

# SAFETY DATA SHEET

Version 8.11  
Revision Date 08/12/2025  
Print Date 08/13/2025

## SECTION 1. IDENTIFICATION

### 1.1 Product identifiers

Product name : p-NPP Alkaline Phosphatase Substrate

Product Number : ES009

Catalogue No. : 621264

Brand : Millipore

### 1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Reagent for development and research

Uses advised against :

The product is being supplied under the TSCA R&D Exemption (40 CFR Section 720.36). It is the recipient's responsibility to comply with the requirements of the R&D exemption. The product may not be used for a non-exempt commercial purpose under TSCA unless appropriate consent is granted in writing by MilliporeSigma.

### 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.  
3050 SPRUCE ST  
ST. LOUIS MO 63103  
UNITED STATES

Telephone : +1 314 771-5765

Fax : +1 800 325-5052

### 1.4 Emergency telephone number

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week

## SECTION 2. HAZARDS IDENTIFICATION

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

Skin irritation : Category 2

Serious eye damage : Category 1

Reproductive toxicity : Category 2

Specific target organ toxicity - repeated exposure : Category 2


Specific target organ toxicity - repeated exposure (Oral) : Category 2 (Kidney, Liver, Blood)

Short-term (acute) aquatic hazard : Category 3

### Other hazards

None known.

### GHS label elements

Hazard pictograms : 

Signal Word : Danger

Hazard Statements : H315 Causes skin irritation.  
H318 Causes serious eye damage.  
H361 Suspected of damaging fertility or the unborn child.  
H373 May cause damage to organs through prolonged or repeated exposure.  
H373 May cause damage to organs (Kidney, Liver, Blood) through prolonged or repeated exposure if swallowed.  
H402 Harmful to aquatic life.

Precautionary statements : **Prevention:**  
P201 Obtain special instructions before use.  
P202 Do not handle until all safety precautions have been read and understood.  
P260 Do not breathe mist or vapours.  
P264 Wash skin thoroughly after handling.  
P273 Avoid release to the environment.  
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

### Response:

P302 + P352 IF ON SKIN: Wash with plenty of soap and water.  
P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue

rinsing. Immediately call a POISON CENTER/ doctor.  
P308 + P313 IF exposed or concerned: Get medical advice/ attention.  
P332 + P313 If skin irritation occurs: Get medical advice/ attention.  
P362 Take off contaminated clothing and wash before reuse.

**Storage:**

P405 Store locked up.

**Disposal:**

P501 Dispose of contents/ container to an approved waste disposal plant.

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### SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

**Components**

| Chemical name                | CAS No./Unique ID | Concentration (% w/w) | Trade secret |
|------------------------------|-------------------|-----------------------|--------------|
| Diethanolamine hydrochloride | 14426-21-2*       | >= 5 - < 10           | -            |
| Diethanolamine               | 111-42-2*         | >= 1 - < 5            | -            |

\* Indicates that the identifier is a CAS No.

Actual concentration is withheld as a trade secret

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### SECTION 4. FIRST AID MEASURES

General advice : Show this safety data sheet to the doctor in attendance.

If inhaled : After inhalation: fresh air. Call in physician.

In case of skin contact : In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

In case of eye contact : After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist. Remove contact lenses.

If swallowed : After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

Most important symptoms and effects, : The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in

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|                            |  |
|----------------------------|--|
| both acute and delayed     | section 11                               |
| Protection of first-aiders | : For personal protection see section 8. |
| Notes to physician         | : No data available                      |

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## SECTION 5. FIREFIGHTING MEASURES

|  |  |
|--|--|
| Suitable extinguishing media                   | : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.  |
| Unsuitable extinguishing media                 | : For this substance/mixture no limitations of extinguishing agents are given.   |
| Specific hazards during fire fighting          | : Not combustible.   |
|  | Ambient fire may liberate hazardous vapours.   |
| Hazardous combustion products                  | : Carbon oxides  |
|  | Nitrogen oxides (NO <sub>x</sub> )   |
|  | Sulphur oxides   |
|  | Hydrogen chloride gas  |
| Specific extinguishing methods                 | : No data available  |
| Further information                            | : Suppress (knock down) gases/vapours/mists with a water spray jet.<br>Prevent fire extinguishing water from contaminating surface water or the ground water system. |
| Special protective equipment for fire-fighters | : Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.      |

