

# SAFETY DATA SHEET

according to the OSHA  
Hazard Communication Standard

Version 6.9  
Revision Date 08/03/2026  
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## SECTION 1. IDENTIFICATION

### 1.1 Product identifiers

Product name : Black Phosphorus, Crystal, 99.995%

Product Number : 808970  
Brand : Aldrich  
Index-No. : 015-002-00-7  
CAS-No. : 7723-14-0

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

Identified uses : Laboratory chemicals, Synthesis of substances

Restrictions on use : 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.  
SPRUCE ST 3050  
63103 St. Louis

Telephone : (314) 771-5765  
Telefax: (800) 325-5052

### 1.4 Emergency telephone number

Emergency Phone # : 800 424 9300 (CHEMTREC) 24/7  
+1 703 527 3887 (CHEMTREC) 24/7

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## SECTION 2. HAZARDS IDENTIFICATION

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

#### Hazards for the product as supplied

Flammable solids : Category 2

Short-term (acute) aquatic hazard : Category 3

Long-term (chronic) aquatic hazard : Category 3

#### Other hazards

None known.

#### GHS label elements

Hazard pictograms :



Signal word : Warning

Hazard statements : H228 Flammable solid.  
H412 Harmful to aquatic life with long lasting effects.

Precautionary statements :

**Prevention:**  
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.  
P240 Ground and bond container and receiving equipment.  
P241 Use explosion-proof electrical/ ventilating/ lighting equipment.  
P273 Avoid release to the environment.  
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

**Response:**  
P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.

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

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## SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

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CAS-No. : 7723-14-0

### Components

| Chemical name | CAS No./Unique ID | Concentration (% w/w) | Trade secret |
|---------------|-------------------|-----------------------|--------------|
| phosphorus    | 7723-14-0*        | >= 80 - <= 100        | TSC          |

\* Indicates that the identifier is a CAS No.

TSC- the actual concentration or concentration range 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.
- In case of skin contact : In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower.
- In case of eye contact : After eye contact: rinse out with plenty of water. Remove contact lenses.
- If swallowed : After swallowing: make victim drink water (two glasses at most). Consult doctor if feeling unwell.
- Most important symptoms and effects, both acute and delayed : The most important known symptoms and effects are described in the labelling (see section 2 GHS label elements) and/or in 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 : Water  
Foam  
Carbon dioxide (CO<sub>2</sub>)  
Dry powder
- Unsuitable extinguishing media : For this substance/mixture no limitations of extinguishing agents are given.
- Specific hazards during fire fighting : Combustible.

Development of hazardous combustion gases or vapours possible in the event of fire.

|                                                |                                                                                                                                                                      |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hazardous combustion products                  | : Oxides of phosphorus                                                                                                                                               |
| 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 | : In the event of fire, wear self-contained breathing apparatus.                                                                                                     |

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## SECTION 6. ACCIDENTAL RELEASE MEASURES

|                                                                     |                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Personal precautions, protective equipment and emergency procedures | : Advice for non-emergency personnel:<br>Avoid inhalation of dusts.<br>Avoid substance contact.<br>Ensure adequate ventilation.<br>Keep away from heat and sources of ignition.<br>Evacuate the danger area, observe emergency procedures, consult an expert.<br>Advice for emergency responders:<br>Wear appropriate personal protective equipment, as indicated in Section 8. |
| Environmental precautions                                           | : Do not let product enter drains.<br>Risk of explosion.                                                                                                                                                                                                                                                                                                                        |
| Methods and materials for containment and cleaning up               | : Cover drains. Collect, bind, and pump off spills.<br>Observe possible material restrictions (see sections 7 and 10).<br>Take up dry. Dispose of properly. Clean up affected area. Avoid generation of dusts.                                                                                                                                                                  |

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## SECTION 7. HANDLING AND STORAGE

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The life science business of Merck KGaA, Darmstadt, Germany operates as MilliporeSigma in the US and Canada

**MILLIPORE  
SIGMA**

For precautions see section 2 GHS label elements

Advice on protection against fire and explosion : Keep away from open flames, hot surfaces and sources of ignition.  
Take precautionary measures against static discharge.

Further information on storage conditions : Tightly closed.  
Keep away from heat and sources of ignition.

Storage class : 4.1B, Flammable solid hazardous materials

Recommended storage temperature : Recommended storage temperature see product label.

Further information on storage stability : Air-, heat-, and moisture-sensitive.

Handle and store under inert gas.

