MSDS: 0010913
Print Date: 01/19/2010
Revision Date: 01/19/2010

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: **VAPORPH3OS® Phosphine Fumigant**
Synonyms: None
Product Description: Phosphine gas
Intended/Recommended Use: Fumigant

Supplied By: CYTEC CANADA INC., 9061 GARNER ROAD
NIAGARA FALLS, ONTARIO, CANADA L2E 6S5 1-905/356-9000

Manufactured By: CYTEC INDUSTRIES INC., FIVE GARRET MOUNTAIN PLAZA,
WOODLAND PARK, NEW JERSEY 07424, USA - 973/357-3100

EMERGENCY PHONE (24 hours/day) - For emergency involving spill, leak, fire, exposure or accident call:
Asia Pacific Region:
Australia - +61-3-9663-2130 or 1800-033-111
China (PRC) - +86(0)532-8388-9090 (NRCC)
New Guinea - +61-3-9663-2130
New Zealand - +61-3-9663-2130 or 0800-734-607
All Others - +65-633-44-177 (CareChem24 Singapore)
Canada: 1-905-356-8310 (Cytec Welland, Canada plant)
Europe/Africa/Middle East: +44-(0)208-762-8322 (CareChem24 UK)
Latin America:
Brazil - 0800 0111 767 (SOS Cotec)
Chile - +56-2-247-3600 (CITUC QUIMICO)
All Others - +52-376-73 74122 (Cytec Atequiza, Mexico plant)
USA: +1-703-527-3887 or 1-800-424-9300 (CHEMTREC)

® indicates trademark registered in the U.S. Outside the U.S., mark may be registered, pending or a trademark. Mark is or may be used under license.

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

APPEARANCE AND ODOR:

Color:	colorless
Appearance:	gas
Odor:	garlic

STATEMENTS OF HAZARD:

DANGER!
POISONOUS LIQUID AND GAS UNDER PRESSURE
MAY BE FATAL IF INHALED
EXTREMELY FLAMMABLE
CATCHES FIRE IF EXPOSED TO AIR
MAY FORM EXPLOSIVE MIXTURE IN AIR
CAUSES THERMAL BURNS OF EYES AND SKIN

POTENTIAL HEALTH EFFECTS

EFFECTS OF EXPOSURE:

The probable oral lethal dose in humans is about 5 mg/kg. A study was conducted by Cytec Industries with seven groups of 10 rats (5/sex/group) exposed once for four hours to various levels of dynamically-generated vapor of phosphine. The four hour LC50 (rat) for the combined sexes is 57 ppm. Symptoms of poisoning included weakness, fatigue, headache, dizziness, and tightness of the chest.
This material is pyrophoric and therefore, contact with skin or eyes may produce thermal burns. Refer to Section 11 for toxicology information on the regulated components of this product.

3. COMPOSITION/INFORMATION ON INGREDIENTS

WHMIS REGULATED COMPONENTS

Component / CAS No.	% (w/w)	Carcinogen
Phosphine 7803-51-2	97 - 99	- .

4. FIRST AID MEASURES

Ingestion:
Not an expected route of exposure. Gas is not known to be absorbed through skin.

Skin Contact:
Not an expected route of exposure. Gas is not known to be absorbed through skin.

Eye Contact:
Rinse immediately with plenty of water for at least 15 minutes. Obtain medical attention immediately.

Inhalation:
Move person to fresh air. If person is not breathing, immediately call for emergency medical support then, begin cardiopulmonary resuscitation including artificial respiration, preferably with a bag-valve-mask device if possible. Rescuers within the areas of potentially unsafe levels of this product (the "HOT ZONE") should employ appropriate personal protective equipment such as SCBA during the rescue of the victim. Call a poison control center or doctor for further treatment advice.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media:
Use water spray, alcohol foam, carbon dioxide or dry chemical to extinguish fires.

Protective Equipment:
Firefighters, and others exposed, wear self-contained breathing apparatus. Wear full firefighting protective clothing. See MSDS Section 8 (Exposure Controls/Personal Protection).

Special Hazards:
In case of fire, stop flow of gas if possible. Keep cylinders cool by spraying with water if exposed to fire. Cylinders are not fitted with pressure relief devices and may explode if over-heated. Move cylinders from fire area if you can do it without risk. Withdraw immediately if cylinders can not be kept cool. Damaged cylinders should be handled only by a specialist. This material is spontaneously flammable in air and may form explosive mixtures in air.

