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

1.1. Product identifier

Trade name 
SDS no 
Chemical description 
CAS-No. 
EC-No. 
EC Index-No. 
Registration-No. 
Chemical formula

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

Relevant identified uses 
Uses advised against

1.3. Details of the supplier of the safety data sheet

Company identification

Supplier
E-Mail address (competent person)

1.4. Emergency telephone number

Emergency telephone number 
Availability

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Physical hazards
Health hazards
Environmental hazards

2.2. Label elements

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP)

Signal word (CLP)
Hazard statements (CLP)

- H220 - Extremely flammable gas.
- H280 - Contains gas under pressure; may explode if heated.
- H330 - Fatal if inhaled.
- H400 - Very toxic to aquatic life.
- H314 - Causes severe skin burns and eye damage.
- EUH071 - Corrosive to the respiratory tract.

Precautionary statements (CLP)

- Prevention
  - P260 - Do not breathe gas, vapours.
  - P273 - Avoid release to the environment.
  - P280 - Wear protective gloves, protective clothing, eye protection, face protection.
  - P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- Response
  - P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
  - P303+P361+P353+P315 - IF ON SKIN: (or hair) Take off immediately all contaminated clothing. Rinse skin with water or shower. Get immediate medical advice.
  - P304+P340+P315 - IF INHALED: Remove person to fresh air and keep comfortable for breathing. Get immediate medical advice.
  - 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.
- Storage
  - P403 - Store in a well-ventilated place.
  - P405 - Store locked up.

2.3. Other hazards

May ignite spontaneously in contact with air.

SECTION 3: Composition/information on ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>Composition [V-%]:</th>
<th>Classification according to Regulation (EC) No. 1272/2008 [CLP]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phosphine</td>
<td>(CAS-No.) 7803-51-2</td>
<td>100</td>
<td>Flam. Gas 1, H220 Press. Gas (Liq.), H280</td>
</tr>
<tr>
<td></td>
<td>(EC-No.) 232-260-8</td>
<td></td>
<td>Acute Tox. 1 (Inhalation:gas), H330</td>
</tr>
<tr>
<td></td>
<td>(EC Index-No.) 015-181-00-1</td>
<td></td>
<td>Skin Corr. 1B, H314</td>
</tr>
<tr>
<td></td>
<td>(Registration-No.) 01-2119462840-39</td>
<td></td>
<td>Eye Dam. 1, H318</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Aquatic Acute 1, H400</td>
</tr>
</tbody>
</table>

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

SECTION 4: First aid measures

4.1. Description of first aid measures

- Inhalation
  - Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Perform cardiopulmonary resuscitation if breathing stopped.
- Skin contact
  - 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. Obtain medical assistance.
- Eye contact
  - Immediately flush eyes thoroughly with water for at least 15 minutes.
- Ingestion
  - Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects, both acute and delayed
May cause severe chemical burns to skin and cornea. Suitable first-aid treatment should be immediately available. Seek medical advice before using product. Delayed adverse effects possible. Material is destructive to tissue of the mucous membranes and upper respiratory tract. Cough, shortness of breath, headache, nausea. Refer to section 11.

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

Obtain medical assistance. Treat with corticosteroid spray as soon as possible after inhalation.

SECTION 5: Firefighting measures

5.1. Extinguishing media
- Suitable extinguishing media: Water spray or fog. Dry powder. Shutting off the source of the gas is the preferred method of control.
- Unsuitable extinguishing media: Carbon dioxide. Do not use water jet to extinguish.

5.2. Special hazards arising from the substance or mixture
Specific hazards: Exposure to fire may cause containers to rupture/explode. Escaping gas cannot be extinguished.
Hazardous combustion products: Phosphorus oxides/acids.

5.3. Advice for firefighters
Specific methods: Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas receptacles to rupture. Cool endangered receptacles with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems. If possible, stop flow of product. Use water spray or fog to knock down fire fumes if possible. Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire. Move containers away from the fire area if this can be done without risk.


SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
Try to stop release. Evacuate area. Monitor concentration of released product. Consider the risk of potentially explosive atmospheres. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Eliminate ignition sources. Use chemically protective clothing. Ensure adequate air ventilation. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Act in accordance with local emergency plan. Stay upwind.
6.2. Environmental precautions

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

6.3. Methods and material for containment and cleaning up

- Hose down area with water.
- Keep area evacuated and free from ignition sources until any spilled liquid has evaporated (ground free from frost).
- Wash contaminated equipment or sites of leaks with copious quantities of water.

6.4. Reference to other sections

- See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Safe use of the product

- Gas cabinets, rooms or indoor areas where product is stored or used shall be protected by an automatic sprinkler system.
- The product must be handled in accordance with good industrial hygiene and safety procedures.
- Only experienced and properly instructed persons should handle gases under pressure.
- Consider pressure relief device(s) in gas installations.
- Ensure the complete gas system was (or is regularly) checked for leaks before use.
- Do not smoke while handling product.
- Avoid exposure, obtain special instructions before use.
- Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt.
- Installation of a cross purge assembly between the cylinder 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 suck back of water, acid and alkalis.
- Assess the risk of potentially explosive atmospheres and the need for explosion-proof equipment.
- Purge air from system before introducing gas.
- Take precautionary measures against static discharge.
- Keep away from ignition sources (including static discharges).
- Consider the use of only non-sparking tools.
- Do not breathe gas.
- Avoid release of product into atmosphere.
- Ensure equipment is adequately earthed.

Safe handling of the gas receptacle

- Refer to supplier's container handling instructions.
- Do not allow backfeed into the container.
- Protect cylinders from physical damage; do not drag, roll, slide or drop.
- When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders.
- 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 cylinder 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 cylinder/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 cylinder contents.
Suck back of water into the container must be prevented.
Open valve slowly to avoid pressure shock.

7.2. Conditions for safe storage, including any incompatibilities

: Observe all regulations and local requirements regarding storage of containers.
Containers should not be stored in conditions likely to encourage corrosion.
Container valve guards or caps should be in place.
Containers should be stored in the vertical position and properly secured to prevent them from falling over.
Stored containers should be periodically checked for general condition and leakage.
Keep container below 50°C in a well ventilated place.
Keep away from combustible materials.
Segregate from oxidant gases and other oxidants in store.
All electrical equipment in the storage areas should be compatible with the risk of a potentially explosive atmosphere.

7.3. Specific end use(s)

: None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

<table>
<thead>
<tr>
<th>Phosphine (7803-51-2)</th>
<th>OEL : Occupational Exposure Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU</td>
<td>TWA IOELV (EU) 8 h [mg/m³] : 0.14 mg/m³</td>
</tr>
<tr>
<td></td>
<td>TWA IOELV (EU) 8 h [ppm] : 0.1 ppm</td>
</tr>
<tr>
<td></td>
<td>STEL IOELV (EU) 15 min [mg/m³] : 0.28 mg/m³</td>
</tr>
<tr>
<td></td>
<td>STEL IOELV (EU) 15 min [ppm] : 0.2 ppm</td>
</tr>
<tr>
<td>Germany</td>
<td>TWA (DE) OEL 8h [mg/m³] TRGS 900 : 0.14 mg/m³</td>
</tr>
<tr>
<td></td>
<td>TWA (DE) OEL 8h [ppm] TRGS 900 : 0.1 ppm</td>
</tr>
<tr>
<td></td>
<td>Peak exposure limitation factor (DE) OEL TRGS 900 : 2(II)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Phosphine (7803-51-2)</th>
<th>DNEL: Derived no effect level (Workers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute - systemic effects, inhalation</td>
<td>0.28 mg/m³</td>
</tr>
<tr>
<td>Long-term - systemic effects, inhalation</td>
<td>0.14 mg/m³</td>
</tr>
</tbody>
</table>

PNEC (Predicted No-Effect Concentration) : No data available.

