

MEMORANDUM

To: Riad Suleiman, Dave Meekins
From: Jennifer Williams
Date: 9/29/2015
Subject: Area sampling results – Mercury and nitrous oxide

This memorandum is to notify you that the area air samples taken on September 16, 2015 while Brad DiGiovine (Argonne User) vented the Argonne Bubble Chamber (containing nitrous oxide and mercury) into the Injector Tunnel **do not** indicate an overexposure per the Occupational Safety and Health Administration (OSHA) and the American Conference of Governmental Industrial Hygienist (ACGIH) exposure limits.

The results of the lab analysis are as follows:

Contaminant	OSHA PEL-TWA	ACGIH TLV-TWA	Concentration	Calculated 8-hr TWA
Mercury	0.1 mg/m ³	0.025 mg/m ³	< 0.0303 mg/m ³	< 0.0104 mg/m ³
Nitrous oxide	Not established	50 ppm	23 ppm	7.9 ppm

Sample results indicate that controls in place for the filling of the bubble chamber are adequate. The concentration of mercury was below analytical detection limit and the 8-hour time weighted average for nitrous oxide was 16% of the ACGIH exposure limit.

Use of the blower for mixing must continue when filling and venting the bubble chamber.

Note:

OSHA PEL-TWA is an 8-hour time weighted average adopted by OSHA. Anything above these levels represents an overexposure.

ACGIH TLV-TWA is an 8-hour time weighted average developed by the ACGIH as recommendations and guidelines to assist in the control of health hazards.

Concentration is the amount of a contaminant found on sampling media by the analytical lab.

Calculated TWA is the 8-hour time weighted average found for each of the contaminants.

CC: EH&S file
Dr. Chandler
Brad DiGiovine
Dick Owen

Jefferson Lab
Accelerator Division
Sampling Summary
September 30, 2015

Industrial hygiene sampling was conducted on September 16, 2015 to determine employee exposure levels for mercury and nitrous oxide while venting the Argonne Bubble Chamber in the Injector Tunnel.

Results indicate that exposure levels are below limits set by the Occupational Safety and Health Administration (OSHA) and the American Conference of Governmental Industrial Hygienists (ACGIH).

Detailed information is provided in the attached report. Any questions may be directed to Jennifer Williams, ESH&Q Industrial Hygienist.

Jefferson Lab
Accelerator Division
Industrial Hygiene Sampling Report

Sample Date: 9/16/2015
Contacts: Riad Suleiman, Dave Meekins

I. Operation Information

A. Description

1. Location: Injector Tunnel
2. Contaminant sampled: Mercury and Nitrous Oxide
3. Description of Process: A bubble chamber was setup in the Injector 5D beamline for a physics experiment to measure photo-disintegration of oxygen into helium and carbon. The bubble chamber makes use of a super-heated fluid (nitrous oxide) which is loaded into the bubble chamber in the Injector Tunnel. 150 mL of mercury was pre-loaded into the chamber at Argonne National Laboratory and cannot physically escape the chamber.

During the venting process, 17 liters nitrous oxide at STP (approximately 40 mL of liquid) is released from the chamber into the Injector Tunnel. During the process a fan is positioned in the tunnel to promote mixing.

See TOSP Test of ANL Bubble Chamber Detector TOSP # 52757.

https://mis.jlab.org/mis/apps/mis_forms/operational_safety_procedure_form.cfm?entry_id=52757



Bubble Chamber and supporting apparatus staged in the Injector Tunnel.



Blower positioned in tunnel to promote mixing during nitrous oxide venting.

