

Safety Data Sheet

Version 7.1
Revision Date 05/23/2017

SDS Number 300000005292
Print Date 12/16/2017

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : TDMAT

Chemical formula : C₈H₂₄N₄Ti

Synonyms : TDMAT;Tetrakis(dimethylamino)titanium

Product Use Description : Semiconductor Processing

Manufacturer/Importer/Distributor : Air Products and Chemicals, Inc
7201 Hamilton Blvd.
Allentown, PA 18195-1501
GST No. 123600835 RT0001
QST No. 102753981 TQ0001

Telephone : 1-610-481-4911 Corporate
1-800-345-3148 Chemicals Cust Serv
1-800-752-1597 Gases/Electronics Cust Serv

Emergency telephone number (24h) : 800-523-9374 USA
+1 610 481 7711 International

2. HAZARDS IDENTIFICATION

GHS classification

Flammable liquids - Category 2
Substances and mixtures which in contact with water emit flammable gases - Category 1
Acute toxicity - Oral Category 4
Acute toxicity - Inhalation Category 3
Skin corrosion - Category 1B
Serious Eye Damage - Category 1

GHS label elements

Hazard pictograms/symbols



Safety Data Sheet

Version 7.1

Revision Date 05/23/2017

SDS Number 300000005292

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Signal Word: Danger

Hazard Statements:

H225:Highly flammable liquid and vapour.

H260:In contact with water releases flammable gases which may ignite spontaneously.

H302:Harmful if swallowed.

H331:Toxic if inhaled.

H314:Causes severe skin burns and eye damage.

Precautionary Statements:

Prevention

: P210:Keep away from heat, hot surfaces, sparks, open flames, and other ignition sources. No smoking.
P223:Keep from any possible contact with water, because of violent reaction and possible flash fire.
P231+P232:Handle under inert gas, protect from moisture.
P233:Keep container tightly closed.
P240:Ground/Bond container and receiving equipment.
P241:Use explosion-proof electrical/ventilating/lighting/equipment.
P242:Use only non-sparking tools.
P243:Take precautionary measures against static discharge.
P261:Avoid breathing dust/fume/gas/mist/vapours/spray.
P264:Wash hands thoroughly after handling.
P270:Do not eat, drink or smoke when using this product.
P271:Use only outdoors or in a well-ventilated area.
P280:Wear protective gloves/protective clothing/eye protection/face protection.

Response

: P301+P330+P331 :IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
P303+P361+P353 :IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304+P340 :IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305+P351+P338 :IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310 :Immediately call a POISON CENTRE/doctor.
P335 + P334 :Brush off loose particles from skin. Immerse in cool water/wrap in wet bandages.
P363 :Wash contaminated clothing before reuse.
P370+P378 :In case of fire, use recommended extinguishing media for extinction.

Storage

: P402+P404:Store in a dry place. Store in a closed container .
P403+P235:Store in a well-ventilated place. Keep cool.
P405:Store locked up.

Disposal

: P501:Disposal of contents/container to be specified in accordance with regulations.

Safety Data Sheet

Version 7.1

Revision Date 05/23/2017

SDS Number 300000005292

Print Date 12/16/2017

Hazards not otherwise classified

Reacts violently with water.
Reaction with water releases heat.
May cause thermal burns.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS Number	Concentration (Weight)
Methanamine, N-methyl-, titanium(4+) salt	3275-24-9	> 99%

Concentration is nominal. For the exact product composition, please refer to technical specifications. Contains no other components or impurities which will influence the classification of the product.

4. FIRST AID MEASURES

- General advice : Seek medical advice. If breathing has stopped or is labored, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately.
- Eye contact : Hold eyelids apart, initiate and maintain gentle and continuous irrigation until the patient receives medical care. If medical care is not promptly available, continue to irrigate for one hour.
- Skin contact : Immediately remove contaminated clothing, and any extraneous chemical, if possible to do so without delay. Flush immediately with copious amounts of water. Initiate and maintain continuous irrigation until the patient receives medical care. If medical care is not promptly available, continue to irrigate for one hour. Cover wound with sterile dressing.
- Ingestion : Never give anything by mouth to an unconscious person. Prevent aspiration of vomit. Turn victim's head to the side.
- Inhalation : Move to fresh air.
- Most important symptoms/effects - acute and delayed : Nausea. Pain. Vomiting. Eye disease. Skin disorders and Allergies. Neurological disorders

5. FIRE-FIGHTING MEASURES

- Suitable extinguishing media : For smaller fires, use dry chemical or carbon dioxide, do not use water. For large fires, flood fire area with water from as far as possible, using a protective barrier and appropriate personal protective equipment.
Carbon dioxide (CO2).
Dry chemical.
Dry sand.