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## SECTION 6. ACCIDENTAL RELEASE MEASURES

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- Personal precautions, protective equipment and emergency procedures : Advice for non-emergency personnel:  
Do not breathe vapours, aerosols.  
Avoid substance contact.  
Ensure adequate ventilation.  
Evacuate the danger area, observe emergency procedures, consult an expert.  
Advice for emergency responders:  
For personal protection see section 8.
- Environmental precautions : Do not let product enter drains.
- Methods and materials for containment and cleaning up : Cover drains. Collect, bind, and pump off spills.  
Observe possible material restrictions (see sections 7 and 10).  
Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

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## SECTION 7. HANDLING AND STORAGE

For precautions see section 2.2.

- Further information on storage conditions : Tightly closed.
- Storage class : 12, Non Combustible Liquids
- Recommended storage temperature : Recommended storage temperature see product label.
- Further information on storage stability : Recommended storage temperature see product label.

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## SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### Ingredients with workplace control parameters

| Components     | CAS-No.  | Value type<br>(Form of exposure)      | Control parameters /<br>Permissible concentration | Basis     |
|----------------|----------|---------------------------------------|---|-----------|
| Diethanolamine | 111-42-2 | TWA<br>(Inhalable fraction and vapor) | 1 mg/m <sup>3</sup>                               | ACGIH     |
|                |          | TWA                                   | 3 ppm<br>15 mg/m <sup>3</sup>                     | NIOSH REL |

**Engineering measures** : No data available

## Personal protective equipment

Respiratory protection : required when vapours/aerosols are generated.  
Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

Recommended Filter type: : Filter A (acc. to DIN 3181) for vapours of organic compounds

The entrepreneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer. These measures have to be properly documented.

### Hand protection

Material : Latex gloves  
Break through time : 480 min  
Glove thickness : 0.6 mm  
Protective index : Full contact  
Manufacturer : Lapren® (KCL 706 / Aldrich Z677558, Size M)

Material : Nitrile rubber  
Break through time : 30 min  
Glove thickness : 0.11 mm  
Protective index : Splash contact  
Manufacturer : KCL 741 Dermatril® L

Remarks : This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN 16523-1 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: [www.kcl.de](http://www.kcl.de)).

Eye protection : Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).  
Tightly fitting safety goggles

Skin and body protection : protective clothing

Hygiene measures : Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

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## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

|   |                                 |
|---|---------------------------------|
| Appearance  | : liquid                        |
| Color   | : clear, colourless             |
| Odor  | : No data available             |
| Odor Threshold                                      | : No data available             |
| pH  | : No data available             |
| Melting point                                       | : No data available             |
| Boiling point/boiling range                         | : No data available             |
| Flash point   | : No data available             |
| Evaporation rate                                    | : No data available             |
| Flammability (solid, gas)                           | : No data available             |
| Flammability (liquids)                              | : The product is not flammable. |
| Burning rate  | : No data available             |
| Self-ignition                                       | : Not applicable                |
| Upper explosion limit /<br>Upper flammability limit | : Not applicable                |
| Lower explosion limit /<br>Lower flammability limit | : Not applicable                |
| Vapor pressure                                      | : No data available             |
| Relative vapour density                             | : No data available             |
| Relative density                                    | : No data available             |
| Density   | : No data available             |
| Solubility(ies)                                     |                                 |
| Water solubility                                    | : soluble (68 °F / 20 °C)       |
| Partition coefficient: n-<br>octanol/water          | : No data available             |
| Autoignition temperature                            | : Not applicable                |
| Decomposition                                       | : No data available             |

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temperature

Viscosity, dynamic : No data available

Viscosity, kinematic : No data available

Flow time : No data available

Explosive properties : Not classified as explosive.

Oxidizing properties : none

Particle characteristics

Particle size : No data available

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## SECTION 10. STABILITY AND REACTIVITY

Reactivity : No data available

Chemical stability : The product is chemically stable under standard ambient conditions (room temperature) .