B. Data

Applicable regulations and recommendations concerning acceptable concentrations in the workplace:

1. The Department of Labor's Occupational Safety and Health Act (OSHA 29 CFR 1910.1000) lists acceptable exposure limits for several hundred chemicals used in the workplace. The established limits were derived from the American National Standards Institute (ANSI), and to a larger extent, from the American Conference of Governmental Industrial Hygienists (ACGIH). OSHA permissible exposure limits are referenced. Both OSHA and ACGIH limits represent conditions under which it is believed that most workers may be exposed day after day without experiencing adverse health effects.
 - i) OSHA PEL-TWA: The OSHA permissible exposure limit (PEL) – Maximum level of exposure to a hazardous agent to which an employee may be exposed over a specified time period as mandated by 29 CFR 1910
 - ii) ACGIH TLV-TWA: The ACGIH Threshold Limit Value (TLV) -TWA is an 8-hour time weighted concentration of a contaminant. TLV-TWA is an 8-hour time weighted average developed by the ACGIH as recommendations and guidelines to assist in the control of health hazards and may be stricter limits than the OSHA PEL-TWA.

At Jefferson Lab the more conservative threshold is required to be met whether it is OSHA or ACGIH derived.

2. Potential Health Hazards of Detected Chemicals:

Contaminant/Target Organ	OSHA PEL-TWA	ACGIH TLV-TWA
Mercury/CNS, kidney, reproductive, GI	0.1 mg/m ³	0.025 mg/m ³
Nitrous oxide/CNS, respiratory, reproductive	Not established	50 ppm

3. Monitoring parameters

Sample Number	15JW314	15JW315	15JW316	15JW317
Contaminant	Mercury	Mercury	Nitrous oxide	Nitrous oxide
Sample time	165 minutes	n/a - blank	165 minutes	n/a - blank
Flow Rate	n/a (passive badge)	n/a (passive badge)	n/a (passive badge)	n/a (passive badge)
Sample media	SKC Elemental Mercury passive sampler (520-02A)	SKC Elemental Mercury passive sampler (520-02A)	Assay Technology 575 Nitrous Oxide passive sampler	Assay Technology 575 Nitrous Oxide passive sampler
Pump	n/a (passive badge)	n/a (passive badge)	n/a (passive badge)	n/a (passive badge)
Date	9/16/2015	9/16/2015	9/16/2015	9/16/2015
Lab	Analytics	Analytics	Assay Technology	Assay Technology
Method	OSHA ID 140	OSHA ID 140	AT SOP L575	AT SOP L575
Employee username	n/a – area sample	n/a – blank	n/a – area sample	n/a – blank
Location	Injector/North Linac segment gate	n/a - blank	Injector/North Linac segment gate	n/a - blank

4. Number of personnel potentially exposed: 3
5. Frequency of potential exposure: 2x/week
6. Duration of potential exposure: < 5 hours
7. Personal Protective Equipment in use: Safety Glasses

C. Results

Samples were analyzed by Analytics Corporation, Richmond, VA and Assay Technology, Livermore, CA.

Contaminant	OSHA PEL-TWA	ACGIH TLV-TWA	Concentration	Calculated 8-hr TWA
Mercury	0.1 mg/m ³	0.025 mg/m ³	< 0.0303 mg/m ³	< 0.0104 mg/m ³
Nitrous oxide	Not established	50 ppm	23 ppm	7.9 ppm

D. Calculations for observed 8-hour time weighted averages (TWAs) for contaminants sampled:

Injector/North Linac segment gate

Mercury: $(< 0.0303 \text{ mg/m}^3) \times (165 \text{ min}) / 480 \text{ min} = < 0.0104 \text{ mg/m}^3$

Nitrous Oxide: $(23 \text{ ppm}) \times (165 \text{ min}) / 480 \text{ min} = 7.9 \text{ ppm}$

II. Conclusions

Sampling results indicate contaminant concentrations and 8-hour time weighted averages were below exposure limits set by the Occupational Safety and Health Administration (OSHA) and the American Conference of Governmental Industrial Hygienist (ACGIH); **there was no personal overexposure.**

Results indicate that controls in place for venting the bubble chamber are adequate. Use of the blower for mixing must continue when filling the bubble chamber.

