



MATERIAL SAFETY DATA SHEET

MATERION

1. Chemical product and company identification

A. Product name Titanium Nickel Niobium Targets

Other means of identification

SDS number G77

B. Recommended use and Limitations on use

Recommended use Manufacture of computer, electronic and optical products, electrical equipment
Scientific research and development
Other: Manufacture of medical and defense equipment

Limitations on use Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Consumer uses: Private households (= general public = consumers)

C. Supplier information

Company name Materion Advanced Materials Germany GmbH

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Germany

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MSDS number G77

2. Hazards identification

A. Hazard category/Classification

Physical hazards Not classified.

Health hazards Sensitization, skin Category 1
Carcinogenicity Category 2
Specific target organ toxicity, repeated exposure Category 1 (Respiratory system)

Environmental hazards Not classified.

B. Warning label items including precautionary statement

• **Pictogram**



• **Signal word** Danger

• **Hazard statement**

H317 May cause an allergic skin reaction.
H351 Suspected of causing cancer.
H372 Causes damage to organs (respiratory system) through prolonged or repeated exposure by inhalation.

• **Precautionary statement**

Prevention

P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
P260 Do not breathe dust/fume/gas/mist/vapors/spray.
P264 Wash thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P272 Contaminated work clothing should not be allowed out of the workplace.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

Response

P302 + P352 IF ON SKIN: Wash with plenty of water.
P304 + P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P308 + P311 IF exposed or concerned: Call a POISON CENTER/doctor.
P333 + P313 If skin irritation or rash occurs: Get medical advice/attention.
P362 + P364 Take off contaminated clothing and wash it before reuse.

Storage

P405 Store locked up.

Disposal

P501 Dispose of contents/container (in accordance with related regulations).

C. Other hazards not included in the hazard category criteria (e.g. dust explosion hazard) None known.

Supplemental information For further information, please contact the Product Stewardship Department at +1.216.383.4019.

3. Composition/information on ingredients

Chemical identity	Common and alternative names	CAS number	ID number	Content in percent (%)
Titanium		7440-32-6	KE-33881	70 - 80
Nickel		7440-02-0	KE-25818	15 - 25
Niobium		7440-03-1	2013-3-5602	3 - 8

4. First aid measures

A. In case of eye contact Rinse with water. If eye irritation persists: Get medical advice/attention.
B. In case of skin contact Wash off with soap and water. Get medical attention if irritation develops and persists.
C. In case of inhalation Move to fresh air. Call a poison center or doctor/physician if you feel unwell.
D. In case of swallowing Rinse mouth. Get medical attention if symptoms occur.
E. Note to physician Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.

Most important symptoms/effects, acute and delayed May cause an allergic skin reaction. Prolonged exposure may cause chronic effects.

General advice If exposed or concerned: get medical attention/advice.

5. Fire-fighting measures

A. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media Water Spray or Fog. Powder. Dry sand.

Unsuitable extinguishing media Carbon dioxide (CO₂).

B. Specific hazards arising from the chemical (example: hazardous combustion products) No unusual fire or explosion hazards noted.

C. Specific methods of fire-fighting

Special protective equipment for firefighters Wear suitable protective equipment.

Special fire fighting procedures Move containers from fire area if you can do so without risk.

General fire hazards No unusual fire or explosion hazards noted.

Specific methods Use standard firefighting procedures and consider the hazards of other involved materials.

6. Accidental release measures

- A. Personal precautions, protective equipment and emergency measures** Keep unnecessary personnel away. Wear appropriate protective equipment and clothing during clean-up.
- B. Environmental precautions** Avoid discharge into drains, water courses or onto the ground.
- C. Methods and materials for containment and cleaning up** Stop the flow of material, if this is without risk. For waste disposal, see section 13 of the MSDS.

7. Handling and storage

- A. Precautions for safe handling** Do not handle until all safety precautions have been read and understood. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Observe good industrial hygiene practices.
- B. Conditions for safe storage (including any incompatibilities)** Store locked up.

8. Exposure controls/personal protection

A. Exposure limit values, biological limit values, etc

Korea. OELs. Standards for Exposure to Chemical Substances and Physically Hazardous Factors

Components	Type	Value
Nickel (CAS 7440-02-0)	TWA	1 mg/m ³

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Nickel (CAS 7440-02-0)	TWA	1.5 mg/m ³	Inhalable fraction.

Biological limit values No biological exposure limits noted for the ingredient(s).

B. Appropriate engineering controls Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. General ventilation normally adequate.

