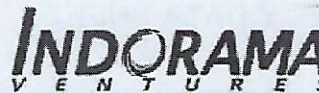


SAFETY DATA SHEET



TRIETHANOLAMINE 99%

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SECTION 1. IDENTIFICATION

Product name : TRIETHANOLAMINE 99%

Manufacturer or supplier's details

Company name of supplier : Indorama Ventures Oxides LLC
Address : 24 Waterway Ave., Suite 1100, The Woodlands, Texas 77380
United States of America (USA)
Telephone : (256) 3405200

E-mail address of person responsible for the SDS : oxide.sds.global@indorama.net
Emergency telephone number : CHEMTREC – United States (English)
Local (City) Northern Virginia: +1 703-741-5970

Recommended use of the chemical and restrictions on use

Recommended use : Intermediate

Level 7 Chemical
255 Sturgis Rd
Conway, AR 72034
(855) 927-1777

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Not a hazardous substance or mixture.

GHS label elements

Not a hazardous substance or mixture.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Components

Chemical name	CAS-No.	Concentration (% w/w)
2,2',2''-nitritotriethanol	102-71-6	>= 90 - <= 100

SECTION 4. FIRST AID MEASURES

General advice : Treat symptomatically.
Get medical attention if symptoms occur.

If inhaled : If inhaled, remove to fresh air.
Get medical attention if symptoms occur.

In case of skin contact : Get medical attention if irritation develops and persists.

In case of eye contact : Flush eyes with water as a precaution.
Remove contact lenses.
If eye irritation persists, consult a specialist.

If swallowed : Keep respiratory tract clear.
Never give anything by mouth to an unconscious person.
If symptoms persist, call a physician.

Most important symptoms and effects, both acute and : None known.

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delayed
Notes to physician : Treat symptomatically.

SECTION 5. FIRE-FIGHTING MEASURES

- Suitable extinguishing media : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
- Unsuitable extinguishing media : High volume water jet
- Hazardous combustion products : Carbon oxides
Nitrogen oxides (NOx)
- Specific extinguishing methods : Standard procedure for chemical fires.
- Further information : No action shall be taken involving any personal risk or without suitable training.
- Special protective equipment for fire-fighters : Wear self-contained breathing apparatus for firefighting if necessary.

SECTION 6. ACCIDENTAL RELEASE MEASURES

- Personal precautions, protective equipment and emergency procedures : Refer to protective measures listed in sections 7 and 8.
- Environmental precautions : Prevent product from entering drains.
Prevent further leakage or spillage if safe to do so.
If the product contaminates rivers and lakes or drains inform respective authorities.
- Methods and materials for containment and cleaning up : Neutralise with acid.
Wipe up with absorbent material (e.g. cloth, fleece).
Keep in suitable, closed containers for disposal.

SECTION 7. HANDLING AND STORAGE

- Advice on protection against fire and explosion : Normal measures for preventive fire protection.
- Advice on safe handling : Avoid formation of respirable particles.
Do not breathe vapours or spray mist.
Avoid contact with skin and eyes.
For personal protection see section 8.
Smoking, eating and drinking should be prohibited in the application area.
Dispose of rinse water in accordance with local and national regulations.
- Conditions for safe storage : No special storage conditions required.
Keep in properly labelled containers.
- Materials to avoid : For incompatible materials please refer to Section 10 of this SDS.
- Further information on storage stability : Stable under normal conditions.

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SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
2,2',2"-nitrilotriethanol	102-71-6	TWA	5 mg/m ³	ACGIH

Personal protective equipment

- Respiratory protection : No personal respiratory protective equipment normally required.
- Hand protection
- Remarks : The suitability for a specific workplace should be discussed with the producers of the protective gloves.
- Eye protection : Tightly fitting safety goggles
- Skin and body protection : Choose body protection according to the amount and concentration of the dangerous substance at the work place.
- Hygiene measures : General industrial hygiene practice.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