Sampling and Report completed by: Jennifer Williams



Analytics Corporation
10329 Stony Run Lane
Ashland, Va 23005
Phone: (804) 365-3000 Fax: (804) 365-3002
AIHA Accreditation # 176, ID 100531

Final Report

Work Order T260047

JEFFERSON LAB
BLDG 35
12000 JEFFERSON AVE
NEWPORT NEWS, VA 23606

Customer: AML00020
Attention: JEN WILLIAMS
PO Number NA

Date Received: 09/17/15
Client Project ID BUBBLE CHAMBER VENT

Lab ID: T260047001	Sample ID: 15JW314	Media: Mercury Badge	Sample Date: 9/16/2015	Sampling Time
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Analyte	Method	Analysis Date	Volume	Reporting Limit	Front	Rear	Total	Concentration
Mercury	OSHA ID140	09/22/15	3.3 L	0.10 ug			< 0.100 ug	< 0.0303 mg/M3

Lab ID: T260047002	Sample ID: 15JW315	Media: Mercury Badge	Sample Date: 9/16/2015	Sampling Time
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Analyte	Method	Analysis Date	Volume	Reporting Limit	Front	Rear	Total	Concentration
Mercury	OSHA ID140	09/22/15	0 L	0.100 ug			< 0.100 ug	--



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General Laboratory Comments

Abbreviations:

ug = micrograms; mg=milligrams; g = grams, ppm=parts per million (volume), ppb = parts per billion (volume), mg/M3=milligrams per cubic meter of air, ug/M3=micrograms per cubic meter of air; Min=minutes, Qual=Qualifiers

Customer: JEFFERSON LAB
Attention: JENNIFER WILLIAMS
Address: ATTN: JENNIFER WILLIAMS
12000 JEFFERSON AVE
SUITE 12
NEWPORT NEWS, VA 23606
USA

Phone No.: (757) 269-7882

Fax No.:

Lab Work Order: 2015090481

Project ID: BUBBLE CHAMBER VENT

PO No.:

Customer No.: 58617

Received Date: September 17, 2015

Date Reported: September 22, 2015

Exposure results are the average concentration for the period of time monitored. RL = Reporting Limit. ND = None Detected at or above the reporting limit. The results relate only to the items tested. Unless noted below, samples were received in acceptable condition, all applicable quality control were within method specifications, lab blanks were subtracted before a result was reported, and any customer supplied field blanks were not subtracted from sample results. The molar volume at 25 C (24.45 L/mole) was used to calculate parts per million, ppm. Air concentrations reported are based upon field sampling information provided by the customer. For assistance with the content of this report, please visit the Customer Support section of our web site at <http://www.assaytech.com> or contact Technical Support at 1-800-833-1258. For details of significant method modifications go to www.assaytech.com/method.html.

Lab Sample ID	Lab Code	Date Sampled	Client Sample ID	Media	Media Lot / Serial #	Analytes Requested	Quantity Found			Sample		Concentration		
							Total	RL	Units	Vol. (L)	Time	Found	RL	Units
15041042	ATCA	09/16/2015	15JW317	575B	5F15 - LD4772	NITROUS OXIDE	0.449	0.40	UG					
Analyzed By: JHEARING		Analyzed On: 9/22/2015		Approved By: SGREEN		Approved On: 9/22/2015								
15041043	ATCA	09/16/2015	15JW316	575B	5F15 - LD4454	NITROUS OXIDE	6.11	0.40	UG	0.145	165	23	1.5	PPM
Analyzed By: JHEARING		Analyzed On: 9/22/2015		Approved By: SGREEN		Approved On: 9/22/2015								

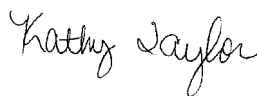
Method References:

TestCode	Analytes Requested	Method Reference	Regulatory Agency	TWA Limit	STEL Limit	Exposure Units
10024972A	NITROUS OXIDE	AT SOP L575	ACGIH TLV	50		PPM

Applicable OSHA PELs, ACGIH TLVs, or NIOSH RELS have been included in this lab report for guidance, but may not be sufficient for regulatory compliance. Clients should be aware that more stringent international, state, local, or organizational exposure limits may supersede the limits included with this report. Visit www.OSHA.gov/dsg/annotated-pels for detailed information on exposure limits and OSHA policies.