Mechanical/Static Sensitivity Statements:
None

6. ACCIDENTAL RELEASE MEASURES

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Personal precautions:
Where exposure level is not known, wear approved, positive pressure, self-contained respirator. Where exposure level is known, wear approved respirator suitable for level of exposure.

Methods For Cleaning Up:
Remove sources of ignition. Evacuate area. If burning, allow to burn until leak is stopped.

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7. HANDLING AND STORAGE

HANDLING

Precautionary Measures: Do not breathe gas. Keep container tightly closed. Use with adequate ventilation. Keep cylinder out of sun and away from heat. Keep cylinder in an upright position and protect from falling. This gas deadens the sense of smell. Do not depend on odor to detect presence of gas.
X POISON X

Special Handling Statements: Before dispensing product, purge equipment with an inert gas. Cylinders must be handled in accordance with industry standards for compressed gases. Refer to the Compressed Gas Association (CGA) Pamphlet P-1 "Safe Handling of Compressed Gases In Containers". Phosphine gas may react with certain metals and cause corrosion, especially at higher temperatures and relative humidity. Metals such as brass, copper and other copper alloys and precious metals are susceptible to corrosion.

STORAGE
Cylinders should be stored in an assigned area which should be cool, dry, well ventilated and fire resistant. It is recommended that both full and used cylinders be stored outdoors in a dedicated and properly designed and labeled storage area, away from other building ventilation intakes. This area should be secured, locked and have a well-drained, firm and level surface, preferably reinforced concrete. Cylinders must be stored in an upright position and secured or protected from falling. Cylinders should never be stored where the temperatures will exceed 60 C (140 F). The indoor storage of toxic gases is prohibited in some jurisdictions. The storage of these gases in occupied spaces is not recommended. Indoor storage in a separate building with no other occupancy is suitable. The building should be adequately ventilated and equipped with a continuous monitoring and alarm system.

Storage Temperature: Store at < 60 °C 140 °F
Reason: Safety.

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8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Measures:
Utilize a closed system process where feasible. Where this material is not used in a closed system, good enclosure and local exhaust ventilation should be provided to control exposure.

Respiratory Protection:
In case of insufficient ventilation, wear suitable respiratory equipment. If exposed to vapour or spray, wear self-contained breathing apparatus. Continuously monitoring phosphine concentration in the workplace is recommended. Emergency procedure should be established for phosphine leaks.

Eye Protection:
Wear eye/face protection. Provide eye wash fountain and safety shower in close proximity to points of potential exposure.

Skin Protection:
Not an expected route of exposure. Gas is not known to be absorbed through skin. Steel toed safety shoes are recommended for anyone handling compressed gas cylinders.

Additional Advice:
Food, beverages, and tobacco products should not be carried, stored, or consumed where this material is in use. Before eating, drinking, or smoking, wash face and hands thoroughly with soap and water.

Exposure Limit(s)

7803-51-2 Phosphine

ACGIH (TLV):	1 ppm (STEL) 0.3 ppm (TWA)
AIHA (WEEL):	Not established
Other Value:	Not established

9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	colorless
Appearance:	gas
Odor:	garlic
Boiling Point:	-87 °C -125 °F
Melting Point:	-133 °C -208 °F
Vapor Pressure:	502psig @ 20 °C
Specific Gravity/Density:	Not applicable
Vapor Density:	1.146(air = 1) @ 20 °C
Percent Volatile (% by wt.):	100
pH:	Not applicable
Saturation In Air (% By Vol.):	Not applicable
Evaporation Rate:	Not applicable
Solubility In Water:	27cc gas/100 ml @ 20 °C
Volatile Organic Content:	Not available
Flash Point:	(Pyrophoric)
Flammable Limits (% By Vol):	Lower: 1.8
Autoignition Temperature:	38 °C 100 °F
Decomposition Temperature:	Not available
Partition coefficient (n-octanol/water):	Not applicable
Odor Threshold:	Not available

10. STABILITY AND REACTIVITY

Stability:	Stable
Conditions To Avoid:	None known
Polymerization:	Will not occur
Conditions To Avoid:	None known
Materials To Avoid:	Air, oxidizing agents. Dimethylsulfoxide
Hazardous Decomposition Products:	oxides of phosphorus