8.2. Exposure controls

8.2.1. Appropriate engineering controls

: Product to be handled in a closed system and under strictly controlled conditions.
Provide adequate general and local exhaust ventilation.
Preferably use permanent leak-tight installations (e.g. welded pipes).
Systems under pressure should be regularly checked for leakages.
Ensure exposure is below occupational exposure limits (where available).
Gas detectors should be used when toxic gases may be released.
Consider the use of a work permit system e.g. for maintenance activities.

8.2.2. Individual protection measures, e.g. personal protective equipment

: 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:
PPE compliant to the recommended EN/ISO standards should be selected.

- Eye/face protection
  : Wear goggles and a face shield when transfilling or breaking transfer connections.
  Standard EN 166 - Personal eye-protection - specifications.
  Provide readily accessible eye wash stations and safety showers.

- Skin protection
Phosphine

- Hand protection
  - Wear working gloves when handling gas containers.
  - Wear cold insulating gloves when transferring or breaking transfer connections.
  - Wear chemically resistant protective gloves.
  - The breakthrough time of the selected gloves must be greater than the intended use period.
  - Consult glove manufacturer’s product information on material suitability and material thickness.

- Other
  - Keep suitable chemically resistant protective clothing readily available for emergency use.
  - Consider the use of flame resistant anti-static safety clothing.
  - Wear safety shoes while handling containers.

- Respiratory protection
  - Gas filters may be used if all surrounding conditions e.g. type and concentration of the contaminant(s) and duration of use are known.
  - Use gas filters with a full face mask, where exposure limits may be exceeded for a short-term period, e.g. connecting or disconnecting containers.
  - Recommended: Filter B (grey).
  - Gas filters do not protect against oxygen deficiency.
  - Keep self-contained breathing apparatus readily available for emergency use.

8.2.3. Environmental exposure controls
- 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

**Appearance**
- Physical state at 20°C / 101.3kPa: Gas.
- Colour: Colourless.
- Odour: Garlic like. Odour can persist. Rotten fish. Poor warning properties at low concentrations.
- Odour threshold: Odour threshold is subjective and inadequate to warn of overexposure.
- Melting point: -134 °C
- Boiling point: -88 °C
- Flash point: Not applicable for gases and gas mixtures.
- Flammability range: Pyrophoric.
- Relative vapour density at 20 °C: Not applicable.
- Evaporation rate (ether=1): Not applicable for gases and gas mixtures.
- Vapour pressure [20°C]: 34.6 bar(a)
- Vapour pressure [50°C]: 62 bar(a)
- Relative density, gas (air=1): 1.2
- Relative density, liquid (water=1): 0.74
- Solubility in water: 300 mg/l
- pH value: Not applicable for gases and gas mixtures.
- Partition coefficient n-octanol/water [log Kow]: Not applicable for inorganic products.
- Decomposition point [°C]: Not applicable.
Phosphine

Auto-ignition temperature : 38 °C
Viscosity [20°C] : No reliable data available.
Explosive Properties : Not applicable.
Oxidising Properties : Not applicable.

9.2. Other information
Molar mass : 34 g/mol
Critical temperature [°C] : 51.6 °C
Other data : Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity

10.1. Reactivity
No reactivity hazard other than the effects described in sub-sections below.

10.2. Chemical stability
Stable under normal conditions.

10.3. Possibility of hazardous reactions
Can form explosive mixture with air.
May react violently with oxidants.
Can ignite spontaneously in air (fire cannot be put out). Can form spontaneous, violently explosive mixture in air.