S. Green - Laboratory Director



K. Taylor - Ohio Supervisor

SAFETY DATA SHEET

Nitrous Oxide

Section 1. Identification

GHS product identifier	: Nitrous Oxide
Chemical name	: dinitrogen oxide
Other means of identification	: Nitrogen oxide; Nitrous oxide; Nitrogen oxide (N ₂ O); Laughing gas; Hyponitrous acid anhydride; Dinitrogen monoxide
Product use	: Synthetic/Analytical chemistry.
Synonym	: Nitrogen oxide; Nitrous oxide; Nitrogen oxide (N ₂ O); Laughing gas; Hyponitrous acid anhydride; Dinitrogen monoxide
SDS #	: 001042
Supplier's details	: Airgas USA, LLC and its affiliates 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253
Emergency telephone number (with hours of operation)	: 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status	: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Classification of the substance or mixture	: OXIDIZING GASES - Category 1 GASES UNDER PRESSURE - Compressed gas SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3

GHS label elements

Hazard pictograms



Signal word

: Danger

Hazard statements

: May cause or intensify fire; oxidizer.
Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.
May cause drowsiness and dizziness.

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.

Prevention

: 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. Avoid breathing gas. Use and store only outdoors or in a well ventilated place.

Section 2. Hazards identification

- 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. Call a POISON CENTER or physician if you feel unwell.
- 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 classified** : In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

Section 3. Composition/information on ingredients

- Substance/mixture** : Substance
- Chemical name** : dinitrogen oxide
- Other means of identification** : Nitrogen oxide; Nitrous oxide; Nitrogen oxide (N₂O); Laughing gas; Hyponitrous acid anhydride; Dinitrogen monoxide

CAS number/other identifiers

- CAS number** : 10024-97-2
- Product code** : 001042

Ingredient name	%	CAS number
nitrous oxide	100	10024-97-2

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.

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

Section 4. First aid measures

Description of necessary first aid measures

- Eye contact** : 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. Get medical attention.
- Inhalation** : 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. Get medical attention. If necessary, call a poison center or physician. 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** : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. 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** : May cause eye irritation. Contact with rapidly expanding gas may cause burns or frostbite.

Section 4. First aid measures

- Inhalation** : Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
- Skin contact** : May cause skin irritation. Contact with rapidly expanding gas may cause burns or frostbite.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Ingestion** : Can cause central nervous system (CNS) depression. As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

- Eye contact** : No specific data.
- Inhalation** : Adverse symptoms may include the following:
nausea or vomiting
headache
drowsiness/fatigue
dizziness/vertigo
unconsciousness
- Skin contact** : No specific data.
- Ingestion** : No specific data.

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.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

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

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.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

- 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. Avoid breathing 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 non-emergency 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

- 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.

Section 7. Handling and storage

Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid contact with eyes, skin and clothing. Avoid breathing 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 occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is 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, including any incompatibilities** : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Store locked up. Separate from acids, alkalis, 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).

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Dinitrogen oxide	ACGIH TLV (United States, 6/2013). TWA: 90 mg/m ³ 8 hours. TWA: 50 ppm 8 hours. NIOSH REL (United States, 4/2013). TWA: 46 mg/m ³ 10 hours. TWA: 25 ppm 10 hours.

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

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure 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: safety glasses with side-shields.

Skin protection

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.

