plenty of water. If skin irritation or a rash occurs get medical advise/attention.

Emergency Overview: A silvery white metal with a slight gold tinge. Solid nickel does not burn but nickel dust may form explosive mixtures if dispersed in air as a fine powder. Nickel is well recognized as a skin sensitizer and studies suggest a 2.5 – 5% prevalence of nickel sensitization in the general population. Exposure to several nickel salts has been shown to cause cancer in occupational settings but the evidence for metallic nickel is largely negative. In the form in which the product is sold it poses little immediate hazard to the health of emergency response personnel or the environment during transportation emergencies.

Potential Health Effects: Skin contact may cause sensitization in some workers, resulting in outbreaks of dermatitis with symptoms such as redness, rash, itching and swelling. Once a person is sensitized, contact with even a small amount of nickel can cause such outbreaks. The reaction can even spread from the hands or arms to the face and body. Nickel salts are considered to pose a risk of occupational cancer but the evidence with respect to metallic nickel is equivocal at best, with various agencies in disagreement about the interpretation of scientific studies to date. (see Toxicological Information, Section 11)

Potential Environmental Effects: In the form in which this product is sold (pellets or rounds) it has very low bioavailability and does not pose any significant environmental risks. However, extended or protected exposure in aquatic environments may lea to the slow release of ionic nickel which does have some environmental risks. (see Ecological Information, Section 12)

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENTS	CAS Registry No.	CONCENTRATION (% wt/wt)
Elemental Nickel	7440-02-0	99.90 – 100%

Note: see Section 8 for Occupational Exposure Guidelines.

SECTION 4. FIRST AID MEASURES

Eye Contact: *Symptoms:* Mild eye irritation, redness. Do not rub eye(s). Let the eye(s) water naturally for a few minutes. Look right and left, then up and down. If particle/dust does not come out, cautiously rinse eye(s) with lukewarm, gently flowing water for 5 minutes or until particle/dust is removed, while holding the eyelid(s) open. If eye irritation persists, get medical attention. DO NOT attempt to manually remove anything from the eye.

Skin Contact: *Symptoms:* Redness, rash, itching, swelling. In the event of skin contact or contamination take off contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Gently brush away excess product. Wash with plenty of lukewarm, gently flowing water and a mild, non-abrasive soap. Wash contaminated clothing before reuse or discard. If skin irritation or rash occurs, get medical advice/attention.

Inhalation: *Symptoms:* Coughing and irritation in heavy dust clouds. If symptoms are experienced remove source of contamination or move victim from exposure area to fresh air immediately and obtain medical advice.

Ingestion: *Symptoms:* Stomach upset, nausea, diarrhea. If swallowed, no specific intervention is indicated as this material is not likely to be hazardous by ingestion. However, if you are concerned or feel unwell, obtain medical advice.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Massive metal is not flammable or combustible. Although this product is non-friable and non dusting, further mechanical processing of the product may produce nickel dust, which may be a minor explosion hazard when dispersed in air at high concentrations and exposed to a source of ignition heat, flame or other ignition sources.

Extinguishing Media: Use any means of extinction appropriate for surrounding fire conditions such as water spray, carbon dioxide, dry chemical or foam.

Fire Fighting: If possible, remove material not yet involved in the fire from the fire area. Fire fighters must be fully trained and should wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full facepiece mask.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Eliminate or control source or cause of spillage if at all possible. Clean up spilled material immediately. Any molten metal should be allowed to cool and solidify before attempting cleanup. Once solidified, wear gloves to pick up material and return to process if possible. Powder or dust should be cleaned up by sweeping, shoveling, etc. return uncontaminated material to the process if possible. Place contaminated material in suitable labelled containers for recovery or disposal. Treat or dispose of waste material in accordance with all local, regional and national requirements.

Personal Precautions: Personnel responding to an accidental release should wear long-sleeved work clothing and gloves to minimize skin contact. Where molten metal is involved, heat-resistant gloves and clothing suitable for protection from thermal radiation and hot metal splash should be worn.

Environmental Precautions: Nickel metal has limited bioavailability and therefore poses no immediate ecological risk but should not be allowed to remain in the marine environment for extended periods.

SECTION 7. HANDLING AND STORAGE

Precautions for Safe Handling: Avoid materials handling and transport practices that are likely to generate airborne dust through abrasion or crushing and grinding. If material is to be melted, it should be THOROUGHLY DRIED first. Otherwise, entrained moisture could expand explosively and spatter molten metal uncontrollably.

