

# Nitrogen Dioxide

## 1. Product Identification

<b>product identifier</b>	: Nitrogen Dioxide
<b>Chemical name</b>	: nitrogen dioxide
<b>Other means of identification Product use Synonym</b>	: Nitrogen oxide; Nitrogen dioxide (dinitrogen tetroxide); Nitrogen oxide (NO <sub>2</sub> ); Nitrogen peroxide; Dinitrogen tetroxide
<b>SDS #</b>	: Nitrogen oxide; Nitrogen dioxide (dinitrogen tetroxide); Nitrogen oxide (NO <sub>2</sub> ); Nitrogen peroxide; Dinitrogen tetroxide
<b>Supplier's details</b>	: 001041 : Airgas USA, LLC and its affiliates 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253

### Manufacturer / Distributor:

#### Ehsan International Gases

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## 2. Hazards identification

<b>OSHA/HCS status</b>	: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
<b>Classification of the substance or mixture <u>GHS label elements</u></b>	: OXIDIZING GASES - Category 1 GASES UNDER PRESSURE - Compressed gas ACUTE TOXICITY (inhalation) - Category 1 SKIN CORROSION/IRRITATION - Category 1 SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 1



**Hazard pictograms** :

**Signal word** : Danger

## Nitrogen Dioxide

**Hazard statements** : May cause or intensify fire; oxidizer.  
 Contains gas under pressure; may explode if heated.  
 May cause frostbite.  
 Fatal if inhaled.  
 Causes serious eye damage.  
 Causes severe skin burns and eye damage.

### Precautionary statements

**General** : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use.  
 Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Open valve slowly. Use only with equipment cleaned for Oxygen service.

## 2. Hazards identification

**Prevention** : Wear protective gloves. Wear eye or face protection. Wear respiratory protection. Keep away from clothing, incompatible materials and combustible materials. Keep reduction valves free from grease and oil. Use only outdoors or in a well-ventilated area. Do not breathe gas. Wash hands thoroughly after handling. Use and store only outdoors or in a well ventilated place.

**Response** : In case of fire: Stop leak if safe to do so. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or physician. IF SWALLOWED: Immediately call a POISON CENTER or physician. Rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. Wash contaminated clothing before reuse. Immediately call a POISON CENTER or physician. 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 or physician.

**Storage** : Store locked up. Protect from sunlight. Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.

**Disposal** : Dispose of contents and container in accordance with all local, regional, national and international regulations.

**Hazards not otherwise** : In addition to any other important health or physical hazards, this product may displace **classified** oxygen and cause rapid suffocation.

## 3. Composition/information on ingredients

**Substance/mixture** : Substance  
**Chemical name** : nitrogen dioxide  
**Other means of identification** : Nitrogen oxide; Nitrogen dioxide (dinitrogen tetroxide); Nitrogen oxide (NO<sub>2</sub>); Nitrogen peroxide; Dinitrogen tetroxide

### CAS number/other identifiers

**CAS number** : 10102-44-0  
**Product code** : 001041

Ingredient name	%	CAS number
nitrogen dioxide	100	10102-44-0

**There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.**

## Nitrogen Dioxide

Occupational exposure limits, if available, are listed in Section 8.

### Description of necessary first aid measures

### Section 4. First aid measures

- Eye contact** : Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician.
- Inhalation** Get medical attention immediately. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed

person may need to be kept under medical surveillance for 48 hours.

- Skin contact** : Get medical attention immediately. Call a poison center or physician. Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Ingestion** As this product is a gas, refer to the inhalation section.

### Most important symptoms/effects, acute and delayed Potential acute health effects

- Eye contact** : Causes serious eye damage. Contact with rapidly expanding gas may cause burns or frostbite.
- Inhalation** : Fatal if inhaled. May give off gas, vapor or dust that is very irritating or corrosive to the respiratory system. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
- Skin contact** : Causes severe burns. Contact with rapidly expanding gas may cause burns or frostbite.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Ingestion** : May cause burns to mouth, throat and stomach. As this product is a gas, refer to the inhalation section.

