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Current Version: 1.0
Revision Date: May 18, 2018

Material Safety Data Sheet

Identity: Titanium Nitride

Formula: TiN

SECTION I - GENERAL INFORMATION

Manufacturer: Advanced Engineering Materials Limited (AEM)

The information below is believed to be accurate and represents the best information available to AEM. However, AEM makes no warranty, expressed or implied with respect to such information and assumes no liability resulting from its use.

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

<i>CAS #</i>	<i>OSHA/PEL</i>	<i>ACGIH/TLV</i>	<i>%</i>
25583-20-4	NE	NE	0.0 - 100.0%

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

Physical States: Solid

Boiling Point: N/A

Vapor Pressure (vs. air or mm Hg): N/A

Melting Point: 2950.00°C (5306.0 F)

Density: 5.22 g/cm³

Evaporation Rate: N/A

Flash Point: N/A

Solubility in Water: Insoluble

Appearance and odor: Gray-black powder may have an ammonia odor in moist air.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Method Used: Unknown

Explosive Limits: LEL: N/A

UEL: N/A

Extinguishing Media: Use suitable extinguishing agent for surrounding material and type of fire

Special Fire Fighting Procedures:

Firefighters must wear full face, self-contained breathing apparatus with full protective clothing to prevent contact with skin and eyes. Fumes from fire are hazardous. Isolate runoff to prevent environmental pollution.

Unusual Fire and Explosion Hazards:

–When heated to decomposition, titanium nitride may emit toxic fumes of ammonia gas which can form explosive mixtures



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with air.

–Contact with acids may generate flammable hydrogen gas.

–May react with moist air to liberate ammonia gas.

SECTION V - REACTIVITY DATA

Stability: Stable

Conditions to Avoid (instability): None

Incompatibility: Water, steam, moisture and acids.

Hazardous Decomposition or Byproducts: Ammonia gas, hydrogen gas and oxides of nitrogen.

Hazardous Polymerization: Will not occur

Conditions to avoid (hazardous polymerization): None

SECTION VI - HEALTH HAZARD DATA

Routes of entry: Inhalation? Yes Skin? No Eyes? No Ingestion? Yes Other? No

To the best of our knowledge the chemical, physical and toxicological properties of titanium nitride have not been thoroughly investigated and recorded.

Titanium compounds are generally considered to be physiologically inert. There are no reported cases in the literature where titanium as such has caused human intoxication. The dusts of titanium or most titanium compounds such as titanium oxide may be placed in the nuisance category. (Sax, Dangerous Properties of Industrial Materials, eighth edition)

Ammonia gas is a human poison by an unspecified route. Poison by inhalation, ingestion, and possibly other routes. An eye, mucous membrane, and systemic irritant by inhalation. Mutation data reported. (Sax, Dangerous Properties of Industrial Materials, eighth edition)

Signs and Symptoms of Overexposure:

Inhalation: May cause a red, dry throat, coughing, shortness of breath, swelling of mouth and throat.

Ingestion: May cause tissue damage, chemical burns, nausea and vomiting.

Skin: May cause redness, burning, itching, inflammation, blistering and tissue damage.

Eye: May cause redness, burning, itching, watering, lens opacities and ulceration of the conjunctiva and cornea.

Health Hazards (Acute and Chronic):

Inhalation:

Acute: May cause irritation to the respiratory system and mucous membranes of the nose and throat. Ammonia gas may



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cause irritation to the nose and throat, dyspnea, bronchial spasms, chest pain, pulmonary edema and pink frothy sputum. Chronic: May cause pulmonary edema. Repeated or prolonged exposure to ammonia gas may cause swelling of mouth and throat to the point of asphyxiation, permanent injury and death.

Ingestion:

Acute: Considered to have low toxicity by ingestion. Ammonia gas may cause nausea, vomiting and burns.
Chronic: No chronic health effects recorded.

Skin:

Acute: May cause irritation. Ammonia gas may cause irritation and chemical burns. Chronic: Repeated or prolonged exposure to ammonia gas may cause tissue damage.

Eye:

Acute: May cause moderate irritation. Ammonia gas may cause severe irritation and chemical burns. Chronic: Repeated or prolonged exposure to ammonia gas may cause irreversible damage to the conjunctiva, cornea and lens.

Target Organs: May affect the respiratory system, skin and eyes.

Carcinogenicity: NTP? No IARC Monographs? No OSHA Regulated? No

Medical Conditions Aggravated by Exposure: Pre-existing lung and skin disorders.

Emergency and First Aid Procedures:

Inhalation: Remove victim to fresh air, keep warm and quiet, and give oxygen if breathing is difficult; seek medical attention

Ingestion: Give 1-2 glasses of milk or water and induce vomiting, seek medical attention. Never induce vomiting or give anything by mouth to an unconscious person

Skin: Remove contaminated clothing, brush material off skin, wash affected area with mild soap and water, and seek medical attention if symptoms persist

Eye: Flush eyes with lukewarm water, lifting upper and lower eyelids for at least 15 minutes and seek medical attention

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be taken in case material is released or spilled:

Wear appropriate respiratory and protective equipment specified in section VIII. Isolate spill area, provide ventilation and extinguish sources of ignition. Vacuum up spill using a high efficiency particulate absolute (HEPA) air filter and place in a closed container for proper disposal. Take care not to raise dust.



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Waste disposal method:

Dispose of in accordance with state, local, and federal regulations.

Hazard Label Information:

Store in cool, dry area and in tightly sealed container. Wash thoroughly after handling.

Precautions: Titanium nitride may be moisture sensitive, handle and store under argon or other inert gas.

SECTION VIII - CONTROL MEASURES

Protective Equipment Summary (Hazard Label Information):

NIOSH approved respirator, impervious gloves, safety glasses, clothes to prevent contact.

Ventilation:

Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

Handle in a controlled atmosphere Mechanical (General): Not recommended

Other: Handle in an inert gas such as argon

Work/Hygienic/Maintenance Practices:

Implement engineering and work practice controls to reduce and maintain concentration of exposure at low levels. Use good housekeeping and sanitation practices. Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air.

Please be advised that N/A can either mean Not Applicable or No Data Has Been Established