Possibility of hazardous reactions : Exothermic reaction with:  
anhydrides  
Oxidizing agents  
Acids  
Isocyanates  
Halogenated compounds  
Peroxides  
phenols  
acid halides  
strong reducing agents  
Caution! In contact with nitrites, nitrates, nitrous acid  
possible liberation of nitrosamines!  
Violent reactions possible with:  
The generally known reaction partners of water.

Conditions to avoid : no information available

Incompatible materials : Strong oxidizing agents

Hazardous decomposition products : In the event of fire: see section 5



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## SECTION 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Mixture

##### Acute toxicity

Oral: No data available

Symptoms: Possible symptoms: , mucosal irritations

Dermal: No data available

##### Skin corrosion/irritation

Remarks: Mixture causes skin irritation.

##### Serious eye damage/eye irritation

Remarks: Mixture causes serious eye damage.

##### Respiratory or skin sensitization

No data available

##### Germ cell mutagenicity

No data available

##### Carcinogenicity

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Diethanolamine)

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.

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

##### Reproductive toxicity

Suspected of damaging the unborn child.

Suspected of damaging fertility.

##### Specific target organ toxicity - single exposure

No data available

##### Specific target organ toxicity - repeated exposure

Mixture may cause damage to organs through prolonged or repeated exposure.

Mixture may cause damage to organs through prolonged or repeated exposure.

- Kidney, Liver, Blood

##### Aspiration hazard

No data available

### 11.2 Additional Information

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

Other dangerous properties can not be excluded.

This substance should be handled with particular care.

Handle in accordance with good industrial hygiene and safety practice.

## Components

### Diethanolamine hydrochloride

#### Acute toxicity

LD50 Oral - Rat - male and female - 1,600 mg/kg

(OECD Test Guideline 401)

Remarks: The value is given in analogy to the following substances: Diethanolamine

Inhalation: No data available

Dermal: No data available

LD50 Subcutaneous - Mouse - 4,786 mg/kg

#### Skin corrosion/irritation

Remarks: No data available

#### Serious eye damage/eye irritation

Eyes - Rabbit

Result: Risk of serious damage to eyes.

(OECD Test Guideline 405)

Remarks: The value is given in analogy to the following substances: Diethanolamine

#### Respiratory or skin sensitization

No data available

#### Germ cell mutagenicity

No data available

#### Carcinogenicity

No data available

#### Reproductive toxicity

No data available

#### Specific target organ toxicity - single exposure

Kidney, Liver, Blood

Remarks: The value is given in analogy to the following substances: Diethanolamine

#### Specific target organ toxicity - repeated exposure

May cause damage to organs through prolonged or repeated exposure.

Remarks: The value is given in analogy to the following substances: Diethanolamine

#### Aspiration hazard

No data available

### Diethanolamine

#### Acute toxicity

LD50 Oral - Rat - male and female - 1,600 mg/kg

(OECD Test Guideline 401)

Symptoms: Irritations of mucous membranes in the mouth, pharynx, oesophagus and gastrointestinal tract.

Inhalation: No data available

Dermal: No data available

No data available

**Skin corrosion/irritation**

Skin - Rabbit

Result: irritating

(OECD Test Guideline 404)

Remarks: (Regulation (EC) No 1272/2008, Annex VI)

**Serious eye damage/eye irritation**

Eyes - Rabbit

Result: Causes serious eye damage.

(OECD Test Guideline 405)

Remarks: (Regulation (EC) No 1272/2008, Annex VI)

**Respiratory or skin sensitization**

Maximisation Test - Guinea pig

Result: negative

(OECD Test Guideline 406)

**Germ cell mutagenicity**

Test Type: Ames test

Test system: Escherichia coli/Salmonella typhimurium

Result: negative

Test Type: Mutagenicity (mammal cell test): chromosome aberration.

Test system: rat hepatocytes

Result: negative

Test Type: sister chromatid exchange assay

Test system: Chinese hamster ovary cells

Result: negative

Test Type: Mutagenicity (mammal cell test): chromosome aberration.

Test system: Chinese hamster ovary cells

Result: negative

Test Type: In vitro mammalian cell gene mutation test

Test system: Mouse lymphoma test

Result: negative

Method: OECD Test Guideline 474

Species: Mouse - male and female

Result: negative

**Carcinogenicity**

No data available

**Reproductive toxicity**

Suspected of damaging the unborn child.