C. Personal protective equipment

- **Respiratory protection** In case of insufficient ventilation, wear suitable respiratory equipment. In case of inadequate ventilation, use respiratory protection.
- **Eye protection** If contact is likely, safety glasses with side shields are recommended.
- **Hand protection** Suitable gloves can be recommended by the glove supplier. Wear gloves to prevent metal cuts and skin abrasions during handling.
- **Body protection** Use personal protective equipment as required.

Hygiene measures Observe any medical surveillance requirements. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Contaminated work clothing should not be allowed out of the workplace.

9. Physical and chemical properties

A. Appearance

- Physical state** Solid.
- Form** Solid.
- Color** Grey metallic.

B. Odor None.

C. Odor threshold Not applicable.

D. pH Not applicable.

E. Melting point/freezing point

- Melting point** 2453 °F (1345 °C) estimated
- Freezing point** Not applicable.

F. Boiling point, initial boiling point, and boiling range Not applicable.

G. Flash point	Not applicable.
H. Evaporation rate	Not applicable.
I. Flammability (solid, gas)	None known.
J. Upper/lower limit on flammability or explosive limits	
Flammability limit - lower (%)	Not applicable.
Flammability limit - lower (%) temperature	Not applicable.
Flammability limit - upper (%)	Not applicable.
Flammability limit - upper (%) temperature	Not applicable.
Explosive limit - lower (%)	Not applicable.
Explosive limit - lower (%) temperature	Not applicable.
Explosive limit - upper (%)	Not applicable.
Explosive limit - upper (%) temperature	Not applicable.
K. Vapor pressure	Not applicable.
L. Solubility	
Solubility (water)	Insoluble.
M. Vapor density	Not applicable.
N. Specific gravity	Not applicable.
O. n-octanol/water partition coefficient	Not applicable. Not applicable.
P. Auto-ignition temperature	Not applicable.
Q. Decomposition temperature	Not applicable.
R. Viscosity	Not applicable.
S. Molecular weight	Not available.
Other data	
Density	7.30 - 8.50 g/cm ³
Explosive properties	Not explosive.
Oxidizing properties	Not oxidizing.
Surface tension	Not applicable.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
A. Stability and hazardous reaction potential	
Stability	Material is stable under normal conditions.
Hazardous reaction potential	No dangerous reaction known under conditions of normal use.
B. Conditions to avoid (e.g. static discharge, shock or vibration, etc)	Contact with incompatible materials.
C. Incompatible materials	Strong acids. Strong oxidizing agents.
D. Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

A. Information on likely routes of exposure	
• Respiratory organs	Prolonged inhalation may be harmful.
• Skin	May cause an allergic skin reaction.
• Eyes	Direct contact with eyes may cause temporary irritation.

• Mouth Expected to be a low ingestion hazard.

B. Information on health hazards

- Acute toxicity (list all possible routes of exposure) Not known.
- Corrosivity or irritation to the skin Not likely, due to the form of the product.
- Serious eye damage/eye irritation Not likely, due to the form of the product.
- Respiratory sensitization May cause respiratory irritation.
- Skin sensitization May cause an allergic skin reaction.
- Carcinogenic properties /Carcinogenicity Suspected of causing cancer.

IARC Monographs. Overall Evaluation of Carcinogenicity

Nickel (CAS 7440-02-0)

2B Possibly carcinogenic to humans.

- Mutagenic properties /Mutagenicity Suspected of causing genetic defects.
- Reproductive toxicity Not classified.
- Specific target organ toxicity - single exposure Not classified.
- Specific target organ toxicity - repeated exposure Causes damage to organs through prolonged or repeated exposure.
- Aspiration hazard Not an aspiration hazard.

12. Ecological information

A. Ecotoxicity

Hazardous to the aquatic environment, acute hazard

The product is not classified as environmentally hazardous.

The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

B. Persistence/degradability

No data is available on the degradability of any ingredients in the mixture.

C. Bioaccumulative potential

No data available.

D. Mobility in soil

Not relevant, due to the form of the product.

E. Other adverse effects

No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

A. Method of disposal

Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container (in accordance with related regulations).

B. Disposal considerations (including disposal of contaminated containers or packaging)

Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

Waste code

The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

14. Transport information

IATA

- A. UN number Not applicable.
- B. UN proper shipping name Not applicable.
- C. Transport hazard class(es)
 - Class Not applicable.
 - Subsidiary risk -
- D. Packing group Not applicable.
- E. Environmental hazards No.
- F. Special precautions for user Not applicable.