Section 9. Physical and chemical properties

Appearance

Physical state	: Gas. [Compressed gas.]
Color	: Colorless.
Molecular weight	: 44.01 g/mole
Molecular formula	: N ₂ O
Boiling/condensation point	: -88.5°C (-127.3°F)
Melting/freezing point	: -90.8°C (-131.4°F)
Critical temperature	: 36.55°C (97.8°F)
Odor	: Characteristic.
Odor threshold	: Not available.
pH	: Not available.
Flash point	: [Product does not sustain combustion.]
Burning time	: Not applicable.
Burning rate	: Not applicable.
Evaporation rate	: Not available.
Flammability (solid, gas)	: Extremely flammable in the presence of the following materials or conditions: reducing materials and combustible materials.
Lower and upper explosive (flammable) limits	: Not available.
Vapor pressure	: 745 (psig)
Vapor density	: 1.53 (Air = 1) Liquid Density@BP: 76.8 lb/ft ³ (1230 kg/m ³)
Specific Volume (ft³/lb)	: 8.6957
Gas Density (lb/ft³)	: 0.115
Relative density	: Not applicable.
Solubility	: Not available.
Solubility in water	: 1.2 g/l
Partition coefficient: n-octanol/water	: 0.36
Auto-ignition temperature	: Not available.
Decomposition temperature	: Not available.
SADT	: Not available.
Viscosity	: Not applicable.

Section 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
Conditions to avoid	: No specific data.

Section 10. Stability and reactivity

Incompatibility with various substances : Extremely reactive or incompatible with the following materials: oxidizing materials, reducing materials and combustible materials.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Not available.

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Classification

Product/ingredient name	OSHA	IARC	NTP
Dinitrogen oxide	-	3	-

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
Dinitrogen oxide	Category 3	Not applicable.	Narcotic effects

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 : May cause eye irritation. Contact with rapidly expanding gas may cause burns or frostbite.

Section 11. Toxicological information

- Inhalation** : Can cause central nervous system (CNS) depression. May cause drowsiness and dizziness. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
- Skin contact** : May cause skin irritation. Contact with rapidly expanding gas may cause burns or frostbite.
- Ingestion** : Can cause central nervous system (CNS) depression. As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

- Eye contact** : No specific data.
- Inhalation** : Adverse symptoms may include the following:
nausea or vomiting
headache
drowsiness/fatigue
dizziness/vertigo
unconsciousness
- Skin contact** : No specific data.
- Ingestion** : No specific data.

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.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	LogP _{ow}	BCF	Potential
Dinitrogen oxide	0.36	-	low

Mobility in soil



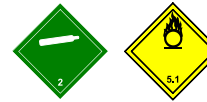
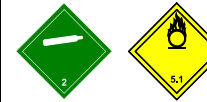
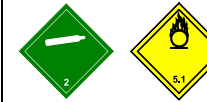
Soil/water partition coefficient (K_{oc}) : Not available.

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

Section 13. Disposal considerations

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.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1070	UN1070	UN1070	UN1070	UN1070
UN proper shipping name	NITROUS OXIDE	NITROUS OXIDE	NITROUS OXIDE	NITROUS OXIDE	NITROUS OXIDE
Transport hazard class(es)	2.2 (5.1) 	2.2 (5.1) 	2.2 (5.1) 	2.2 (5.1) 	2.2 (5.1) 
Packing group	-	-	-	-	-
Environment	No.	No.	No.	No.	No.
Additional information	Limited quantity Yes. Packaging instruction Passenger aircraft Quantity limitation: 75 kg Cargo aircraft	Explosive Limit and Limited Quantity Index 0 ERAP Index 3000 Passenger Carrying Ship Index	-	-	Passenger and Cargo Aircraft Quantity limitation: 75 kg Cargo Aircraft Only Quantity limitation: 150 kg

Section 14. Transport information

	Quantity limitation: 150 kg	450			
		<u>Passenger Carrying Road or Rail Index</u>			
		75			

“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.

