MATERION

MATERIAL SAFETY DATA SHEET

1. Chemical product and company identification

A. Product name Titanium targets

Other means of identification

SDS number 2BV

Materion Code 2BV

Synonym(s) Titanium

B. Recommended use and Limitations on use

Recommended use Not available.

C. Supplier information

Company name Materion Advanced Chemicals Inc.

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Division Milwaukee

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MSDS number 2BV

2. Hazards identification

A. Hazard category/Classification

Physical hazards Not classified.

Health hazards Not classified.

Environmental hazards Not classified.

B. Warning label items including precautionary statement

• Pictogram None.

• Signal word None.

• Hazard statement The substance does not meet the criteria for classification. The material as sold in solid form is generally not considered hazardous. However, if the process involves grinding, melting, cutting or any other process that causes a release of dust or fumes, hazardous levels of airborne particulate could be generated.

• Precautionary statement

Prevention Observe good industrial hygiene practices.

Response

P314 Get medical advice/attention if you feel unwell.

Storage Store away from incompatible materials.

Disposal

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

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

Supplemental information None.

3. Composition/information on ingredients

The components are not hazardous or are below required disclosure limits.

4. First aid measures

A. In case of eye contact	Do not rub eyes. Rinse with water. Get medical attention if irritation develops and persists.
B. In case of skin contact	Rinse with water. Get medical attention if irritation develops and persists.
C. In case of inhalation	Move to fresh air. Call a physician if symptoms develop or persist.
D. In case of swallowing	Get medical advice/attention if you feel unwell.
E. Note to physician	Provide general supportive measures and treat symptomatically. Thermal burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital.
Most important symptoms/effects, acute and delayed	Direct contact with eyes may cause temporary irritation.
General advice	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

A. Suitable (and unsuitable) extinguishing media

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
B. Specific hazards arising from the chemical (example: hazardous combustion products)	During fire, gases hazardous to health may be formed.

C. Specific methods of fire-fighting

Special protective equipment for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Special fire fighting procedures	In case of fire and/or explosion do not breathe fumes. Move containers from fire area if you can do so without risk.
General fire hazards	Flammable solid.
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. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the MSDS.
B. Environmental precautions	Avoid discharge into drains, water courses or onto the ground.
C. Methods and materials for containment and cleaning up	Sweep up or vacuum up spillage and collect in suitable container for disposal. Prevent product from entering drains. Clean up in accordance with all applicable regulations. Collect dust using a vacuum cleaner equipped with HEPA filter.

7. Handling and storage

A. Precautions for safe handling	Wear appropriate personal protective equipment. Observe good industrial hygiene practices.
B. Conditions for safe storage (including any incompatibilities)	Store in original tightly closed container. Store in a well-ventilated place. Store away from incompatible materials (see Section 10 of the MSDS).

8. Exposure controls/personal protection

A. Exposure limit values, biological limit values, etc

No exposure limits noted for ingredient(s).

Biological limit values	No biological exposure limits noted for the ingredient(s).
B. Appropriate engineering controls	Ventilate as needed to control airborne dust. Use explosion-proof ventilation equipment if airborne dust levels are high.

C. Personal protective equipment

• Respiratory protection	In case of insufficient ventilation, wear suitable respiratory equipment.
• Eye protection	Wear eye/face protection. Wear safety glasses with side shields (or goggles).

• Hand protection	Wear appropriate chemical resistant gloves.
• Body protection	Wear suitable protective clothing. Wear protective gloves.
Hygiene measures	When using do not smoke. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking.

9. Physical and chemical properties

A. Appearance	
Physical state	Solid.
Form	Solid.
Color	Not available.
B. Odor	Not available.
C. Odor threshold	Not available.
D. pH	Not available.
E. Melting point/freezing point	
Melting point	3034.4 °F (1668 °C) 3034.4 °F (1668 °C) estimated
Freezing point	3034.4 °F (1668 °C) 3034.4 °F (1668 °C) estimated
F. Boiling point, initial boiling point, and boiling range	5948.6 °F (3287 °C) 5948.6 °F (3287 °C) estimated
G. Flash point	Not available.
H. Evaporation rate	Not available.
I. Flammability (solid, gas)	Flammable solid.
J. Upper/lower limit on flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
K. Vapor pressure	< 0.0000001 kPa at 25 °C 0.00001 hPa estimated
L. Solubility	
Solubility (water)	Not available.
M. Vapor density	Not available.
N. Specific gravity	4.51 at 20 °C 4.51 estimated
O. n-octanol/water partition coefficient	Not available.
P. Auto-ignition temperature	482 °F (250 °C) 2192 °F (1200 °C) 482 °F (250 °C) estimated
Q. Decomposition temperature	Not available.
R. Viscosity	Not available.
S. Molecular weight	47.9 g/mol
Other data	
Density	4.51 g/cm3 estimated at 20 °C 4.51 g/cm3 estimated
Explosive properties	Not explosive.
Molecular formula	Ti
Oxidizing properties	Not oxidizing.

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)	Heat, flames and sparks. High temperatures. Contact with incompatible materials.
C. Incompatible materials	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	Due to lack of data the classification is not possible.
• Skin	Due to lack of data the classification is not possible.
• Eyes	Due to lack of data the classification is not possible.
• Mouth	Due to lack of data the classification is not possible.

B. Information on health hazards

• Acute toxicity (list all possible routes of exposure)	No data available.
• Corrosivity or irritation to the skin	Due to lack of data the classification is not possible.
• Serious eye damage/eye irritation	Due to lack of data the classification is not possible.
• Respiratory sensitization	Due to lack of data the classification is not possible.
• Skin sensitization	Due to lack of data the classification is not possible.
• Carcinogenic properties /Carcinogenicity	Due to lack of data the classification is not possible.
• Mutagenic properties /Mutagenicity	Due to lack of data the classification is not possible.
• Reproductive toxicity	Due to lack of data the classification is not possible.
• Specific target organ toxicity - single exposure	Due to lack of data the classification is not possible.
• Specific target organ toxicity - repeated exposure	Due to lack of data the classification is not possible.
• Aspiration hazard	Due to lack of data the classification is not possible.

12. Ecological information

A. Ecotoxicity	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.
Hazardous to the aquatic environment, acute hazard	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 this product.
C. Bioaccumulative potential	No data available.
D. Mobility in soil	No data available.
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. This material and its container must be disposed of as hazardous waste. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. 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

Not regulated.

Harmful Substances Requiring Special Medical Examination

Not regulated.

Workplace Environmental Monitoring Harmful Materials

Not regulated.

Occupational Exposure Limit

Not regulated.

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

Not regulated.

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

Not regulated.

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. Non-Toxic Chemicals List (National Institute of Environment Research (NIER) Public Notice No. 1997-10, as amended)
Korea. Observational Chemicals (Ministerial Decree of TCCL Article 6)
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)

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