### Over-exposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following:  
pain watering  
redness
- Inhalation** : No specific data.
- Skin contact** : Adverse symptoms may include the following: pain  
or irritation redness  
blistering may occur
- Ingestion** : Adverse symptoms may include the following:  
stomach pains

## Nitrogen Dioxide

### Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

### 5. Fire-fighting measures

- Extinguishing media** : Use an extinguishing agent suitable for the surrounding fire.
- Suitable extinguishing media** :
- Unsuitable extinguishing media** : None known.

#### Section 5. Fire-fighting measures

- Specific hazards arising from the chemical** : Contains gas under pressure. Oxidizing material. This material increases the risk of fire and may aid combustion. Contact with combustible material may cause fire. In a fire or if heated, a pressure increase will occur and the container may burst or explode.
- Hazardous thermal decomposition products** : Decomposition products may include the following materials: nitrogen oxides
- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

### 6. Accidental release measures

#### Personal precautions, protective equipment and emergency procedures

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- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Do not breathe gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For nonemergency personnel".
- Environmental precautions** : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

### Methods and materials for containment and cleaning up

## 7. Handling and storage

- Small spill** : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.
- Large spill** : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

### Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Do not get in eyes or on skin or clothing. Do not breathe gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep away from clothing, incompatible materials and combustible materials. Keep reduction valves free from grease and oil. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

- Advice on general** : Eating, drinking and smoking should be prohibited in areas where this material is **occupational hygiene** handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

- Conditions for safe storage,** : Store in accordance with local regulations. Store in a segregated and approved area. **including any** Store away from direct sunlight in a dry, cool and well-ventilated area, away from **incompatibilities** incompatible materials (see Section 10). Store locked up. Separate from acids, alkalies, reducing agents and combustibles. Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

## 8. Exposure controls/personal protection

### Control parameters

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**Occupational exposure limits**

Ingredient name	Exposure limits
nitrogen dioxide	<p><b>ACGIH TLV (United States, 6/2013).</b>                      STEL: 9.4 mg/m<sup>3</sup> 15 minutes.                      STEL: 5 ppm 15 minutes.                      TWA: 5.6 mg/m<sup>3</sup> 8 hours.                      TWA: 0.2 ppm 8 hours.</p> <p><b>NIOSH REL (United States, 4/2013).</b>                      STEL: 1.8 mg/m<sup>3</sup> 15 minutes.                      STEL: 1 ppm 15 minutes.</p> <p><b>OSHA PEL (United States, 2/2013).</b>                      CEIL: 9 mg/m<sup>3</sup>                      CEIL: 5 ppm</p> <p><b>OSHA PEL 1989 (United States, 3/1989).</b>                      STEL: 1.8 mg/m<sup>3</sup> 15 minutes.                      STEL: 1 ppm 15 minutes.</p>

**Appropriate engineering :** Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or **controls** other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

**Environmental exposure :** Emissions from ventilation or work process equipment should be checked to ensure **controls** they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

**Individual protection measures**

**Hygiene measures**

: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

**Eye/face protection**

: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles and/ or face shield. If inhalation hazards exist, a full-face respirator may be required instead.

**Skin protection**

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**Hand protection**

: 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. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

**Body protection**

: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

**Other skin protection**

: Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

**Respiratory protection**

: Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

# Nitrogen Dioxide

## 9. Physical and chemical properties

### Appearance

Physical state	: Gas. [gaseous]
Color	: Yellowish-brown. Brownish-red. Yellow.
Molecular weight	: 46.01 g/mole
Molecular formula	: N-O <sub>2</sub>
Boiling/condensation point	: 21.2 °C (70.2°F )
Melting/freezing point	: -11.2 °C (11.8°F )
Critical temperature	: 157.8 °C (316°F )
Odor	: Pungent.
Odor threshold pH	: Not available.
Flash point	: Not available.
Burning time	: [Product does not sustain combustion.]
Burning rate	: Not applicable.
Evaporation rate	: Not applicable.
Flammability (solid, gas)	: Not available.
Lower and upper explosive (flammable) limits	: Not available.
Vapor pressure	: Not available.
Vapor density	: 14.7 (psia )
Specific Volume (ft <sup>3</sup> /lb)	: 1.58 (Air = 1)
Gas Density (lb/ft <sup>3</sup> )	: 4.902
Relative density	: 0.204
Solubility	: Not applicable.
Solubility in water	: Not available.
Partition coefficient: noctanol/water	: Not available.
Auto-ignition temperature	: Not available.
Decomposition temperature	: Not available.