Safety Data Sheet

Version 7.1

Revision Date 05/23/2017

SDS Number 300000005292

Print Date 12/16/2017

	Limestone powder.
Extinguishing media which must not be used for safety reasons.	: Water. Alcohol-resistant foam.
Specific hazards	: Burning produces noxious and toxic fumes. Downwind personnel must be evacuated. Fire or intense heat may cause violent rupture of packages. Flash back possible over considerable distance. May form explosive mixtures in air. Reacts violently with water. Flammability of product may vary with environmental conditions, such as, humidity or temperature. Product will react with water or humidity. Flash point of primary reaction by-product, dimethylamine, is < -50 degrees C.
Special protective equipment for fire-fighters	: Avoid contact with the skin. A face shield should be worn. Do not use neoprene or silicone equipment. Equipment constructed of butyl rubber is recommended. Use personal protective equipment. Wear self contained breathing apparatus for fire fighting if necessary.
Further information	: Do not allow run-off from firefighting to enter drains or water courses., Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment, and Emergency Procedures	: Wear suitable protective clothing, gloves and eye/face protection. Use self-contained breathing apparatus and chemically protective clothing. Remove all sources of ignition. Evacuate personnel to safe areas.
Environmental precautions	: Prevent spilled product from entering streams or drinking water supplies. Local authorities should be advised if significant spillages cannot be contained. Shut off or remove all ignition sources. Construct a dike to prevent spreading.
Methods for cleaning up	: Call Emergency Response number for advice. Approach suspected leak areas with caution. Absorb with inert absorbent materials such as: Dry sand. Vermiculite. Activated charcoal. Polypropylene. Place in appropriate chemical waste container.
Additional advice	: Protect from water. If possible, stop flow of product.

7. HANDLING AND STORAGE

Handling

See "Flammable and Combustible Liquid Code" NFPA No. 30, National Fire Protection Association, Boston, MA. Avoid contact with skin and eyes. Emergency showers and eye wash stations should be readily accessible. Adhere to work practice rules established by government regulations. Avoid contact with eyes. Use personal protective equipment. When using, do not eat, drink or smoke.

Storage

Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition. Keep in a dry, cool place. Keep away from oxidizers. Store in an area suitable for water reactive

Safety Data Sheet

Version 7.1

Revision Date 05/23/2017

SDS Number 300000005292

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materials. Minimize exposure to air. Exposure may cause material to degrade. Store under a nitrogen atmosphere. Maintain storage temperature below 50°C. Storage in stainless containers is preferred.

Technical measures/Precautions

Keep away from open flames, hot surfaces and sources of ignition.

Storage Temperature : 32 - 104 °F (0 - 40 °C)

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering measures

Use explosion-proof equipment.

Apply process controls to ensure safe operating conditions. Assess potential flammability hazards based on flashpoint and potential ignition sources.

Use process enclosures, local exhaust ventilation with a minimum hood velocity of 100 linear feet per minute or a glove box to maintain airborne levels below Exposure Guidelines.

Provide readily accessible eye wash stations and safety showers.

Provide natural or explosion-proof ventilation adequate to ensure concentrations are kept below exposure limits.

Personal protective equipment

Respiratory protection : Use a NIOSH/MSHA approved full-face respirator with amine/HEPA cartridge(s).

Hand protection : Impervious gloves.
Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Eye protection : Full face shield with goggles underneath.
Chemical resistant goggles must be worn.

Skin and body protection : Slicker Suit.
Impervious clothing.
Full rubber suit (rain gear).
Rubber or plastic boots.
Long sleeve shirts and trousers without cuffs.
Do not use neoprene or silicone equipment.

