MATERIAL SAFETY DATA SHEET

1. Chemical product and company identification

A. Product name Tungsten-Titanium (WTi) pieces

B. Recommended use and Limitations on use

Recommended use Not available.

C. Supplier information

Company name Materion Advanced Chemicals Inc.

Address 407 N 13th Street
1316 W. St. Paul Avenue
Milwaukee WI 53233
United States

Division Milwaukee

Email advancedmaterials@materion.com

Contact person Noreen Atkinson

Emergency telephone number Chemtrec 800.424.9300

MSDS number T-MSDS0072

2. Hazards identification

A. Hazard category/Classification

Physical hazards	Not classified.	
Health hazards	Serious eye damage/eye irritation	Category 2
Environmental hazards	Not classified.	

B. Warning label items including precautionary statement

• Pictogram

• Signal word Warning

• Hazard statement

H319 Causes serious eye irritation.

• Precautionary statement

Prevention

P280 Wear eye/face protection.
P264 Wash thoroughly after handling.
P280 Wear eye protection/face protection.

Response

P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313 If eye irritation persists: Get medical advice/attention.

Storage Store away from incompatible materials.

Disposal Dispose of waste and residues in accordance with local authority requirements.

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

Supplemental information 194% of the mixture consists of component(s) of unknown long-term hazards to the aquatic environment. 194% of the mixture consists of component(s) of unknown acute oral toxicity. 194% of the mixture consists of component(s) of unknown acute hazards to the aquatic environment. 194% of the mixture consists of component(s) of unknown acute dermal toxicity. For further information, please contact the Product Stewardship Department at +1.800.862.4118.

3. Composition/information on ingredients

Chemical identity	Common and alternative names	CAS number	ID number	Content in percent (%)
Tungsten		7440-33-7	KE-35000	1 - 95
Other components below reportable levels				5 - 99

4. First aid measures

A. In case of eye contact Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. 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 physician if symptoms develop or persist.

D. In case of swallowing Rinse mouth. Get medical advice/attention if you feel unwell.

E. Note to physician Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.

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 None known.

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 Use water spray to cool unopened containers.

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. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. 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 Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water.

Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use. For waste disposal, see section 13 of the MSDS.

7. Handling and storage

A. Precautions for safe handling Avoid contact with eyes. Avoid prolonged exposure. Provide adequate ventilation. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Observe good industrial hygiene practices.

B. Conditions for safe storage (including any incompatibilities) Store in a cool, dry place out of direct sunlight. Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the MSDS).

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
Tungsten (CAS 7440-33-7)	STEL	10 mg/m3
	TWA	5 mg/m3

US. ACGIH Threshold Limit Values

Components	Type	Value
Tungsten (CAS 7440-33-7)	STEL	10 mg/m3
	TWA	5 mg/m3

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

B. Appropriate engineering controls Good general ventilation (typically 10 air changes per hour) 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. Provide eyewash station.

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.

Hygiene measures 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.

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) estimated

Freezing point 3034.4 °F (1668 °C) estimated

F. Boiling point, initial boiling point, and boiling range 5948.6 °F (3287 °C) estimated

G. Flash point Not available.

H. Evaporation rate Not available.

I. Flammability (solid, gas) Not available.

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 0.00001 hPa estimated

L. Solubility

Solubility (water) Not available.

M. Vapor density Not available.

N. Specific gravity	11.32 estimated
O. n-octanol/water partition coefficient	Not available.
P. Auto-ignition temperature	482 °F (250 °C) estimated
Q. Decomposition temperature	Not available.
R. Viscosity	Not available.
S. Molecular weight	Not available.

Other data

Density	11.32 g/cm3 estimated
Explosive properties	Not explosive.
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)	Contact with incompatible materials.
C. Incompatible materials	Fluorine. Chlorine.
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	Due to lack of data the classification is not possible.
• Eyes	Causes serious eye irritation.
• Mouth	Due to lack of data the classification is not possible.

B. Information on health hazards

• Acute toxicity (list all possible routes of exposure)	Not known.
• Corrosivity or irritation to the skin	Due to lack of data the classification is not possible.
• Serious eye damage/eye irritation	Causes serious eye irritation.
• 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 for this 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

Tungsten (CAS 7440-33-7)

Harmful Substances Requiring Special Medical Examination

Tungsten (CAS 7440-33-7)

Workplace Environmental Monitoring Harmful Materials

Tungsten (CAS 7440-33-7)

Occupational Exposure Limit

Tungsten (CAS 7440-33-7)

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

Accidental Release Prevention Substances

Not regulated.

Observational 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.

Specific Air Pollutants

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.

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

A. Source of information	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)
B. Issue date	09-27-2016
C. Number of revisions and date of most recent revision	Not applicable.
D. Other	Not available.
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