

Safety data sheet Phosphine

Creation date : 28.01.2005
Revision date : 31.08.2011

Version : 1.2

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SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product name
Phosphine

EC No (from EINECS): 232-260-8
CAS No: 7803-51-2
Index-Nr. 015-181-00-1

Chemical formula PH₃
REACH Registration number:
Not available.

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

Relevant identified uses

Industrial and professional. Perform risk assessment prior to use.

Uses advised against

Consumer use.

1.3. Details of the supplier of the safety data sheet

Company identification

BOC, PO Box 1201, Bluebell, Dublin
E-Mail Address ReachSDS@boc.com

1.4. Emergency telephone number

Emergency phone numbers (24h): 1850 333 435

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification acc. to Regulation (EC) No 1272/2008/EC (CLP/GHS)

Press. Gas (Liquefied gas) - Contains gas under pressure; may explode if heated.

Flam. Gas 1 - Extremely flammable gas.

Acute Tox. 1 - Fatal if inhaled.

Skin Corr. 1B - Causes severe skin burns and eye damage.

Aquatic Acute 1 - Very toxic to aquatic life.

Classification acc. to Directive 67/548/EEC & 1999/45/EC

T+; R26 | F+; R12, R17 | C; R34 | N; R50

Extremely flammable.

Spontaneously flammable in air.

Very toxic by inhalation.

Causes burns (to eyes, respiratory system and skin).

Very toxic to aquatic organisms.

Risk advice to man and the environment

Liquefied gas.

2.2. Label elements

- Labelling Pictograms



- Signal word

Danger

- Hazard Statements

H280	Contains gas under pressure; may explode if heated.
H220	Extremely flammable gas.
H330	Fatal if inhaled.
H314	Causes severe skin burns and eye damage.
H400	Very toxic to aquatic life.

- Precautionary Statements

Precautionary Statement Prevention

P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P260	Do not breathe gas, vapours.
P273	Avoid release to the environment.

Precautionary Statement Response

P377	Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381	Eliminate all ignition sources if safe to do so.
P304+P340+P315	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get immediate medical advice/attention.
P303+P361+P353+P315	IF ON SKIN (or hair): Remove / Take off immediately all contaminated clothes. Rinse skin with water/shower. Get immediate medical advice/attention.
P305+P351+P338+P315	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.

Precautionary Statement Storage

P403	Store in a well-ventilated place.
P405	Store locked up.

Precautionary Statement Disposal

None.

2.3. Other hazards

Spontaneously flammable in air., Contact with liquid may cause cold burns/frost bite.

SECTION 3: Composition/information on ingredients

Substance / Mixture: Substance.

3.1. Substances

Phosphine

CAS No: 7803-51-2

Index-Nr.: 015-181-00-1

EC No (from EINECS): 232-260-8

REACH Registration number:

Not available.

Contains no other components or impurities which will influence the classification of the product.

3.2. Mixtures

Not applicable.

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SECTION 4: First aid measures

4.1. Description of first aid measures

First Aid General Information:

Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

First Aid Inhalation:

Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

First Aid Skin / Eye:

May cause severe chemical burns to skin and cornea. Suitable first-aid treatment should be immediately available. Seek medical advice before using product. Remove contaminated clothing. Drench affected area with water for at least 15 minutes. In case of frostbite spray with water for at least 15 minutes. Apply a sterile dressing. Immediately flush eyes thoroughly with water for at least 15 minutes. Obtain medical assistance.

First Aid Ingestion:

Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects, both acute and delayed

Delayed adverse effects possible. May cause severe chemical burns to skin and cornea. Suitable first-aid treatment should be immediately available. Seek medical advice before using product. May result in pulmonary oedema.

4.3. Indication of any immediate medical attention and special treatment needed

Obtain medical assistance. None.

SECTION 5: Fire fighting measures

5.1. Extinguishing media

Suitable extinguishing media

Carbon dioxide. Dry powder. Alcohol-resistant foam. Use water spray or fog to control fire fumes.

5.2. Special hazards arising from the substance or mixture

Specific hazards

Escaping gas cannot be extinguished. Exposure to fire may cause containers to rupture/explode. Can form violent, spontaneously explosive mixture in air.

Hazardous combustion products

If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition: Phosphorus oxides/acids

5.3. Advice for fire-fighters

Specific methods

If possible, stop flow of product. Move container away or cool with water from a protected position. Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire. Prevent water used in emergency cases from entering sewers and drainage systems.

Special protective equipment for fire-fighters

Gas tight chemically protective clothing (Type 1) in combination with self contained breathing apparatus.