Conditions for Safe Storage: Store in a dry, secure and covered location separate from incompatible materials.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Guidelines: *(Time-Weighted Average (TWA) concentration over 8 hr unless otherwise indicated)*

Component	ACGIH TLV	OSHA PEL	NIOSH REL
Nickel, elemental	1.5 mg/m^3 (inhalable)	1 mg/m^3	0.015 mg/m^3

NOTE: OEGs for individual jurisdictions may differ from those given above. Check with local authorities for the applicable OEGs in your jurisdiction. ACGIH - American Conference of Governmental Industrial Hygienists; OSHA - Occupational Safety and Health Administration; NIOSH - National Institute for Occupational Safety and Health. TLV – Threshold Limit Value, PEL – Permissible Exposure Limit, REL – Recommended Exposure Limit.

NOTE: The selection of the necessary level of engineering controls and personal protective equipment will vary depending upon the conditions of use and the potential for exposure. The following are therefore only general guidelines that may not fit all circumstances. Control measures to consider include:

Ventilation: Where production and processing procedures generate airborne nickel dust use adequate local or general exhaust ventilation to maintain concentrations well below recommended occupational exposure limits.

Protective Clothing: Gloves and coveralls or other long-sleeved work clothing is recommended to prevent prolonged or repeated direct skin contact with nickel metal. Appropriate eye protection should also be worn.

Respirators: .Where nickel dust or fume is generated and cannot be controlled to within acceptable levels by engineering means, use appropriate NIOSH-approved respiratory protection equipment (a 42CFR84 Class N, R or P-100 particulate filter cartridge) in a half face piece or full-face piece air purifying of filtering face piece respirator.

General Hygiene Considerations: Do not eat, drink or smoke in work areas. Thoroughly wash hands before eating, drinking, or smoking in appropriate, designated area as well as at the end of the workday.
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SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Silvery-white metal	**Odour:** None	**Odour Threshold:** Not applicable	**pH:** Not Applicable
Melting Point/Range: 1453°C (2647°F)	**Boiling Point/Range:** 2832°C (5130°F)	**Vapour Pressure:** Negligible @ 20°C	**Vapour Density:** Not Applicable
Relative Density (Water = 1)**:** 8.908 @ 25°C	**Evaporation Rate:** Not Applicable	**Partition Distribution** (n-octanol/water): No Data	**Solubility (in water):** Essentially insoluble
Flammability: Non-combustible solid	**Flammable Limits (LEL/UEL):** Not applicable	**Auto-ignition Temperature:** None	**Decomposition Temperature:** None

NOTE: Flash point and viscosity are not relevant physical properties of this product and therefore have not been included above.

SECTION 10. STABILITY AND REACTIVITY

Stability & Reactivity: This material is stable and not considered reactive under normal temperatures and pressures. Hazardous polymerization or runaway reactions will not occur.

Incompatibilities: Elemental nickel is insoluble in water and strong nitric acid but is slightly soluble in hydrochloric and sulphuric acid as well as dilute nitric acid. Nickel, especially in powder or dust form, is incompatible with ammonium nitrate, halogens and interhalogens such as bromine pentafluoride and chlorine trifluoride, potassium perchlorate, selenium, sulphur, hydrazine and hydrazoic acid. Nickel powder has reacted violently with titanium powder and potassium perchlorate.

Hazardous Decomposition Products: Nickel oxide fumes will form at elevated temperatures such as during welding, oxy-acetylene torch or argon plasma cutting etc. The particle size of these fumes is largely within the respirable size range, which increases the likelihood of inhalation and deposition of nickel oxide particles within the lung.

SECTION 11. TOXICOLOGICAL INFORMATION

General: In the metallic form in which this product is sold it is relatively non-toxic. It is non-friable and does not generate dust in normal handling procedures. However, nickel is well known as one of the most frequent skin sensitizers in humans and this represents the major occupational risk of elemental nickel exposure.

Acute:
Skin/Eye: No acute toxicity data were identified from the literature sources available.

Inhalation: The CNESST report a case of massive overexposure to fine nickel dust for 90 minutes that resulted in a worker developing a fatal case of chemical pneumonia (estimated airborne concentration 382 mg/m^3).

Ingestion: Ingestion of water contaminated with nickel or its compounds has been reported to cause nausea, abdominal cramps, diarrhea and vomiting.

Chronic: Several animal studies have demonstrated lung inflammation after nickel inhalation. However, human experience has not conclusively confirmed this finding. However, Nickel is recognized as one of the leading causes of allergic contact dermatitis. This dermatitis can be very persistent due to the cumulative effects of repeated exposures. The prevalence of nickel sensitivity in the general population is estimated to be 2.5 – 5.0% due to the common occurrence of nickel in many everyday utensils, jewelry etc. Nickel sensitivity, once acquired, is apparently not lost. Recovery from the dermatitis usually occurs within seven days of cessation of exposure but may take several weeks. The International Agency for Research on Cancer (IARC) considers nickel metal to be a 2B carcinogen (possibly carcinogenic to humans) while the American Conference of Governmental Industrial Hygienists (ACGIH) lists elemental nickel as A5 (not suspected to be a human carcinogen). The National Toxicology Program (NTP) lists nickel metal as reasonably anticipated to be carcinogenic to humans while the EU lists it as a Category 3 carcinogen (possible carcinogenic effects). OSHA does not currently list nickel metal as a carcinogen while NIOSH lists all nickel and nickel compounds as carcinogens.