10.4. Conditions to avoid
Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
Avoid moisture in installation systems.

10.5. Incompatible materials
Air, Oxidisers.
For additional information on compatibility refer to ISO 11114.

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

SECTION 11: Toxicological information

11.1. Information on toxicological effects
Acute toxicity
Fatal if inhaled.
Delayed fatal pulmonary oedema possible.

<table>
<thead>
<tr>
<th>LC50 inhalation rat (ppm)</th>
<th>10 ppm/4h</th>
</tr>
</thead>
</table>

Skin corrosion/irritation
Causes severe skin burns and eye damage.

Serious eye damage/irritation
Causes serious eye damage.

Respiratory or skin sensitisation
No known effects from this product.

Germ cell mutagenicity
No known effects from this product.

Carcinogenicity
No known effects from this product.

Reproductive toxicity

Toxic for reproduction : Fertility
No known effects from this product.

Toxic for reproduction : unborn child
No known effects from this product.

STOT-single exposure
Severe corrosion to the respiratory tract at high concentrations.
Damage to central nervous system.
Irritation to the respiratory tract.

STOT-repeated exposure
No known effects from this product.

Aspiration hazard
Not applicable for gases and gas mixtures.
SECTION 12: Ecological information

12.1. Toxicity
Assessment: Very toxic to aquatic life.
EC50 48h - Daphnia magna [mg/l]: No data available.
EC50 72h - Algae [mg/l]: No data available.
LC50 96 h - Fish [mg/l]: No data available.

12.2. Persistence and degradability
Assessment: Not applicable for inorganic products.

12.3. Bioaccumulative potential
Assessment: No data available.

12.4. Mobility in soil
Assessment: Because of its high volatility, the product is unlikely to cause ground or water pollution. Partition into soil is unlikely.

12.5. Results of PBT and vPvB assessment
Assessment: Not classified as PBT or vPvB.

12.6. Other adverse effects
Other adverse effects: May cause pH changes in aqueous ecological systems.
Effect on the ozone layer: None.
Effect on global warming: No known effects from this product.

SECTION 13: Disposal considerations

13.1. Waste treatment methods
Contact supplier if guidance is required.
Must not be discharged to atmosphere.
Toxic and corrosive gases formed during combustion should be scrubbed before discharge to atmosphere.
Gas may be scrubbed in alkaline solution under controlled conditions to avoid violent reaction.
Ensure that the emission levels from local regulations or operating permits are not exceeded.
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.
Return unused product in original cylinder to supplier.

List of hazardous waste codes (from Commission Decision 2000/532/EC as amended):
16 05 04 *: Gases in pressure containers (including halons) containing hazardous substances.

13.2. Additional information
External treatment and disposal of waste should comply with applicable local and/or national regulations.

SECTION 14: Transport information

14.1. UN number
UN-No.: 2199
14.2. UN proper shipping name
Transport by road/rail (ADR/RID) : PHOSPHINE
Transport by air (ICAO-TI / IATA-DGR) : Phosphine
Transport by sea (IMDG) : PHOSPHINE

14.3. Transport hazard class(es)
Labelling :
2.3 : Toxic gases.
2.1 : Flammable gases.
Environmentally hazardous substances

Transport by road/rail (ADR/RID)
Class : 2.
Classification code : 2TF.
Tunnel Restriction : D - Passage forbidden through tunnels of category D and E.

Transport by sea (IMDG)
Class / Div. (Sub. risk(s)) : 2.3 (2.1)
Emergency Schedule (EmS) - Fire : F-D.
Emergency Schedule (EmS) - Spillage : S-U.

14.4. Packing group
Transport by road/rail (ADR/RID) : Not established.
Transport by air (ICAO-TI / IATA-DGR) : Not established.
Transport by sea (IMDG) : Not established.