Environmental exposure controls : Prevent spilled product from entering streams or drinking water supplies. Local authorities should be advised if significant spillages cannot be contained. Shut off or remove all ignition sources.

Special instructions for protection and hygiene : Remove contaminated clothing. Drench affected area with water for at least 15 minutes. Wash hands at the end of each workshift and before eating, smoking or using the toilet. Provide readily accessible eye wash stations and safety showers.

Safety Data Sheet

Version 7.1

Revision Date 05/23/2017

SDS Number 300000005292

Print Date 12/16/2017

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	: Liquid. Yellow.
Odor	: Fishy.
Odor threshold	: No data available.
pH	: 11
Melting point/range	: -4 °F (-20 °C)
Boiling point/range	: 167 °F (75 °C) at 2.80 mmHg
Flash point	: <= 46 °F (<= 8 °C)
Evaporation rate	: No data available.
Flammability (solid, gas)	: Not applicable.
Upper/lower explosion/flammability limit	: 4.1 %(V) / 0.76 %(V)
Vapor pressure	: 0.11 mmHg at 77 °F (25 °C)
Water solubility	: Reacts violently with water.
Relative vapor density	: Heavier than air.
Relative density	: 0.94 (water = 1)
Partition coefficient: n-octanol/water [log Kow]	: No data available.
Auto-ignition temperature	: No data available.
Decomposition temperature	: No data available.
Viscosity	: No data available.
Molecular Weight	: 224.17 g/mol

10. STABILITY AND REACTIVITY

Chemical Stability	: Stable under normal conditions.
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Safety Data Sheet

Version 7.1

Revision Date 05/23/2017

SDS Number 300000005292

Print Date 12/16/2017

Conditions to avoid	: Heat, flames and sparks. Exposure to moisture. Reaction with water releases heat. May cause thermal burns. Heat.
Materials to avoid	: Oxidizing agents. Humid air. Water. Alcohol Acids. Bases. Oxygen. Aldehydes Ketones. Silicone. Neoprene. Active hydrogen containing species. Paper. Methyl Alcohol
Hazardous decomposition products	: Hazardous combustion products: Dimethylamine Titanium oxides. Carbon monoxide. Carbon dioxide (CO ₂). Ammonia Nitrogen oxides (NO _x). Nitric acid. Hydrolysis products: Titanium oxides. Dimethylamine
Possibility of hazardous Reactions/Reactivity	: Reacts violently with water.

11. TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Likely routes of exposure

Effects on Eye	: Causes eye burns. May cause blindness.
Effects on Skin	: Causes skin burns. If absorbed through the skin, may cause central nervous system effects, such as headache, nausea, dizziness, confusion, breathing difficulties. Skin absorption may cause nausea, headache and pain.
Inhalation Effects	: Can cause severe eye, skin and respiratory tract burns. May cause central nervous system effects, such as headache, nausea, dizziness, confusion, breathing difficulties. Severe cases of overexposure can result in respiratory failure.
Ingestion Effects	: If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the oesophagus and the stomach. May cause death unless

Safety Data Sheet

Version 7.1

Revision Date 05/23/2017

SDS Number 300000005292

Print Date 12/16/2017

treated promptly. May cause central nervous system damage.

Symptoms : Nausea. Pain. Vomiting. Eye disease., Skin disorders and Allergies., Neurological disorders

Acute toxicity

Acute Oral Toxicity : LD50 : 1,000 mg/kg Species : Rat. Estimated based on toxicological data of hydrolysis products.

Inhalation : LC50 (4 h) : 2 - 10 mg/l Estimated based on toxicological data of hydrolysis products. Information given is based on data on the components and the toxicology of similar products.

Acute Dermal Toxicity : No data is available on the product itself.

Skin corrosion/irritation : Severe skin irritation.

Serious eye damage/eye irritation : Severe eye irritation. Corneal edema may give rise to a perception of "blue haze" or "fog" around lights. This effect is temporary and has no known residual effect.

Sensitization. : No data available.

Chronic toxicity or effects from long term exposures

Carcinogenicity : No data available.

Reproductive toxicity : No data is available on the product itself.