Guideline:

EN 943-2:2002: Protective clothing against liquid and gaseous chemicals, aerosols and solid particles. Performance requirements for gas-tight (Type 1) chemical protective suits for emergency teams (ET).

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Evacuate area. Eliminate ignition sources. Ensure adequate air ventilation. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Consider the risk of potentially explosive atmospheres. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Monitor concentration of released product. EN 137 Respiratory protective devices — Self-contained open-circuit compressed air breathing apparatus with full face mask — Requirements, testing, marking.

6.2. Environmental precautions

Try to stop release. Reduce vapour with fog or fine water spray.

6.3. Methods and material for containment and cleaning up

Ventilate area.

6.4. Reference to other sections

See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Only experienced and properly instructed persons should handle gases under pressure. The substance must be handled in accordance with good industrial hygiene and safety procedures. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Avoid exposure, obtain special instructions before use. Take precautionary measures against static discharges. Ensure equipment is adequately earthed. Purge air from system before introducing gas. Keep away from ignition sources (including static discharges). Do not smoke while handling product. Assess the risk of potentially explosive atmosphere and the need for explosion-proof equipment. Consider the use of only non-sparking tools. Ensure the complete gas system has been (or is regularly) checked for leaks before use. Installation of a cross purge assembly between the container and the regulator is recommended. Purge system with dry inert gas (e.g. helium or nitrogen) before gas is introduced and when system is placed out of service. Avoid suckback of water, acid and alkalis.

7.2. Conditions for safe storage, including any incompatibilities

Refer to supplier's handling instructions. Do not allow backfeed into the container. Protect containers from physical damage; do not drag, roll, slide or drop. When moving containers, even for short distances, use appropriate equipment eg. trolley, hand truck, fork truck etc. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. If user experiences any difficulty operating container valve discontinue use and contact supplier. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Keep container valve outlets clean and free from contaminants particularly oil and water. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to transfer gases from one container to another. Never use direct flame or electrical heating devices to raise the pressure of a container. Do not remove or deface labels provided by the supplier for the identification of the container contents. Keep container below 50°C in a well ventilated place. Observe all regulations and local requirements regarding storage of containers. Segregate from oxidant gases and other oxidants in store. Cylinders should be stored in the vertical position and properly secured to prevent falling over. Stored containers should be periodically checked for general

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conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible materials. All electrical equipment in the storage areas should be compatible with the risk of potentially explosive atmosphere. Containers should not be stored in conditions likely to encourage corrosion.

7.3. Specific end use(s)
None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Exposure limit value

Value type	value	Note
Great Britain - LTEL	0,1 ppm	EH 40/07
Great Britain - STEL	0,2 ppm	EH 40/07

PNEC not available.

Derived No Effect Levels

Type	Exposure	Value	Population	Effects
DNEL	Short term inhalation	0,28 mg/m ³	Workers	Systemic
DNEL	Long term inhalation	0,14 mg/m ³	Workers	Systemic

8.2. Exposure controls

Appropriate engineering controls

A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered. Product to be handled in a closed system and under strictly controlled conditions. Keep concentrations well below occupational exposure limits. Gas detectors should be used when toxic quantities may be released. Gas detectors should be used when quantities of flammable gases/vapours may be released. Consider work permit system e.g. for maintenance activities. Systems under pressure should be regularly checked for leakages. Provide adequate general or local ventilation. Use only permanent leak-tight installations (e.g. welded pipes).

Personal protective equipment

Eye and face protection

Protect eyes, face and skin from liquid splashes. 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. Wear a face-shield when transfilling and breaking transfer connections. Safety eyewear, goggles or face-shield to EN166 should be used to avoid exposure to liquid splashes. Wear eye protection to EN 166 when using gases. Full-face mask recommended

Guideline:

EN 136 Respiratory protective devices. Full face masks. Requirements, testing, marking

Skin protection

Hand protection

Advice: Wear working gloves and safety shoes while handling containers., Chemically resistant gloves complying with EN 374 should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Guideline: EN 374-1/2/3 Protective gloves against chemicals and micro-organisms.

Body protection

Protect eyes, face and skin from contact with product. Keep suitable chemically resistant protective clothing readily available for emergency use. Personal protective equipment for the body should be selected based on the task being performed and the risks involved.

Guideline:

EN 943: Protective clothing against liquid and gaseous chemicals, including liquid aerosols and solid particles.

Other protection

Wear flame resistant/retardant clothing. Take precautionary measures against static discharges. Wear working gloves and safety shoes while handling containers. ISO/TR 2801:2007 Clothing for protection against heat and flame -- General recommendations for selection, care and use of protective clothing. EN ISO 20345 Personal protective equipment - Safety footwear.