- Appearance : viscous liquid
- Color : light yellow
- Odor : ammoniacal
- Odor Threshold : No data available
- pH : 11 (68 °F / 20 °C)
Concentration: 20 g/l
- Freezing point : 68.9 °F / 20.5 °C
- Boiling point/boiling range : 637.0 °F / 336.1 °C
(1,013.25 hPa)
Decomposition: yes
- Flash point : 379 °F / 193 °C

Method: ISO 2719, Pensky-Martens closed cup
- Evaporation rate : < 0.1
- Self-ignition : No data available
- Upper explosion limit / Upper flammability limit : 7.2 %(V)
- Lower explosion limit / Lower flammability limit : 3.6 %(V)
- Vapor pressure : < 0.0003 hPa (70 °F / 21 °C)
- Relative vapor density : 5.2

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Relative density : 1.125 (68 °F / 20 °C)
Density : 1.125 g/cm³ (68 °F / 20 °C)
Bulk density : No data available
Solubility(ies)
Water solubility : > 1,000 g/l completely miscible (68 °F / 20 °C)
Solubility in other solvents : partly soluble
Solvent: Methanol
Partition coefficient: n-octanol/water : log Pow: -2.3 (77 °F / 25 °C)
pH: 7.1
Autoignition temperature : ca. 615 °F / 324 °C
Decomposition temperature : > 482 °F / > 250 °C
Method: Isoperibol Lütolf
> 248 °F / > 120 °C
Method: Dewar
Viscosity
Viscosity, dynamic : 934 mPa.s (68 °F / 20 °C)
Viscosity, kinematic : 527 mm²/s (77 °F / 25 °C)
Oxidizing properties : The substance or mixture is not classified as oxidizing.
Self-heating substances : No data available
Molecular weight : 149.19 g/mol

SECTION 10. STABILITY AND REACTIVITY

Reactivity : No dangerous reaction known under conditions of normal use.
Chemical stability : Stable under normal conditions.
Possibility of hazardous reactions : No hazards to be specially mentioned.
Conditions to avoid : None known.
Incompatible materials : Metals
Strong acids and strong bases
Strong oxidizing agents
Hazardous decomposition products : No hazardous decomposition products are known.

SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity

Components:

2,2',2"-nitrilotriethanol:

Acute oral toxicity : LD50 (Rat, male and female): 6,400 mg/kg

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Method: OECD Test Guideline 401

Acute inhalation toxicity : No observed effect concentration (Rat, male and female): 1.8 mg/m³
Exposure time: 8 h
Test atmosphere: vapour
Method: OECD Test Guideline 403

Acute dermal toxicity : LD50 (Rabbit, male and female): > 5,000 mg/kg

Skin corrosion/irritation

Components:

2,2',2''-nitrioltriethanol:

Species : Rabbit
Method : OECD Test Guideline 404
Result : No skin irritation

Species : Human
Result : No skin irritation

Serious eye damage/eye irritation

Components:

2,2',2''-nitrioltriethanol:

Species : Rabbit
Result : No eye irritation
Method : OECD Test Guideline 405

Respiratory or skin sensitization

Components:

2,2',2''-nitrioltriethanol:

Routes of exposure : Skin
Species : Guinea pig
Method : OECD Test Guideline 406
Result : Does not cause skin sensitization.

Germ cell mutagenicity

Components:

2,2',2''-nitrioltriethanol:

Genotoxicity in vitro : Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative

Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 473
Result: negative

Metabolic activation: with and without metabolic activation

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Method: OECD Test Guideline 476

Result: negative

Carcinogenicity

Components:

2,2',2''-nitrioltriethanol:

Species : Rat, male and female
Application Route : Dermal
Exposure time : 103 weeks
Dose : 250 mg/kg
Frequency of Treatment : 5 daily
Method : OECD Test Guideline 451
Result : negative

IARC No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

NTP No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Reproductive toxicity

Components:

2,2',2''-nitrioltriethanol:

Effects on fertility : Species: Rat, male and female
Application Route: Oral
Method: OECD Test Guideline 416
Result: No effects on fertility and early embryonic development were detected.