Germ cell mutagenicity : This material was not mutagenic in a bacterial assay.

Specific target organ systemic toxicity (single exposure) : No data available.

Specific target organ systemic toxicity (repeated exposure) : No data available.

Aspiration hazard : No data available.

Delayed and Immediate Effects and Chronic Effects from Short and Long Term Exposure

This product contains no listed carcinogens according to IARC, ACGIH, NTP and/or OSHA in concentrations of 0.1 percent or greater. Prolonged contact may result in chemical burns and permanent damage. Eye disease., Skin disorders and Allergies., Neurological disorders

Safety Data Sheet

Version 7.1

Revision Date 05/23/2017

SDS Number 300000005292

Print Date 12/16/2017

12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Aquatic toxicity : No data is available on the product itself.

Toxicity to other organisms : No data available.

Persistence and degradability

Biodegradability : No data is available on the product itself.

Mobility : No data available.

Bioaccumulation : No data is available on the product itself.

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products : Contact supplier if guidance is required.

Contaminated packaging : Dispose of container and unused contents in accordance with federal, state, and local requirements.

14. TRANSPORT INFORMATION

DOT

UN/ID No. : UN3129
Proper shipping name : Water-reactive liquid, corrosive, n.o.s., (Tetrakis(dimethylamino)titanium)
Class or Division : 4.3
Packing group : I
Label(s) : 4.3 (8)
Marine Pollutant : No

IATA

UN/ID No. : UN3129
Proper shipping name : Water-reactive liquid, corrosive, n.o.s., (Tetrakis(dimethylamino)titanium)
Class or Division : 4.3
Packing group : I
Label(s) : 4.3 (8)
Marine Pollutant : No

IMDG

UN/ID No. : UN3129

Safety Data Sheet

Version 7.1

Revision Date 05/23/2017

SDS Number 300000005292

Print Date 12/16/2017

Proper shipping name : WATER-REACTIVE LIQUID, CORROSIVE, N.O.S.,
(Tetrakis(dimethylamino)titanium)
Class or Division : 4.3
Packing group : I
Label(s) : 4.3 (8)
Marine Pollutant : No

TDG

UN/ID No. : UN3129
Proper shipping name : WATER-REACTIVE LIQUID, CORROSIVE, N.O.S.,
(Tetrakis(dimethylamino)titanium)
Class or Division : 4.3
Packing group : I
Label(s) : 4.3 (8)
Marine Pollutant : No

Further Information

The transportation information is not intended to convey all specific regulatory data relating to this material. For complete transportation information, contact customer service.

15. REGULATORY INFORMATION

Toxic Substance Control Act (TSCA) 12(b) Component(s):

None.

Country	Regulatory list	Notification
USA	TSCA	Included on Inventory.
EU	EINECS	Included on EINECS inventory or polymer substance, monomers included on EINECS inventory or no longer polymer.
Canada	DSL	Not on Inventory.
Australia	AICS	Not on Inventory.
Japan	ENCS	Covered by low volume exemption. Not on inventory.
South Korea	ECL	Included on Inventory.
China	SEPA	Air Products has received a simplified registration certificate from the Chinese government to import, manufacture or use.
Philippines	PICCS	Not on Inventory.

EPA SARA Title III Section 312 (40 CFR 370) Hazard Classification
Acute Health Hazard Fire Hazard.

US. California Safe Drinking Water & Toxic Enforcement Act (Proposition 65)

Safety Data Sheet

Version 7.1

Revision Date 05/23/2017

SDS Number 300000005292

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This product does not contain any chemicals known to State of California to cause cancer, birth defects or any other harm.

16. OTHER INFORMATION

NFPA Rating

Health : 3
Fire : 2
Instability : 2
Special : W 2

HMIS Rating

Health : 3
Flammability : 3
Physical hazard : 2

Prepared by : Air Products and Chemicals, Inc. Global EH&S Department

Telephone : 1-610-481-4911 Corporate
1-800-345-3148 Chemicals Cust Serv
1-800-752-1597 Gases/Electronics Cust Serv

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For additional information, please visit our Product Stewardship web site at
<http://www.airproducts.com/productstewardship/>