Suspected of damaging fertility.

**Specific target organ toxicity - single exposure**

No data available

Acute oral toxicity - Irritations of mucous membranes in the mouth, pharynx, oesophagus and gastrointestinal tract.

**Specific target organ toxicity - repeated exposure**

Ingestion - May cause damage to organs through prolonged or repeated exposure.

- Kidney, Liver, Blood

Remarks: Classified according to Regulation (EU) 1272/2008, Annex VI (Table 3.1/3.2)

Dermal - Kidney

**Aspiration hazard**

No data available

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**SECTION 12. ECOLOGICAL INFORMATION****Ecotoxicity****Components:****Diethanolamine hydrochloride:**

- Toxicity to fish : LC50 (Pimephales promelas (fathead minnow)): 1,460 mg/l  
Exposure time: 96 h  
Remarks: The value is given in analogy to the following substances:  
The value is given in analogy to the following substances: Diethanolamine
- Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 30.1 mg/l  
Exposure time: 48 h  
Test Type: static test  
Remarks: The value is given in analogy to the following substances:  
The value is given in analogy to the following substances: Diethanolamine
- Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (Daphnia magna (Water flea)): 0.78 mg/l  
Exposure time: 21 d  
Remarks: The value is given in analogy to the following substances:  
The value is given in analogy to the following substances: Diethanolamine

**Diethanolamine:**

- Toxicity to fish : LC50 (Oncorhynchus mykiss (rainbow trout)): 460 mg/l  
End point: mortality  
Exposure time: 96 h  
Test Type: static test  
Analytical monitoring: yes  
Remarks: (ECHA)
- Toxicity to daphnia and other aquatic invertebrates : EC50 (Ceriodaphnia dubia (water flea)): 30.1 mg/l  
End point: Immobilization  
Exposure time: 48 h  
Test Type: static test  
Remarks: (ECHA)
- Toxicity to algae/aquatic plants : ErC50 (Pseudokirchneriella subcapitata (green algae)): 9.5 mg/l

Exposure time: 96 h  
Test Type: static test  
Method: US-EPA  
GLP: yes

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : EC10 (Daphnia magna (Water flea)): 1.05 mg/l  
End point: reproduction rate  
Exposure time: 21 d  
Test Type: semi-static test  
Analytical monitoring: yes  
GLP: yes  
Remarks: (ECHA)

Toxicity to microorganisms : EC10 (activated sludge): > 1,000 mg/l  
Exposure time: 30 min  
Test Type: static test  
Method: OECD Test Guideline 209

### **Persistence and degradability**

#### **Components:**

##### **Diethanolamine hydrochloride:**

Biodegradability : aerobic  
Inoculum: activated sludge  
Result: Readily biodegradable.  
Biodegradation: 93 %  
Exposure time: 28 d  
Method: OECD Test Guideline 301F  
Remarks: The value is given in analogy to the following substances:  
The value is given in analogy to the following substances: Diethanolamine

##### **Diethanolamine:**

Biodegradability : aerobic  
Inoculum: activated sludge  
Concentration: 100 mg/l  
Result: Readily biodegradable.  
Biodegradation: 93 %  
Exposure time: 28 d  
Method: OECD Test Guideline 301F  
GLP: yes

Biochemical Oxygen Demand (BOD) : 885 mg/g  
Incubation time: 5 d  
Remarks: (External MSDS)

Chemical Oxygen Demand (COD) : 1,352 mg/g  
Remarks: (External MSDS)

## **Bioaccumulative potential**

### **Components:**

#### **Diethanolamine hydrochloride:**

Bioaccumulation : Remarks: No data available

#### **Diethanolamine:**

Partition coefficient: n-octanol/water : log Pow: -2.46 (77 °F / 25 °C)  
pH: 6.8 - 7.3  
Method: OECD Test Guideline 107  
Remarks: Bioaccumulation is not expected.

## **Mobility in soil**

### **Components:**

#### **Diethanolamine hydrochloride:**

Stability in soil : Remarks: No data available

## **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).

### **Components:**

#### **Diethanolamine:**

Results of PBT and vPvB assessment : Substance does not meet the criteria for PBT or vPvB according to Regulation (EC) No 1907/2006, Annex XIII.