Respiratory protection

Keep self contained breathing apparatus readily available for emergency use., Use SCBA in the event of high concentrations, The selection of the Respiratory Protective Device (RPD) must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected RPD., When allowed by a risk assessment a supplied air respirator may be used.

Guideline:

EN 136 Respiratory protective devices. Full face masks. Requirements, testing, marking

Guideline:

EN 137 Respiratory protective devices — Self-contained open-circuit compressed air breathing apparatus with full face mask — Requirements, testing, marking.

Thermal hazards

If there is a risk of contact with the liquid, all protective equipment should be suitable for extremely low temperatures.

Environmental Exposure Controls

Specific risk management measures are not required beyond good industrial hygiene and safety procedures. Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

General information

Appearance/Colour: Colourless gas.

Odour: Rotten fish Garlic like. Poor warning properties at low concentrations. Odour can persist.

Odour threshold:

Odour threshold is subjective and inadequate to warn for over exposure.

Melting point: -134 °C

Boiling point: -88 °C

Flash point: Not applicable for gases and gas mixtures.

Evaporation rate:

Not applicable for gases and gas mixtures.

Flammability range: 1,6 %(V) - 98 %(V) Pyrophoric.

Vapour Pressure 20 °C: 34,6 bar

Relative density, gas: 1,2

Solubility in water: 300 mg/l

Partition coefficient: n-octanol/water:

Not applicable.

Autoignition temperature: 37,8 °C

Molecular weight: 34 g/mol

Critical temperature: 51,6 °C

Relative density, liquid: 0,74

9.2. Other information

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Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity

10.1. Reactivity

Unreactive under normal conditions.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Can ignite spontaneously in air (fire cannot be put out). Can form violent, spontaneously explosive mixture in air., May react violently with oxidants.

10.4. Conditions to avoid

Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

10.5. Incompatible materials

Air, Oxidiser. For material compatibility see latest version of ISO-11114.

10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced. If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition: Phosphorus oxides/acids

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute oral toxicity

No data available.

Acute inhalation toxicity

Value: LC50

Species: Rat

Exposure time: 4 h

Value in non-standard unit: 10 ppm

Delayed fatal pulmonary oedema possible.

Value: LCLo

Species: Human

Exposure time: 5 h

Value in non-standard unit: 1000 ppm

Acute dermal toxicity

No data available.

Skin irritation

Irritant

Eye irritation

Irritant

Sensitization

No known effects from this product.

Repeated dose toxicity

Species: Rat

Route of application: Inhalation

Exposure time numeric value: 17.472 h

Value type: NOAEL

Value: < 3 ppm

No known effects from this product.

Genetic toxicity in vivo

Species: Mouse

Result: Negative.

Assessment mutagenicity

No known effects from this product.

Carcinogenicity

Species: Rat

Value type: NOAEL

Value: 3 ppm

Method: OECD Test Guideline 453 (Combined Chronic Toxicity / Carcinogenicity Studies)

Assessment carcinogenicity

No known effects from this product.

Assessment toxicity to reproduction

No known effects from this product.

Developmental toxicity/teratogenicity

Species: Rat

Route of application: Inhalation

Value type: NOAEL (Maternal toxicity)

Value: 4,9 ppm

Method: OECD Test Guideline 414 (Prenatal Developmental Toxicity Study)

Species: Rat

Route of application: Inhalation

Value type: LOAEL

Value: 7 ppm

Species: Rat

Route of application: Inhalation

Value type: NOAEL (Foetal toxicity)

Value: 4,9 ppm

Assessment teratogenicity

No indication of teratogenic effects.

Experiences with human exposure

Inhalation can cause damage to respiratory tract and lungs.

May result in pulmonary oedema.

Specific Target Organ Toxicity (STOT) - Single Exposure

Organ: Kidneys

Organ: Liver

Organ: Lungs

Damage to central nervous system., Irritation of respiratory tract

Specific Target Organ Toxicity (STOT) - Repeated Exposure

Organ: Kidneys

Organ: Liver

Organ: Lungs

Irritation of respiratory tract

Aspiration hazard

Not applicable to gases and gas mixtures

SECTION 12: Ecological information

12.1. Toxicity

Very toxic to aquatic life. Avoid release to the environment.

12.2. Persistence and degradability

Atmospheric degradation

Half life: 28 hours

With the usual concentrations of HOx radicals in the atmosphere.