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

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

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

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
Dinitrogen oxide	100	No.	Yes.	No.	Yes.	No.

State regulations

Massachusetts : This material is listed.

New York : This material is not listed.

Section 15. Regulatory information

New Jersey : This material is listed.

Pennsylvania : This material is listed.

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
dinitrogen oxide	No.	Yes.	No.	No.

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-2A: Material causing other toxic effects (Very toxic).
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.

Section 16. Other information

Canada Label requirements : Class A: Compressed gas.
 Class C: Oxidizing material.
 Class D-2A: Material causing other toxic effects (Very toxic).

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

Health	1
Flammability	0
Physical hazards	3

Section 16. Other information

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 \(U.S.A.\)](#)



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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

[History](#)

Date of printing : 5/20/2015.

Date of issue/Date of revision : 5/20/2015.

Date of previous issue : 10/17/2014.

Version : 0.06

Key to abbreviations :

- ATE = Acute Toxicity Estimate
- BCF = Bioconcentration Factor
- GHS = Globally Harmonized System of Classification and Labelling of Chemicals
- IATA = International Air Transport Association
- IBC = Intermediate Bulk Container
- IMDG = International Maritime Dangerous Goods
- LogPow = logarithm of the octanol/water partition coefficient
- MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
- UN = United Nations
- ACGIH – American Conference of Governmental Industrial Hygienists
- AIHA – American Industrial Hygiene Association
- CAS – Chemical Abstract Services
- CEPA – Canadian Environmental Protection Act
- CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)
- CFR – United States Code of Federal Regulations
- CPR – Controlled Products Regulations
- DSL – Domestic Substances List
- GWP – Global Warming Potential
- IARC – International Agency for Research on Cancer
- ICAO – International Civil Aviation Organisation
- Inh – Inhalation
- LC – Lethal concentration
- LD – Lethal dosage
- NDSL – Non-Domestic Substances List
- NIOSH – National Institute for Occupational Safety and Health

Section 16. Other information

TDG – Canadian Transportation of Dangerous Goods Act and Regulations
TLV – Threshold Limit Value
TSCA – Toxic Substances Control Act
WEEL – Workplace Environmental Exposure Level
WHMIS – Canadian Workplace Hazardous Material Information System

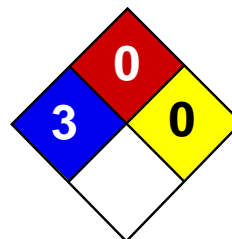
References : Not available.

✔ Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.



Health	3
Fire	0
Reactivity	0
Personal Protection	

Material Safety Data Sheet Mercury MSDS

Section 1: Chemical Product and Company Identification

Product Name: Mercury

Catalog Codes: SLM3505, SLM1363

CAS#: 7439-97-6

RTECS: OV4550000

TSCA: TSCA 8(b) inventory: Mercury

CI#: Not applicable.

Synonym: Quick Silver; Colloidal Mercury; Metallic Mercury; Liquid Silver; Hydragryum

Chemical Name: Mercury

Chemical Formula: Hg

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Mercury	7439-97-6	100

Toxicological Data on Ingredients: Mercury LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, permeator). Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:

Hazardous in case of skin contact (permeator). **CARCINOGENIC EFFECTS:** Classified A5 (Not suspected for human.) by ACGIH. 3 (Not classifiable for human.) by IARC. **MUTAGENIC EFFECTS:** Not available. **TERATOGENIC EFFECTS:** Not available. **DEVELOPMENTAL TOXICITY:** Not available. The substance may be toxic to blood, kidneys, liver, brain, peripheral nervous system, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation.

Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:

When thrown into mercury vapor, boron phosphodiiodide ignites at once. Flame forms with chlorine jet over mercury surface at 200 deg to 300 deg C. Mercury undergoes hazardous reactions in the presence of heat and sparks or ignition.