SADT : Not available.

Viscosity : Not applicable.



# Nitrogen Dioxide

## 10. Stability and reactivity

- Reactivity** : No specific test data related to reactivity available for this product or its ingredients.
- Chemical stability** : The product is stable.
- Possibility of hazardous reactions** : Hazardous reactions or instability may occur under certain conditions of storage or use. Conditions may include the following: contact with combustible materials Reactions may include the following: risk of causing fire : No specific data.
- Conditions to avoid** : Extremely reactive or incompatible with the following materials: reducing materials, combustible materials and organic materials.  
Highly reactive or incompatible with the following materials: alkalis and moisture.
- Incompatibility with various substances** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.
- Hazardous decomposition products** : Under normal conditions of storage and use, hazardous polymerization will not occur.
- Hazardous polymerization**

## 11. Toxicological information

### Information on toxicological effects

#### Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
nitrogen dioxide	LC50 Inhalation Gas.	Rat	115 ppm	1 hours

Irritation/Corrosion Not available.

#### Sensitization

Not available.

#### Mutagenicity

Not available.

Carcinogenicity Not available.

## Nitrogen Dioxide

**Reproductive toxicity** Not available.

**Teratogenicity** Not available.

**Specific target organ toxicity (single exposure)** Not available.

**Specific target organ toxicity (repeated exposure)** Not available.

**Aspiration hazard** Not available.

**Information on the likely : routes of exposure** Not available.

### Potential acute health effects

- Eye contact** : Causes serious eye damage. Contact with rapidly expanding gas may cause burns or frostbite. Fatal if inhaled. May give off gas, vapor or dust that is very irritating or corrosive to the respiratory system. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
- Inhalation** : Causes severe burns. Contact with rapidly expanding gas may cause burns or frostbite.
- Skin contact** : **Ingestion** : May cause burns to mouth, throat and stomach. As this product is a gas, refer to the inhalation section.

### Symptoms related to the physical, chemical and toxicological characteristics

- Eye contact** : Adverse symptoms may include the following:  
pain watering  
redness
- Inhalation** : No specific data.
- Skin contact** : Adverse symptoms may include the following: pain  
or irritation redness  
blistering may occur
- Ingestion** : Adverse symptoms may include the following:  
stomach pains

# Nitrogen Dioxide

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

Long term exposure

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

Potential chronic health effects Not available.

**General** : No known significant effects or critical hazards.

**Carcinogenicity** : No known significant effects or critical hazards.

**Mutagenicity** : No known significant effects or critical hazards.

**Teratogenicity** : No known significant effects or critical hazards.

**Developmental effects** : No known significant effects or critical hazards. **Fertility effects** : No known significant effects or critical hazards.

## 12. Ecological information

Persistence and degradability Not available.

Bioaccumulative potential Not available.

Mobility in soil

**Soil/water partition coefficient (K<sub>oc</sub>)** : Not available.

# Nitrogen Dioxide

## 13. Disposal considerations

**Other adverse effects** : No known significant effects or critical hazards.

### Disposal methods

: The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

United States - RCRA Acute hazardous waste "P" List

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## 14. Transport information

