



MATERIAL SAFETY DATA SHEET

PRODUCT NAME: PHOSPHINE

1. Chemical Product and Company Identification

**BOC Gases,
Division of
The BOC Group, Inc.
575 Mountain Avenue
Murray Hill, NJ 07974**

**BOC Gases
Division of
BOC Canada Limited
5975 Falbourne Street, Unit 2
Mississauga, Ontario L5R 3W6**

TELEPHONE NUMBER: (908) 464-8100
24-HOUR EMERGENCY TELEPHONE NUMBER:
CHEMTREC (800) 424-9300

TELEPHONE NUMBER: (905) 501-1700
24-HOUR EMERGENCY TELEPHONE NUMBER:
(905) 501-0802
EMERGENCY RESPONSE PLAN NO: 20101

PRODUCT NAME: PHOSPHINE
CHEMICAL NAME: Phosphine
COMMON NAMES/SYNONYMS: Hydrogen Phosphide, Phosphorous Trihydride
TDG (Canada) CLASSIFICATION: 2.3 (2.1)
WHMIS CLASSIFICATION: A, B6, D1A, D2B, F

PREPARED BY: Loss Control (908)464-8100/(905)501-1700
PREPARATION DATE: 6/1/95
REVIEW DATES: 6/7/96

2. Composition, Information on Ingredients

INGREDIENT	% VOLUME	PEL-OSHA ¹	TLV-ACGIH ²	LD ₅₀ or LC ₅₀ Route/Species
Phosphine FORMULA: PH ₃ CAS: 7803-51-2 RTECS #: SY7525000	> 99.5	0.3 ppm TWA	0.3 ppm TWA 1 ppm STEL	LC ₅₀ 11 ppm/4H (rat)

¹ As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

² As stated in the ACGIH 1994-95 Threshold Limit Values for Chemical Substances and Physical Agents

3. Hazards Identification

EMERGENCY OVERVIEW

Irritating to the eyes, skin and mucous membranes. Inhalation may result in pulmonary edema. Phosphine is a central nervous system depressant and toxic to the kidneys. Highly Flammable. This product may spontaneously combust in air.

ROUTE OF ENTRY:

Skin Contact Yes	Skin Absorption No	Eye Contact Yes	Inhalation Yes	Ingestion No
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PRODUCT NAME: PHOSPHINE

HEALTH EFFECTS:

Exposure Limits Yes	Irritant Yes	Sensitization No
Teratogen No	Reproductive Hazard No	Mutagen No
Synergistic Effects None reported		

Carcinogenicity: -- NTP: No IARC: No OSHA: No

EYE EFFECTS:

Contact may cause irritation.

SKIN EFFECTS:

Contact may cause irritation, pain, and burning.

INGESTION EFFECTS:

Since product is a gas at room temperature, ingestion is unlikely. Consult a physician for treatment.

INHALATION EFFECTS:

Inhalation of phosphine may cause coughing, shortness of breath, wheezing, increased bronchial secretions, pulmonary edema, weakness, fatigue, headache, dizziness, fainting, drowsiness, tremors, disturbances of gait, convulsions, and coma. Abdominal pain, thirst, nausea, and vomiting may also occur. Severe exposures may be lethal.

NFPA HAZARD CODES

Health: 4
Flammability: 4
Reactivity: 2

HMIS HAZARD CODES

Health: 4
Flammability: 4
Reactivity: 2

RATINGS SYSTEM

0 = No Hazard
1 = Slight Hazard
2 = Moderate Hazard
3 = Serious Hazard
4 = Severe Hazard

4. First Aid Measures

EYES:

In case of eye contact, immediately flush with low pressure, cool water for at least 15 minutes, opening eyelids to ensure flushing. Get immediate medical attention.

SKIN:

Flush affected areas immediately with large quantities of water. Then wash thoroughly with soap and water. Consult a physician if irritation develops.

INGESTION:

Rinse affected area with water. Give water by mouth to dilute. Never give anything by mouth to an unconscious person. Call your local poison control center for advice, giving identity of chemical. **DO NOT INDUCE VOMITING! CALL POISON CONTROL CENTER FOR ADVICE.**

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INHALATION:

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND BE AWARE OF EXTREME FIRE AND EXPLOSION HAZARD. Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area, given artificial resuscitation and supplemental oxygen. Medical assistance should be sought immediately. Treatment should be symptomatic and supportive.

5. Fire Fighting Measures

Conditions of Flammability: May spontaneously combust at room temperature in air		
Flash point: Not Available	Method: Not Applicable	Autoignition Temperature: 300 °F (150 °C)
LEL(%): Not Available		UEL(%): Not Available
Hazardous combustion products: Phosphorus compounds		
Sensitivity to mechanical shock: Not Available		
Sensitivity to static discharge: Not Available		

FIRE AND EXPLOSION HAZARDS:

Spontaneously combustible (pyrophoric). Dry phosphine is spontaneously combustible at room temperature. Although, at low concentrations silane may be released without burning. Releases of higher concentrations may result in the potential for a subsequent fire or explosion hazard. Extremely pure phosphine will not burn below 300°F (150°C).

EXTINGUISHING MEDIA:

None. Allow fire to burn itself out.

FIRE FIGHTING INSTRUCTIONS:

If possible, shut off the source of gas if safe to do so. Fire fighters should use self-contained breathing apparatus and full turnout gear. Use water spray to cool fire fighters.

Phosphorus pentoxide and phosphoric acid may be formed from thermal decomposition. Control water runoff to prevent environmental contamination.

6. Accidental Release Measures

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

7. Handling and Storage

Earth ground and bond all lines and equipment associated with the system. Electrical equipment should be non-sparking or explosion-proof.