11. TOXICOLOGICAL INFORMATION

Toxicological information for the product is found under Section 2. HAZARDS IDENTIFICATION.
Toxicological information on the regulated components of this product is as follows:

Phosphine has a 4-hour inhalation LC50 (rat) value of 57 ppm (0.079 mg/L). Inhalation overexposure is characterized by severe pulmonary irritation, dyspnea, dizziness, lethargy, and stupor. Human evidence indicates that pulmonary irritation and pulmonary edema are the main toxic effects of phosphine inhalation. Phosphine has also been shown to cause central nervous system depression and gastrointestinal irritation, as well as, renal and hepatic toxicity. Acute inhalation overexposure to high concentrations of phosphine can be fatal. This material is pyrophoric and therefore, contact with skin or eyes may produce thermal burns. In an in vivo cytogenetic study, rats exposed to phosphine via inhalation at concentrations of 0, 6.2 and 19 ppm were examined for chromosomal aberrations in whole blood lymphocytes and bone marrow cells. A significant increase in cells with chromosomal aberrations were seen in male rats exposed to 19 ppm phosphine. No increase in cells with chromosomal aberrations were observed in the bone marrow of female rats, nor in the whole blood lymphocytes of male or female rats.

12. ECOLOGICAL INFORMATION

Environmental exposure from substances of this preparation are limited due to the physical form of the product.

13. DISPOSAL CONSIDERATIONS

The Company encourages the recycle, recovery and reuse of materials, where permitted, as an alternative to disposal as a waste. The Company recommends that organic materials classified as hazardous waste according to the relevant local or national regulations be disposed of by thermal treatment or incineration at approved facilities. All local and national regulations should be followed.

14. TRANSPORT INFORMATION

This section provides basic shipping classification information. Refer to appropriate transportation regulations for specific requirements.

US DOT

Dangerous Goods? X
- Proper Shipping Name: Phosphine
- Hazard Class: 2.3
- Subsidiary Class: 2.1
- UN/ID Number: UN2199
- Inhalation Hazard: Toxic Inhalation Hazard - Zone A
- Transport Label Required: Poison Gas - Inhalation Hazard
  Flammable Gas

Component / CAS No.	Hazardous Substances / Reportable Quantity of Product (lbs)
Phosphine	101.0101

Comments: Hazardous Substances/Reportable Quantities - DOT requirements specific to Hazardous Substances only apply if the quantity in one package equals or exceeds the product reportable quantity.

TRANSPORT CANADA

Dangerous Goods? X
Proper Shipping Name: Phosphine
Hazard Class: 2.3
Subsidiary Class: 2.1
UN Number: UN2199
Transport Label Required: Toxic Gas
Flammable Gas

ICAO / IATA

Dangerous Goods? Forbidden

IMO

Dangerous Goods? X
Proper Shipping Name: Phosphine
Hazard Class: 2.3
Subsidiary Class: 2.1
UN Number: UN2199
Transport Label Required: Toxic Gas
Flammable Gas

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15. REGULATORY INFORMATION

This product has been classified in accordance with the hazard criteria of the Controlled products Regulations and this Material Safety Data Sheet contains all the information required by the Controlled Products Regulations.

WHMIS CLASSIFICATION:
Class A Compressed Gas
Class B1 Flammable Gas
Class D1A Very Toxic

Inventory Information

United States (USA): All components of this product are included on the TSCA Chemical Inventory or are not required to be listed on the TSCA Chemical Inventory.

Canada: All components of this product are included on the Domestic Substances List (DSL) or are not required to be listed on the DSL.

Australia: All components of this product are included in the Australian Inventory of Chemical Substances (AICS) or are not required to be listed on AICS. Not to be available except to authorized or licensed persons. APVMA Approval: File Number 51209.

China: All components of this product are included on the Chinese inventory or are not required to be listed on the Chinese inventory.

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16. OTHER INFORMATION

NFPA Hazard Rating (National Fire Protection Association)
Health: 4 - Materials that, under emergency conditions, can be lethal.

Fire: 4 - Materials which will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature, or that are readily dispersed in air and which will burn readily.

Instability: 2 - Materials that readily undergo violent chemical change at elevated temperatures and pressures.

Reasons For Issue:

Revised Section 2
Revised Section 3
Revised Section 8
Revised Section 11

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01/19/2010

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