Effects on fetal development : Species: Rat
Application Route: Oral
General Toxicity Maternal: NOAEL: 120 mg/kg body weight
Method: OECD Test Guideline 414
Result: No teratogenic effects

Species: Rat, male and female
Application Route: Oral
General Toxicity Maternal: NOAEL: > 1,000 mg/kg body weight
Method: OECD Test Guideline 421
Result: No teratogenic effects

Species: Rat
Application Route: Dermal
General Toxicity Maternal: NOAEL: 75 mg/kg body weight
Method: OECD Test Guideline 414
Result: No teratogenic effects

Species: Rabbit

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Application Route: Dermal
General Toxicity Maternal: NOAEL: 10 mg/kg body weight
Method: OECD Test Guideline 414
Result: No teratogenic effects

STOT-single exposure

Product:

Remarks : No data available

STOT-repeated exposure

Product:

Remarks : No data available

Repeated dose toxicity

Components:

2,2',2"-nitritotriethanol:

Species : Rat, male and female
NOEC : 500 mg/m3
Application Route : Inhalation
Test atmosphere : dust/mist
Exposure time : 672 h
Method : OECD Test Guideline 412
Target Organs : Respiratory Tract

Species : Rat, male and female
NOEC : 420 mg/m3
Application Route : Inhalation
Test atmosphere : dust/mist
Exposure time : 120 h
Number of exposures : 6 h/d

Species : Rat, male and female
NOAEL : 1000 mg/kg, 500 mg/m3
Application Route : Ingestion
Exposure time : 2,184 h
Method : OECD Test Guideline 408

Species : Rat, male and female
NOAEL : 125 - 500 mg/kg
Application Route : Skin contact
Exposure time : 2,160 h
Number of exposures : 5 d/w
Method : OECD Test Guideline 411
Target Organs : Kidney

Species : Mouse, male and female
NOAEL : 250 - 1000 mg/kg
Application Route : Skin contact
Exposure time : 2,160 h
Number of exposures : 5 d/w

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SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Product:

Ecotoxicology Assessment

Acute aquatic toxicity : No data available
Remarks: No data available

Chronic aquatic toxicity : No data available
Remarks: No data available

Components:

2,2',2''-nitrioltriethanol:

Toxicity to fish : LC50 (Pimephales promelas (fathead minnow)): 11,800 mg/l
Exposure time: 96 h
Test Type: flow-through test
Test substance: Fresh water

Toxicity to daphnia and other aquatic invertebrates : EC50 (Ceriodaphnia dubia (water flea)): 609.88 mg/l
Exposure time: 48 h
Test Type: static test
Test substance: Fresh water

Toxicity to algae/aquatic plants : ErC50 (Desmodesmus subspicatus (green algae)): 512 mg/l
Exposure time: 72 h
Test Type: static test
Test substance: Fresh water

ErC50 (Desmodesmus subspicatus (green algae)): 750 mg/l
Exposure time: 48 h

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (Daphnia magna (Water flea)): 16 mg/l
Exposure time: 21 d
Test substance: Fresh water

Toxicity to microorganisms : IC50 (activated sludge): > 1,000 mg/l
Exposure time: 3 h
Test substance: Fresh water
Method: OECD Test Guideline 209

IC50 (Pseudomonas putida): > 1,000 mg/l
Exposure time: 16 h

Persistence and degradability

Product:

Stability in water : Method: No information available.
GLP: No information available.
Remarks: see user defined free text

Photodegradation : Remarks: No data available

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Components:

2,2',2''-nitrilotriethanol:

Biodegradability : Inoculum: activated sludge
Concentration: 5.7 mg/l
Result: Readily biodegradable.
Biodegradation: ca. 100 %
Exposure time: 5 d

Chemical Oxygen Demand (COD) : 1600 mgO₂/g

Bioaccumulative potential

Components:

2,2',2''-nitrilotriethanol:

Bioaccumulation : Species: Cyprinus carpio (Carp)
Bioconcentration factor (BCF): < 3.9
Exposure time: 42 d
Test substance: Fresh water

Partition coefficient: n-octanol/water : log Pow: -2.3 (77 °F / 25 °C)
pH: 7.1

Mobility in soil

Product:

Distribution among environmental compartments : Remarks: No data available

Stability in soil : Remarks: No data available

Components:

2,2',2''-nitrilotriethanol:

Distribution among environmental compartments : Koc: 18

Other adverse effects

Product:

Ozone-Depletion Potential : Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances
Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues : Dispose of contents and container in accordance with all local, regional, national and international regulations.
Dispose of contents/ container to an approved waste disposal plant.