14.5. Environmental hazards
Transport by road/rail (ADR/RID) : Environmentally hazardous substance / mixture.
Transport by air (ICAO-TI / IATA-DGR) : Environmentally hazardous substance / mixture.
Transport by sea (IMDG) : Marine pollutant

14.6. Special precautions for user
Packing Instruction(s)
Transport by road/rail (ADR/RID) : P200.
Transport by air (ICAO-TI / IATA-DGR)
   Passenger and Cargo Aircraft : Forbidden.
   Cargo Aircraft only : Forbidden.
Transport by sea (IMDG) : P200.

Special transport precautions :
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 there is adequate ventilation.
- Ensure that containers are firmly secured.
- Ensure cylinder valve is closed and not leaking.
- Ensure valve outlet cap nut or plug (where provided) is correctly fitted.
- Ensure valve protection device (where provided) is correctly fitted.
14.7. Transport in bulk according to Annex II of Marpol and the IBC Code

: Not applicable.

SECTION 15: Regulatory information

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

EU-Regulations
Restrictions on use : None.
Seveso Directive : 2012/18/EU (Seveso III) : Listed.

National regulations
National legislation : Ensure all national/local regulations are observed.

Germany
Water hazard class (WGK) : Water hazard class (WGK) 2, Significantly hazardous to water (Classification according toAwSV, Annex 1; ID No. 277)

15.2. Chemical safety assessment

A CSA has not yet been carried out.

SECTION 16: Other information


Abbreviations and acronyms
ATE - Acute Toxicity Estimate
CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008
EINECS - European Inventory of Existing Commercial Chemical Substances
CAS# - Chemical Abstract Service number
PPE - Personal Protection Equipment
LC50 - Lethal Concentration to 50 % of a test population
RMM - Risk Management Measures
PBT - Persistent, Bioaccumulative and Toxic
vPvB - Very Persistent and Very Bioaccumulative
STOT- SE : Specific Target Organ Toxicity - Single Exposure
CSA - Chemical Safety Assessment
EN - European Standard
UN - United Nations
ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road
IATA - International Air Transport Association
IMDG code - International Maritime Dangerous Goods
RID - Regulations concerning the International Carriage of Dangerous Goods by Rail
WGK - Water Hazard Class

Training advice : Users of breathing apparatus must be trained.

Ensure operators understand the flammability hazard.
Ensure operators understand the toxicity hazard.

Further information : This Safety Data Sheet has been established in accordance with the applicable European Union legislation.
Full text of H- and EUH-statements

<table>
<thead>
<tr>
<th>Acute Tox. 1 (Inhalation:gas)</th>
<th>Acute toxicity (inhalation:gas) Category 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic Acute 1</td>
<td>Hazardous to the aquatic environment — Acute Hazard, Category 1</td>
</tr>
<tr>
<td>Eye Dam. 1</td>
<td>Serious eye damage/eye irritation, Category 1</td>
</tr>
<tr>
<td>Flam. Gas 1</td>
<td>Flammable gases, Category 1</td>
</tr>
<tr>
<td>Press. Gas (Liq.)</td>
<td>Gases under pressure : Liquefied gas</td>
</tr>
<tr>
<td>Skin Corr. 1B</td>
<td>Skin corrosion/irritation, Category 1B</td>
</tr>
<tr>
<td>H220</td>
<td>Extremely flammable gas.</td>
</tr>
<tr>
<td>H280</td>
<td>Contains gas under pressure; may explode if heated.</td>
</tr>
<tr>
<td>H314</td>
<td>Causes severe skin burns and eye damage.</td>
</tr>
<tr>
<td>H318</td>
<td>Causes serious eye damage.</td>
</tr>
<tr>
<td>H330</td>
<td>Fatal if inhaled.</td>
</tr>
<tr>
<td>H400</td>
<td>Very toxic to aquatic life.</td>
</tr>
<tr>
<td>EUH071</td>
<td>Corrosive to the respiratory tract.</td>
</tr>
</tbody>
</table>

DISCLAIMER OF LIABILITY

Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.
Details given in this document are believed to be correct at the time of going to press.
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.