<p><b>Additional information</b></p>	<p>Inhalation hazard zone A</p> <p><b>Reportable quantity</b> 10 lbs / 4.54 kg Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.</p> <p><b>Limited quantity</b> Yes.</p> <p><b>Packaging instruction</b> <b>Passenger aircraft</b> Quantity limitation: Forbidden.</p> <p><b>Cargo aircraft</b> Quantity limitation: Forbidden.</p> <p><b>Special provisions</b> 1, B7, B9, B14, B45, B46, B61, B66, B67, B77</p>	<p><b>Explosive Limit and Limited Quantity Index</b> 0</p> <p><b>ERAP Index</b> 0</p> <p><b>Passenger Carrying Ship Index</b> Forbidden</p> <p><b>Passenger Carrying Road or Rail Index</b> Forbidden</p> <p><b>Special provisions</b> 38</p>	<p>-</p>	<p><b>Passenger and Cargo Aircraft</b> Quantity limitation: 0 Forbidden <b>Cargo Aircraft Only</b> Quantity limitation: 0 Forbidden</p>
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“Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

**Special precautions for user**

: **Transport within user’s premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

## Nitrogen Dioxide

Transport in bulk according : Not available.  
to Annex II of MARPOL 73 /78  
and the IBC Code

### 15. Regulatory information

**U.S. Federal regulations** : TSCA 8(a) CDR Exempt/Partial exemption: Not determined  
United States inventory (TSCA 8b): This material is listed or exempted.  
Clean Water Act (CWA) 311: nitrogen dioxide

Clean Air Act Section 112 : Not listed  
(b) Hazardous Air Pollutants  
(HAPs)

Clean Air Act Section 602 Class : Not listed  
I Substances

Clean Air Act Section 602 Class : Not listed  
II Substances

DEA List I Chemicals : Not listed  
( Precursor Chemicals )

DEA List II Chemicals : Not listed  
( Essential Chemicals )

#### SARA 302/304

##### Composition/information on ingredients

Name	%	EHS	SARA 302 TPQ		SARA 304 RQ	
			(lbs)	(gallons)	(lbs)	( gallons )
nitrogen dioxide	100	Yes.	100	-	10	-

SARA 304 RQ : 10 lbs / 4.5 kg

#### SARA 311/312

**Classification** : Sudden release of pressure  
Immediate (acute) health hazard

##### Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed ( chronic ) health hazard
nitrogen dioxide	100	No.	Yes.	No.	Yes.	No.

## Nitrogen Dioxide

### State regulations

- Massachusetts** : This material is listed.  
**New York** : This material is listed.  
**New Jersey** : This material is listed.  
**Pennsylvania** : This material is listed.  
**Canada inventory** : This material is listed or exempted.

### International regulations

- International lists** : **Australia inventory (AICS)**: This material is listed or exempted.  
**China inventory (IECSC)**: This material is listed or exempted.  
**Japan inventory**: This material is listed or exempted.  
**Korea inventory**: This material is listed or exempted.  
**Malaysia Inventory (EHS Register)**: Not determined.  
**New Zealand Inventory of Chemicals (NZIoC)**: This material is listed or exempted.  
**Philippines inventory (PICCS)**: This material is listed or exempted. **Taiwan inventory (CSNN)**: Not determined.

- Chemical Weapons Convention List Schedule I Chemicals** : Not listed  
**Chemical Weapons Convention List Schedule II Chemicals** : Not listed  
**Chemical Weapons Convention List Schedule III Chemicals** : Not listed

### Canada

- WHMIS (Canada)** : Class A: Compressed gas.  
Class C: Oxidizing material.  
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).  
Class D-2B: Material causing other toxic effects (Toxic). Class E: Corrosive material  
**CEPA Toxic substances**: This material is listed.  
**Canadian ARET**: This material is not listed.  
**Canadian NPRI**: This material is listed.  
**Alberta Designated Substances**: This material is not listed.  
**Ontario Designated Substances**: This material is not listed.  
**Quebec Designated Substances**: This material is not listed.

# Nitrogen Dioxide

## 16. Other information

**Canada Label requirements** : Class A: Compressed gas.  
 Class C: Oxidizing material.  
 Class D-1A: Material causing immediate and serious toxic effects (Very toxic).  
 Class D-2B: Material causing other toxic effects (Toxic). Class E:  
 Corrosive material

### Hazardous Material Information System (U.S.A.)

Health	3
Flammability	0
Physical hazards	1

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on SDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material. [National Fire](#)

### Protection Association (U.S.A.)