For additional storage recommendations, consult Compressed Gas Association Pamphlets P-1, P-14, and Safety Bulletin SB-2.

Use only in well-ventilated areas. Stationary customer site vessels should be operated in accordance with the manufacturer's and Airco instructions. Do not attempt to repair, adjust or in any other way modify the operation

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of these vessels. If there is a malfunction or other type of operations problem with the vessel, contact the closest BOC location immediately for assistance.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. DO NOT allow the temperature where cylinders are stored to exceed 125°F (52°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first-in, first-out" inventory system to prevent full cylinders from being stored for excessive periods of time. Valve protection caps must remain in place unless container is secured with valve outlet piping to use point. Close valve after each use and when the container is empty. Do not drag, slide or roll cylinders on their sides. Use a suitable hand truck for container movement. Use a pressure reducing regulator when connecting container to piping or systems. Do not use gas directly from container. Do not heat container by any means to increase the discharge rate of product from the container.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

8. Exposure Controls, Personal Protection

EXPOSURE LIMITS¹:

INGREDIENT	% VOLUME	PEL-OSHA ²	TLV-ACGIH ³	LD ₅₀ or LC ₅₀ Route/Species
Phosphine FORMULA: PH ₃ CAS: 7803-51-2 RTECS #: SY7525000	> 99.5	0.3 ppm TWA	0.3 ppm TWA 1 ppm STEL	LC ₅₀ 11 ppm/4H (rat)

¹ Refer to individual state of provincial regulations, as applicable, for limits which may be more stringent than those listed here.

² As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)

³ As stated in the ACGIH 1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents.

IDLH (Phosphine): 200 ppm

ENGINEERING CONTROLS:

Use local exhaust ventilation to reduce concentrations to within current exposure limits. A laboratory type hood is suitable for handling small or limited quantities.

EYE/FACE PROTECTION:

Safety goggles or glasses.

SKIN PROTECTION:

Protective gloves: neoprene, butyl rubber, PVC, polyethylene.

RESPIRATORY PROTECTION:

An airline respirator with full face piece equipped with an escape bottle or a self-contained breathing apparatus should be available for emergency use.

OTHER/GENERAL PROTECTION:

Safety shoes, safety shower and eyewash.

9. Physical and Chemical Properties

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PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure	: 522	psia
Vapor density (Air = 1)	: 1.27	
Evaporation point	: Not Available	
Boiling point	: -126	°F
	: -88	°C
Freezing point	: -208.8	°F
	: -133.8	°C
pH	: Not Applicable	
Specific gravity at STP	: Not Available	
Oil/water partition coefficient	: Not Available	
Solubility (H2O)	: Slightly soluble	
Odor threshold	: Not Available	
Odor and appearance	: Colorless gas with a repulsive odor. Smell may resemble rotten fish.	

10. Stability and Reactivity

STABILITY:

Stable

INCOMPATIBLE MATERIALS:

Bases, halogens, oxygen, nitric acid, chromium oxychloride, silver nitrate, mercuric nitrate, nitrogen trichloride and other oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS:

Phosphorus and hydrogen at approximately 1100°F (600°C).

HAZARDOUS POLYMERIZATION:

Will not occur.

11. Toxicological Information

MUTAGENIC:

Unspecified effects reported in human cell culture assay (RTECs).

OTHER:

Phosphine is toxic to the kidneys. Exposure may result in albuminuria and hematuria. Chronic phosphine exposure may result in disturbances of sight, speech and motor functions. Other manifestations of phosphorus poisoning may occur, including skeletal injury.

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12. Ecological Information

OTHER ENVIRONMENTAL INFORMATION: This product does NOT contain any ingredients which are regulated on the U.S. EPA List of Toxic Chemicals (40 CFR 372), and is therefore not subject to release reporting under Section 313 of EPCRA/SARA Title III.

13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

14. Transport Information

PARAMETER	United States DOT	Canada TDG
PROPER SHIPPING NAME:	Phosphine	Phosphine
HAZARD CLASS:	2.3	2.3 (2.1)
IDENTIFICATION NUMBER:	UN 2199	UN 2199
SHIPPING LABEL:	POISON GAS, FLAMMABLE GAS	POISON GAS, FLAMMABLE GAS

Additional Marking Requirement: "Inhalation Hazard"

If net weight of product \geq 100 pounds, the container must be also marked with the letters "RQ".

Additional Shipping Paper Description Requirement: "Poison-Inhalation Hazard, Zone A"

If net weight of product \geq 100 pounds, the shipping papers must be also marked with the letters "RQ".

15. Regulatory Information

Phosphine is listed under the accident prevention provisions of section 112(r) of the Clean Air Act (CAA) with a threshold quantity (TQ) of 5,000 pounds.

SARA TITLE III NOTIFICATIONS AND INFORMATION

Phosphine is listed as an extremely hazardous substance (EHS) subject to state and local reporting under Section 304 of SARA Title III (EPCRA).

The presence of phosphine in quantities in excess of the threshold planning quantity (TPQ) of 500 pounds requires certain emergency planning activities to be conducted.

Releases of phosphine in quantities equal to or greater than the reportable quantity (RQ) of 100 pounds are subject to reporting to the National Response Center under CERCLA, Section 304 SARA Title III.

SARA TITLE III - HAZARD CLASSES:

Acute Health Hazard
Chronic Health Hazard
Fire Hazard
Sudden Release of Pressure Hazard
Reactivity Hazard

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SARA TITLE III - SECTION 313 SUPPLIER NOTIFICATION:

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

CAS NUMBER	INGREDIENT NAME	PERCENT BY VOLUME
7803-51-2	Phosphine	> 99.5

This information must be included on all MSDSs that are copied and distributed for this material.

16. Other Information

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:

Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).