Animal Toxicity:

Hazardous Ingredient:	Acute Oral Toxicity:	Acute Dermal Toxicity:	Acute Inhalation Toxicity:
Nickel, elemental	>9,000 mg/kg†	No data	2.55 mg/L‡

† LD_{50}, Rat, Oral, * LD_{50}, Rat, Dermal ‡ LC_{50}, Rat, Inhalation, 4 hour

SECTION 12. ECOLOGICAL INFORMATION

In the form in which this product is sold it has low bioavailability and does not pose any significant environmental risks. However, prolonged exposure in the aquatic environment may lead slight solubilization of the metal and the release of nickel in ionic form to the water column.

SECTION 13. DISPOSAL CONSIDERATIONS

Nickel-containing waste is normally collected to recover the nickel values. If material cannot be returned to the process or salvage, dispose of in accordance with applicable regulations. Waste materials may meet the definition of a hazardous material for disposal purposes. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated in order to determine the proper waste classification and disposal methods.

SECTION 14. TRANSPORT INFORMATION

Transport Canada Classification ..... Not a regulated product in pellet form
U.S. DOT Hazard Classification ..... Not a regulated product in pellet form

Transport Canada and U.S. DOT Shipping Name ..... Not applicable
Transport Canada and U.S. DOT Product Identification Number ..... Not applicable
Marine Pollutant ..... No
IMO Classification ..... Not regulated

SECTION 15. REGULATORY INFORMATION

U.S.

Ingredients Listed on TSCA Inventory..... Yes
Hazardous Under Hazard Communication Standard ..... Yes
CERCLA Section 103 Hazardous Substances..... Nickel..... RQ: 100 lb (45.4 kg)*
* - reporting not required when the diameter of the pieces of solid metal released is equal to or exceeds 100 micrometers (0.004 in)
EPCRA Section 302 Extremely Hazardous Substance..... No
EPCRA Section 311/312 Hazard Categories ..... Delayed (chronic) health hazard - Carcinogen
EPCRA Section 313 Toxic Release Inventory: ..... Nickel CAS No. 7440-02-0
..... Percent by weight >99.9%

SECTION 16. OTHER INFORMATION

Date of Original Issue: 14 June 2023 **Version:** 01 *(first edition)*
Date of Latest Revision: **Version:**

The information in this Safety Data Sheet is based on the following references:

- American Conference of Governmental Industrial Hygienists, 2004, Documentation of the TLVs and BEIs, 7th Edition + updates
- Australian National Industrial Chemicals Notification & Assessment Scheme (NICNAS) - Human Health Tier II Assessment for Nickel
- Canadian Centre for Occupational Safety and Health, Hamilton, ON – CHEMINFO Record No. 3479, Nickel (1996-02-20)
- Commission des normes, de l'équité, de la santé et de la securité du travail, Répertoire toxicologique – Fiche Nickel (métal)
- GESTIS Substance Database - Nickel Powder, Institute for Occupational Safety & Health of the German Social Accident Insurance (IFA) (accessed 01/05/2023)
- Health Council of the Netherlands, Nickel and its compounds - Evaluation of the effects on reproduction, recommendation for classification - Report No 2003-05OSH (18 Feb 2003)
- Oak Ridge National Laboratory, Health Sciences Research Division, Toxicity Summary for Nickel and Nickel Compounds. 1995
- Patty's Toxicology, Fifth Edition, 2001: E. Bingham & C. H. Powell, Ed.
- SCOEL - Recommendation from the Scientific Committee on occupational exposure Limits for nickel and inorganic nickel compounds 2011
- Toxicology of the Eye, 2nd ed. W. Morton Grant, MD, Charles C. Thomas , Publishers; Springfield. IL (1974)
- U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Toxicological Profile for Nickel (August 2015)
- U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, National Toxicology Program, 15th Report on Carcinogens, December 2021.
- European Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures, amending and repealing directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (REACH).
- Health Canada, SOR/2015-17, Hazardous Products Regulations, 11 February 2015
- U.S. Occupational Safety and Health Administration, Code of Federal Regulations, Title 29, Part 1910.1000 & 1910.1200

Acronyms not spelled out elsewhere in the SDS:
CAS: Chemical Abstracts Service
CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act
CNESST. Commission des normes, de l'équité, de la santé et de la securité du travail de Québec
DOT: Department of Transportation
EPCRA: Emergency Planning and Community Right- to-Know Act
IMO: International Maritime Organization
LD50, LC50: Lethal Dose 50%, Lethal Concentration 50%
OEGs: Occupational Exposure Guidelines
TSCA: Toxic Substances Control Act
Wt.: Weight

Notice to Reader

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