Additional ecological information : Biological effects:

Harmful effect due to pH shift.

When discharged properly, no impairments in the function of adapted biological wastewater treatment plants are to be expected.

Discharge into the environment must be avoided.

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## SECTION 13. DISPOSAL CONSIDERATIONS

### Disposal methods

Waste from residues : Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself.

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## SECTION 14. TRANSPORT INFORMATION

### International Regulations

#### IATA-DGR

Not regulated as a dangerous good

#### IMDG-Code

Not regulated as a dangerous good

#### Transport in bulk according to IMO instruments

Not applicable for product as supplied.

### National Regulations

#### 49 CFR Road

UN/ID/NA number : UN 3082  
Proper shipping name : Environmentally hazardous substance, liquid, n.o.s.  
  
Class : 9  
Packing group : III  
Labels : Class 9 - Miscellaneous dangerous substances and articles  
  
ERG Code : 171  
Marine pollutant : no  
  
Poison Inhalation Hazard : No

### Special precautions for user

Remarks : Not classified as dangerous in the meaning of transport regulations.

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

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## SECTION 15. REGULATORY INFORMATION

### CERCLA Reportable Quantity

| Components | CAS-No. | Component RQ (lbs) | Calculated product RQ (lbs) |
|------------|---------|--------------------|-----------------------------|
|------------|---------|--------------------|-----------------------------|

|                |          |     |      |
|----------------|----------|-----|------|
| Diethanolamine | 111-42-2 | 100 | 2325 |
|----------------|----------|-----|------|

#### **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 313** : The following components are subject to reporting levels established by SARA Title III, Section 313:

|                |          |              |
|----------------|----------|--------------|
| Diethanolamine | 111-42-2 | >= 1 - < 5 % |
|----------------|----------|--------------|

#### **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).

The following chemical(s) are listed as HAP under the U.S. Clean Air Act, Section 112 (40 CFR 61):

|                |          |              |
|----------------|----------|--------------|
| Diethanolamine | 111-42-2 | >= 1 - < 5 % |
|----------------|----------|--------------|

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):

|                |          |              |
|----------------|----------|--------------|
| Diethanolamine | 111-42-2 | >= 1 - < 5 % |
|----------------|----------|--------------|

#### **Clean Water Act**

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

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

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

This product does not contain any priority pollutants related to the U.S. Clean Water Act

#### **US State Regulations**

##### **Massachusetts Right To Know**

|                |          |
|----------------|----------|
| Diethanolamine | 111-42-2 |
|----------------|----------|

##### **Pennsylvania Right To Know**

|                |          |
|----------------|----------|
| Diethanolamine | 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 Diethanolamine, which is/are known to the State of California to cause cancer. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

### The components of this product are reported in the following inventories:

TSCA : All substances listed as active on the TSCA inventory

### TSCA list

The following substance(s) is/are subject to a Significant New Use Rule:

|  |            |                                    |
|--|------------|------------------------------------|
| 5-Chloro-2-methyl-4-isothiazolin-3-one | 26172-55-4 | See 40 CFR 721.4525; Proposed Rule |
|--|------------|------------------------------------|

|                               |           |                                    |
|-------------------------------|-----------|------------------------------------|
| 2-Methyl-4-isothiazolin-3-one | 2682-20-4 | See 40 CFR 721.4525; Proposed Rule |
|-------------------------------|-----------|------------------------------------|

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

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## SECTION 16. OTHER INFORMATION

### Full text of other abbreviations

|                 |   |   |
|-----------------|---|---|
| ACGIH           | : | USA. ACGIH Threshold Limit Values (TLV)   |
| NIOSH REL       | : | USA. NIOSH Recommended Exposure Limits  |
| ACGIH / TWA     | : | 8-hour, time-weighted average   |
| NIOSH REL / TWA | : | Time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek |

AIIC - 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 Harmonised 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 Organisation; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardisation; 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 - Organisation 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 Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals 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

The information is believed to be correct but is not exhaustive and will be used solely as a guideline, which is based on current knowledge of the chemical substance or mixture and is applicable to appropriate safety precautions for the product. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See [www.sigma-aldrich.com](http://www.sigma-aldrich.com) and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

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