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SECTION 14. TRANSPORT INFORMATION

International Regulations

UNRTDG

Not regulated as a dangerous good

IATA-DGR

Not regulated as a dangerous good

IMDG-Code

Not regulated as a dangerous good

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

Domestic regulation

49 CFR

Not regulated as a dangerous good

SECTION 15. REGULATORY INFORMATION

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
2,2'-iminodiethanol	111-42-2	100	*

*: Calculated RQ exceeds reasonably attainable upper limit.

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : No SARA Hazards

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Clean Air Act

This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 112 (40 CFR 61).

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).

The following chemical(s) are listed under the U.S. Clean Air Act Section 111 SOCM! Intermediate or Final VOC's (40 CFR 60.489):

2,2',2"-nitrilotriethanol 102-71-6 >= 90 - <= 100 %

Clean Water Act

This product does not contain any Hazardous Substances listed under the U.S. CleanWater Act, Section 311, Table 116.4A.

This product does not contain any Hazardous Chemicals listed under the U.S. CleanWater Act, Section 311, Table 117.3.

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This product does not contain any toxic pollutants listed under the U.S. Clean Water Act Section 307

US State Regulations

Massachusetts Right To Know

2,2',2''-nitrilotriethanol 102-71-6

Pennsylvania Right To Know

2,2',2''-nitrilotriethanol 102-71-6
2,2'-iminodiethanol 111-42-2

Maine Chemicals of High Concern

Product does not contain any listed chemicals

Vermont Chemicals of High Concern

Product does not contain any listed chemicals

Washington Chemicals of High Concern

Product does not contain any listed chemicals

California Prop. 65

WARNING: This product can expose you to chemicals including 2,2'-iminodiethanol, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

California Permissible Exposure Limits for Chemical Contaminants

2,2',2''-nitrilotriethanol 102-71-6

The ingredients of this product are reported in the following inventories:

DSL : All components of this product are on the Canadian DSL
AIRC : On the inventory, or in compliance with the inventory
NZIoC : On the inventory, or in compliance with the inventory
ENCS : On the inventory, or in compliance with the inventory
ISHL : On the inventory, or in compliance with the inventory
KECI : On the inventory, or in compliance with the inventory
PICCS : On the inventory, or in compliance with the inventory
IECSC : On the inventory, or in compliance with the inventory
TCSI : On the inventory, or in compliance with the inventory
TSCA : All substances listed as active on the TSCA inventory

TSCA list

No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

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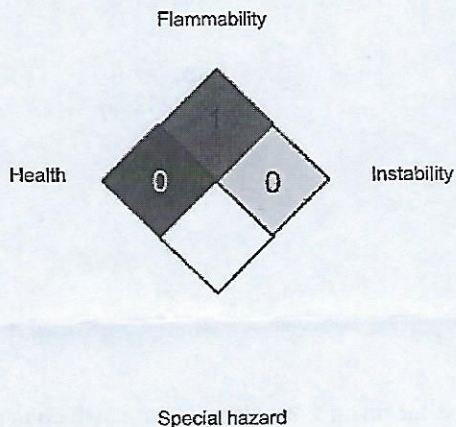
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SECTION 16. OTHER INFORMATION

Further information

NFPA 704:



HMIS® IV:

HEALTH	0
FLAMMABILITY	1
PHYSICAL HAZARD	0

HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. The "*" represents a chronic hazard, while the "/" represents the absence of a chronic hazard.

Full text of other abbreviations

- ACGIH : USA. ACGIH Threshold Limit Values (TLV)
- ACGIH / TWA : 8-hour, time-weighted average

AIIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund

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Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

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The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

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