Special Remarks on Explosion Hazards:

A violent exothermic reaction or possible explosion occurs when mercury comes in contact with lithium and rubidium. CHLORINE DIOXIDE & LIQUID HG, WHEN MIXED, EXPLODE VIOLENTLY. Mercury and Ammonia can produce an

explosive compound. A mixture of the dry carbonyl and oxygen will explode on vigorous shaking with mercury. Methyl azide in the presence of mercury was shown to be potentially explosive.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Corrosive liquid. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep container dry. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, metals.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 25°C (77°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 0.025 from ACGIH (TLV) [United States] SKIN TWA: 0.05 CEIL: 0.1 (mg/m³) from OSHA (PEL) [United States]
Inhalation TWA: 0.025 (mg/m³) [United Kingdom (UK)] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Heavy liquid)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 200.59 g/mole

Color: Silver-white

pH (1% soln/water): Not available.

Boiling Point: 356.73°C (674.1°F)

Melting Point: -38.87°C (-38°F)

Critical Temperature: 1462°C (2663.6°F)

Specific Gravity: 13.55 (Water = 1)

Vapor Pressure: Not available.

Vapor Density: 6.93 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, metals.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Ground mixtures of sodium carbide and mercury, aluminum, lead, or iron can react vigorously. A violent exothermic reaction or possible explosion occurs when mercury comes in contact with lithium and rubidium. Incompatible with boron diiodophosphide; ethylene oxide; metal oxides, metals(aluminum, potassium, lithium, sodium, rubidium); methyl azide; methylsilane, oxygen; oxidants(bromine, peroxyformic acid, chlorine dioxide, nitric acid, tetracarbonylnickel, nitromethane, silver perchlorate, chlorates, sulfuric acid, nitrates,); tetracarbonylnickel, oxygen, acetylinic compounds, ammonia, ethylene oxide, methylsilane, calcium,

Special Remarks on Corrosivity:

The high mobility and tendency to dispersion exhibited by mercury, and the ease with which it forms alloys (amalga) with many laboratory and electrical contact metals, can cause severe corrosion problems in laboratories. Special precautions: Mercury can attack copper and copper alloy materials.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

LD50: Not available. LC50: Not available.

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A5 (Not suspected for human.) by ACGIH. 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, liver, brain, peripheral nervous system, central nervous system (CNS).

Other Toxic Effects on Humans:

Very hazardous in case of skin contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

May affect genetic material. May cause cancer based on animal data. Passes through the placental barrier in animal. May cause adverse reproductive effects(paternal effects- spermatogenesis; effects on fertility - fetotoxicity, post-implantation mortality), and birth defects.

Special Remarks on other Toxic Effects on Humans:

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Mercury UNNA: 2809 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Mercury California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Mercury Connecticut hazardous material survey.: Mercury Illinois toxic substances disclosure to employee act: Mercury Illinois chemical safety act: Mercury New York acutely hazardous substances: Mercury Rhode Island RTK hazardous substances: Mercury Pennsylvania RTK: Mercury Minnesota: Mercury Massachusetts RTK: Mercury New Jersey: Mercury New Jersey spill list: Mercury Louisiana spill reporting: Mercury California Director's List of Hazardous Substances.: Mercury TSCA 8(b) inventory: Mercury SARA 313 toxic chemical notification and release reporting: Mercury CERCLA: Hazardous substances.: Mercury: 1 lbs. (0.4536 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC):

R23- Toxic by inhalation. R33- Danger of cumulative effects. R38- Irritating to skin. R41- Risk of serious damage to eyes. R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. S2- Keep out of the

reach of children. S7- Keep container tightly closed. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S39- Wear eye/face protection. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S46- If swallowed, seek medical advice immediately and show this container or label. S60- This material and its container must be disposed of as hazardous waste. S61- Avoid release to the environment. Refer to special instructions/Safety data sheets.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 0

Personal Protection:

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:22 PM

Last Updated: 05/21/2013 12:00 PM

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