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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     |
|------------|-----------|----------------------------------|---------------------------------------------------|-----------|
| phosphorus | 7723-14-0 | TWA                              | 0.1 mg/m <sup>3</sup>                             | OSHA Z-1  |
|            |           | TWA                              | 0.1 mg/m <sup>3</sup>                             | NIOSH REL |

**Engineering measures** : No data available

### Personal protective equipment

Respiratory protection : required when dusts 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 type P1

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                 | : Nitrile rubber                                                                                                                                                                                                                                                                                                                                                                              |
| Break through time       | : 480 min                                                                                                                                                                                                                                                                                                                                                                                     |
| Glove thickness          | : 0.11 mm                                                                                                                                                                                                                                                                                                                                                                                     |
| Protective index         | : Full contact                                                                                                                                                                                                                                                                                                                                                                                |
| Manufacturer             | : KCL 741 Dermatril® L                                                                                                                                                                                                                                                                                                                                                                        |
| Material                 | : Nitrile rubber                                                                                                                                                                                                                                                                                                                                                                              |
| Break through time       | : 480 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: <a href="http://www.kcl.de">www.kcl.de</a> ). |
| Eye protection           | : Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).<br>Safety glasses                                                                                                                                                                                                                                             |
| Skin and body protection | : Flame retardant antistatic protective clothing.                                                                                                                                                                                                                                                                                                                                             |
| Hygiene measures         | : Change contaminated clothing. Wash hands after working with substance.                                                                                                                                                                                                                                                                                                                      |

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## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

|                             |                                                  |
|-----------------------------|--------------------------------------------------|
| Appearance                  | : crystalline                                    |
| Colour                      | : grey                                           |
| Odour                       | : No data available                              |
| Odour Threshold             | : No data available                              |
| pH                          | : ca. 3 (99 °F / 37 °C)<br>Concentration: 10 g/l |
| Melting point/ range        | : 781 °F / 416 °C                                |
| Boiling point/boiling range | : 536 °F / 280 °C                                |

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|                                                     |                                                                                                                                      |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Flash point                                         | : Not applicable                                                                                                                     |
| Evaporation rate                                    | : No data available                                                                                                                  |
| Flammability (solid, gas)                           | : The substance or mixture is a flammable solid with the category 2.<br>Method: Test N.1: Test method for readily combustible solids |
| Burning rate                                        | : No data available                                                                                                                  |
| Self-ignition                                       | : > 572 °F / > 300 °C<br>1,013 hPa<br>Method: Relative self-ignition temperature for solids                                          |
| Upper explosion limit /<br>Upper flammability limit | : No data available                                                                                                                  |
| Lower explosion limit /<br>Lower flammability limit | : No data available                                                                                                                  |
| Vapour pressure                                     | : 0.04 hPa (70 °F / 21 °C)                                                                                                           |
| Relative vapour density                             | : No data available                                                                                                                  |
| Relative density                                    | : No data available                                                                                                                  |
| Density                                             | : 2.340 g/cm <sup>3</sup>                                                                                                            |
| Solubility(ies)<br>Water solubility                 | : 0.0003 g/l insoluble (68 °F / 20 °C)                                                                                               |
| Partition coefficient: n-<br>octanol/water          | : Not applicable for inorganic substances                                                                                            |
| Autoignition temperature                            | : 500 °F / 260 °C                                                                                                                    |
| Decomposition<br>temperature                        | : No data available                                                                                                                  |
| Viscosity, dynamic                                  | : No data available                                                                                                                  |
| Viscosity, kinematic                                | : No data available                                                                                                                  |
| Flow time                                           | : No data available                                                                                                                  |
| Explosive properties                                | : Not classified as explosive.                                                                                                       |
| Oxidizing properties                                | : none                                                                                                                               |

Molecular weight : 30.97 g/mol

Particle characteristics  
Particle size : No data available

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## SECTION 10. STABILITY AND REACTIVITY

Reactivity : The following applies in general to flammable organic substances and mixtures: in correspondingly fine distribution, when whirled up a dust explosion potential may generally be assumed.

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

Possibility of hazardous reactions : Risk of explosion with:  
halogenates  
nitrates  
bromates  
chlorates  
chromyl chloride  
chlorosulfonic acid  
halogens  
iodates  
perchlorates  
Organic Substances  
Risk of ignition or formation of inflammable gases or vapours with:  
fire-promoting substances  
Oxidizing agents  
peroxi compounds  
sulfur  
nonmetallic oxyhalides  
hydrogen peroxide  
alkalines

Conditions to avoid : Heat  
  
no information available

Incompatible materials : No data available

Hazardous decomposition products : For Hazardous combustion products in the event of fire: see section 5



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## SECTION 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - Rat - female - > 15,000 mg/kg

(OECD Test Guideline 401)

Symptoms: Irritation symptoms in the respiratory tract.

Inhalation: No data available

Dermal: No data available

#### Skin corrosion/irritation

Skin - Rabbit

Result: No skin irritation - 24 h

(OECD Test Guideline 404)

#### Serious eye damage/eye irritation

Eyes - Rabbit

Result: No eye irritation - 24 h

(OECD Test Guideline 405)

#### Respiratory or skin sensitization

Buehler Test - Guinea pig

Result: negative

(OECD Test Guideline 406)

#### Germ cell mutagenicity

Test Type: Ames test

Test system: Escherichia coli/Salmonella typhimurium

Metabolic activation: with and without metabolic activation

Method: OECD Test Guideline 471

Result: negative

Test Type: Chromosome aberration test in vitro

Test system: Chinese hamster lung cells

Metabolic activation: with and without metabolic activation

Method: OECD Test Guideline 473

Result: negative

Test Type: In vitro mammalian cell gene mutation test

Test system: Chinese hamster lung cells

Metabolic activation: with and without metabolic activation

Method: OECD Test Guideline 476

Result: negative

#### Carcinogenicity

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.