Atmospheric degradation

Half life: 5 hours

With sunshine, which increases the HOx radical concentration.

Atmospheric degradation

Non-significant hydrolysis

12.3. Bioaccumulative potential

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The substance has no potential for bioaccumulation.

12.4. Mobility in soil

Henry's constant at 25 °C: 340.335 Pa.m³/mol
Substance near soil surface will diffuse into atmosphere., Substance beneath soil surface is quickly absorbed and degraded.

12.5. Results of PBT and vPvB assessment

No data available.

12.6. Other adverse effects

May cause pH changes in aqueous ecological systems.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Must not be discharged to atmosphere. Do not discharge into any place where its accumulation could be dangerous. Do not discharge into areas where there is a risk of forming an explosive mixture with air. Waste gas should be flared through a suitable burner with flash back arrestor. Toxic and corrosive gases formed during combustion should be scrubbed before discharge to atmosphere. Contact supplier if guidance is required. Gas may be scrubbed in alkaline solution under controlled conditions to avoid violent reaction. Refer to the EIGA code of practice (Doc.30 "Disposal of Gases", downloadable at <http://www.eiga.org>) for more guidance on suitable disposal methods.

Gases in pressure containers (including halons) containing dangerous substances

EWC Nr. 16 05 04*

SECTION 14: Transport information

ADR/RID

14.1. UN number

2199

14.2. UN proper shipping name

Phosphine

14.3. Transport hazard class(es)

Class: 2

Classification Code: 2TF

Labels: 2.3, 2.1

Tunnel restriction code: (D)

Emergency Action Code: 2PE

14.4. Packing group (Packing Instruction)

P200

14.5. Environmental hazards

None.

14.6. Special precautions for user

None.

IMDG

14.1. UN number

2199

14.2. UN proper shipping name

Phosphine

14.3. Transport hazard class(es)

Class: 2.3

Labels: 2.3, 2.1

EmS: F-D, S-U

14.4. Packing group (Packing Instruction)

P200

14.5. Environmental hazards

None.

14.6. Special precautions for user

None.

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Not applicable.

IATA

14.5. Environmental hazards

None.

14.6. Special precautions for user

None.

Other transport information

Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers ensure that they are firmly secured. Ensure that the container valve is closed and not leaking. Ensure that the valve outlet cap nut or plug (where provided) is correctly fitted. Ensure that the valve protection device (where provided) is correctly fitted. Ensure adequate ventilation. Ensure compliance with applicable regulations.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Seveso Directive 96/82/EC: Listed

Other regulations

Council Directive 67/548/EEC on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances

Council Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work
Directive 1999/45/EC concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations

Directive 89/686/EEC on personal protective equipment

Directive 94/9/EC on equipment and protective systems intended for use in potentially explosive atmospheres (ATEX)

Directive 97/23/EC on the approximation of the laws of the Member States concerning pressure equipment.

15.2. Chemical safety assessment

CSA has not been carried out.

SECTION 16: Other information

Ensure all national/local regulations are observed. Ensure operators understand the flammability hazard. Ensure operators understand the toxicity hazard. Users of breathing apparatus must be trained. Before using this product in any new process or experiment, a

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thorough material compatibility and safety study should be carried out.

Advice

Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted. Details given in this document are believed to be correct at the time of going to press.

Further information

Note:

When using this document care should be taken, as the decimal sign and its position complies with rules for the structure and drafting of international standards, and is a comma on the line.

As an example 2,000 is two (to three decimal places) and not two thousand, whilst 1.000 is one thousand and not one (to three decimal places).

References

Various sources of data have been used in the compilation of this SDS, they include but are not exclusive to: European Chemical Agency: Guidance on the Compilation of Safety Data Sheets. European Chemical Agency: Information on Registered Substances <http://apps.echa.europa.eu/registered/registered-sub.aspx#search> European Industrial Gases Association (EIGA) Doc. 169/11 Classification and Labelling guide. ISO 10156:2010 Gases and gas mixtures -- Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets. International Programme on Chemical Safety (<http://www.inchem.org/>) Matheson Gas Data Book, 7th Edition. National Institute for Standards and Technology (NIST) Standard Reference Database Number 69. The ESIS (European chemical Substances 5 Information System) platform of the former European Chemicals Bureau (ECB) ESIS (<http://ecb.jrc.ec.europa.eu/esis/>). The European Chemical Industry Council (CEPIC) ERICards. United States of America's National Library of Medicine's toxicology data network TOXNET (<http://toxnet.nlm.nih.gov/index.html>) Substance specific information from suppliers. EH40 (as amended) Workplace exposure limits.

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