IMDG

- A. UN number** Not applicable.
B. UN proper shipping name Not applicable.
C. Transport hazard class(es)
 Class Not applicable.
 Subsidiary risk -
D. Packing group Not applicable.
E. Environmental hazards
 Marine pollutant No.
EmS Not applicable.
F. Special precautions for user Not applicable.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

15. Regulatory information

A. Restrictions under the Industrial Safety and Health Law

Harmful Substances Prohibited from Manufacturing

Not regulated.

Harmful Substances Requiring Permission for Manufacture or Use

Not regulated.

Controlled Hazardous Substances

Nickel (CAS 7440-02-0)

Harmful Substances Requiring Special Medical Examination

Nickel (CAS 7440-02-0)

Workplace Environmental Monitoring Harmful Materials

Nickel (CAS 7440-02-0)

Occupational Exposure Limit

Nickel (CAS 7440-02-0)

B. Restrictions under the Chemicals Control Law (Previously Toxic Chemicals Control Law)

Accidental Release Prevention Substances

Not regulated.

Act on the Registration and Evaluation of Chemicals

Banned Toxic Chemicals

Not regulated.

Designated Existing Chemicals Subject to Registration (PEC) (MoE No. 2015-92)

Not listed.

Restricted Chemical Substances

Not regulated.

Toxic Chemicals

Not regulated.

C. Restrictions under the Dangerous Substance Safety Management Act

D. Restrictions under the Wastes Control Act

Halogenated Materials in Waste Organic Solvents

Not regulated.

Hazardous Substances

Not regulated.

E. Restrictions under other foreign or domestic laws

Clean Air Conservation Act

Air Pollutants

Nickel (CAS 7440-02-0)

Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides (Rules on PIC, MoE No. 2014-252, Dec. 31, 2014; Standards for Pesticides, RDA No. 2014-26), as amended

Not listed.

Specific Air Pollutants

Nickel (CAS 7440-02-0)

Further information This material safety data sheet was prepared in accordance with Article 41 of the Industrial Safety and Health Law.

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Korea	Existing Chemicals List (ECL)	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information

Bibliography

ACGIH
EPA: AQUIRE database
NLM: Hazardous Substances Data Base
US. IARC Monographs on Occupational Exposures to Chemical Agents
Korea. Accidental Release Prevention Substances (Presidential Decree of Toxic Chemical Control Law, Executive Order No. 19203)
Korea. Dangerous Substances Threshold Quantity (Presidential Decree of Dangerous Substances Safety Management Act No. 18406, Schedule 1)
Korea. Harmful Substances Prohibited from Manufacturing (Presidential Decree on the Industrial Safety and Health Act (No. 13053), Article 29)
Korea. Harmful Substances Requiring Permission for Manufacture or Use (Presidential Decree on the Industrial Safety and Health Act (No. 13053), Article 30)
Korea. OELs. Regulation for Permitted Concentration of Hazardous Substances (Ministry of Labor (MOL) Public Notice No. 1986-45, as amended)
Korea. Prohibited Chemical Substances (TCCL Article 11)
Korea. Regulated volatile organic compounds (VOCs) (MOE Notice No. 2001-36, March 8, 2001, as amended)
Korea. Restricted Chemical Substances (TCCL Article 11)
Korea. Toxic Chemical Control Law (TCCL), Existing Chemicals Inventory (KECI)
Korea. Toxic Chemical Control Law (TCCL), pre-1997 List
Korea. Toxic Chemicals (TCCL Article 10)
Korea. Toxic Release Inventory (TRI) Chemicals (TCCL Article 14)
Korea. Accidental Release Prevention Substances (Pres. Decree of Toxic Chemical Control Law, Ex. Order No. 19203, Tables 2 & 3, Dec 28, 2005)
Korea. OELs (ISHL Article 42; MOL Public Notice No. 1986-45, as amended through MOEL Notice 2013-38, August 14, 2013)
Korea. Prohibited Chemical Substances (AREC "K-REACH" Article 27; Designation of Toxic, Restricted or Banned Chemicals Appendices 4 and 5)
Korea. Restricted Chemical Substances (AREC "K-REACH" Article 27; Designation of Toxic, Restricted or Banned Chemicals Appendices 2 and 3)
KECI, January 27, 2015, amended through MoE 2016-138, July 13, 2016
Korea. Toxic Chemicals (AREC "K-REACH" Article 20; Designation of Toxic, Restricted or Banned Chemicals Appendix 1)
Korea. Toxic Release Inventory (TRI) Chemicals (MOE Public Notice No. 2002-166, Nov. 8, 2002)

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