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

No data available

**Specific target organ toxicity - single exposure**

No data available

**Specific target organ toxicity - repeated exposure**

No data available

**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.

After inhalation of dust:

After uptake of large quantities:

Pneumonia

Handle in accordance with good industrial hygiene and safety practice.

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**SECTION 12. ECOLOGICAL INFORMATION****Ecotoxicity****Components:****phosphorus:**

Toxicity to fish : LC50 (Danio rerio (zebra fish)): 33.2 mg/l  
End point: mortality  
Exposure time: 96 h  
Test Type: static test  
Method: OECD Test Guideline 203  
GLP: yes

Toxicity to daphnia and : EC50 (Daphnia magna (Water flea)): 10.5 mg/l  
other aquatic  
invertebrates End point: Immobilization  
Exposure time: 48 h  
Test Type: static test  
Method: OECD Test Guideline 202  
GLP: yes

Toxicity to algae/aquatic : ErC50 (Desmodesmus subspicatus (green algae)):  
plants 18.3 mg/l  
Exposure time: 72 h  
Test Type: static test  
Analytical monitoring: yes  
Method: OECD Test Guideline 201  
GLP: yes

Toxicity to : EC50 (activated sludge): > 1,000 mg/l

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microorganisms

Exposure time: 3 h  
Test Type: static test  
Method: OECD Test Guideline 209  
GLP: yes

### **Persistence and degradability**

#### **Components:**

##### **phosphorus:**

Biodegradability : Remarks: The methods for determining biodegradability are not applicable to inorganic substances.

### **Bioaccumulative potential**

#### **Components:**

##### **phosphorus:**

Bioaccumulation : Remarks: No data available

Partition coefficient: n-octanol/water : Remarks: Not applicable for inorganic substances

### **Mobility in soil**

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:**

##### **phosphorus:**

Additional ecological information : Discharge into the environment must be avoided.

### **Endocrine disrupting properties**

No data available

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## **SECTION 13. DISPOSAL CONSIDERATIONS**

### **Disposal methods**

Waste from residues : Waste material must be disposed of in accordance

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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

UN/ID No. : UN 1338  
Proper shipping name : Phosphorus, amorphous  
Class : 4.1  
Packing group : III  
Labels : Division 4.1 - Flammable solids  
Packing instruction (cargo : 449  
aircraft)  
Packing instruction : 446  
(passenger aircraft)

#### IMDG-Code

UN number : UN 1338  
Proper shipping name : PHOSPHORUS, AMORPHOUS  
  
Class : 4.1  
Packing group : III  
Labels : 4.1  
EmS Code : F-A, S-G  
Marine pollutant : yes

#### Transport in bulk according to IMO instruments

Not applicable for product as supplied.

### National Regulations

#### 49 CFR

UN/ID/NA number : UN 1338  
Proper shipping name : Phosphorus, amorphous  
  
Class : 4.1  
  
Packing group : III  
Labels : Division 4.1 - Flammable solids  
ERG Code : 133  
Marine pollutant : no  
Poison Inhalation Hazard : No

#### Special precautions for user

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.

## SECTION 15. REGULATORY INFORMATION

### CERCLA Reportable Quantity

| Components | CAS-No.   | Component RQ (lbs) | Calculated product RQ (lbs) |
|------------|-----------|--------------------|-----------------------------|
| phosphorus | 7723-14-0 | 1                  | 1                           |

### SARA 304 Extremely Hazardous Substances Reportable Quantity

| Components | CAS-No.   | Component RQ (lbs) | Calculated product RQ (lbs) |
|------------|-----------|--------------------|-----------------------------|
| phosphorus | 7723-14-0 | 1                  | 1                           |

### SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

| Components | CAS-No.   | Component TPQ (lbs) |
|------------|-----------|---------------------|
| phosphorus | 7723-14-0 | 100                 |

**SARA 311/312 Hazards** : Fire Hazard

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

phosphorus 7723-14-0 >= 90 - <= 100 %

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).

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 111 SOCM I Intermediate or Final VOC's (40 CFR 60.489).

### Clean Water Act

The following Hazardous Substances are listed under the U.S. CleanWater Act, Section 311, Table 116.4A:

phosphorus 7723-14-0 >= 90 - <= 100 %

The following Hazardous Chemicals are listed under the U.S. CleanWater Act, Section 311, Table 117.3:

phosphorus 7723-14-0 >= 90 - <= 100 %

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

No components are subject to the Massachusetts Right to Know Act.

#### Pennsylvania Right To Know

**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

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

US 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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**SECTION 16. OTHER INFORMATION****Full text of other abbreviations**

NIOSH REL : USA. NIOSH Recommended Exposure Limits  
OSHA Z-1 : USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants  
NIOSH REL / TWA : Time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek  
OSHA Z-1 / TWA : 8-hour time weighted average

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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