

SECTION: 1. Product and company identification

1.1. Product identifier

Product form : Substance
 Substance name : Sulfur dioxide
 CAS-No. : 7446-09-5
 Formula : SO₂
 Other means of identification : Bisulfite; Sulfurous Anhydride; Sulfurous Oxide; Sulfur Oxide; Sulphur Dioxide

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

Use of the substance/mixture : Industrial and professional use

1.3. Details of the supplier of the safety data sheet

Linde Inc.
 10 Riverview Drive
 Danbury, CT 06810-6268, USA
 www.lindeus.com

Electronics gas products 1-800-932-0624 or 1-908-329-9700
 Linde Inc. 1-844-44LINDE (1-844-445-4633)

For additional product information contact your local customer service.

1.4. Emergency telephone number

Emergency number : Onsite Emergency: 1-800-645-4633

CHEMTREC, 24 hr/day 7 days/week
 — Within USA: 1-800-424-9300, Outside USA: 001-703-527-3887
 (collect calls accepted, Contract 17729)

SECTION 2: Hazard identification

2.1. Classification of the substance or mixture

GHS-US classification

Press. Gas (Liq.) H280
 Acute Tox. 3 (Inhalation:gas) H331
 Skin Corr. 1B H314
 Eye Dam. 1 H318

2.2. Label elements

GHS US labelling

Hazard pictograms (GHS US) :



GHS04

GHS05

GHS06

Signal word (GHS US) :

Danger

Hazard statements (GHS US) :

H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED
 H314 - CAUSES SEVERE SKIN BURNS AND EYE DAMAGE
 H331 - TOXIC IF INHALED
 CGA-HG01 - MAY CAUSE FROSTBITE.
 CGA-HG22 - CORROSIVE TO THE RESPIRATORY TRACT.

Precautionary statements (GHS US) :

P202 - Do not handle until all safety precautions have been read and understood.
 P261 - Avoid breathing gas
 P262 - Do not get in eyes, on skin, or on clothing.
 P271+P403 - Use and store only outdoors or in a well-ventilated place.
 P280+P284 - Wear protective gloves, protective clothing, eye protection, respiratory protection, and/or face protection.

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P303, P361, P353, P363, P310 - IF ON SKIN OR (HAIR): Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. Immediately call a POISON CENTER/doctor.
P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P311 - Call a poison center or doctor.
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Contact an ophthalmologist immediately.
P405 - Store locked up.
P501 - Dispose of contents/container in accordance with container Supplier/owner instructions
CGA-PG05 - Use a back flow preventive device in the piping.
CGA-PG20+CGA-PG10 - Use only with equipment of compatible materials of construction and rated for cylinder pressure.
CGA-PG12 - Do not open valve until connected to equipment prepared for use.
CGA-PG18 - When returning cylinder, install leak tight valve outlet cap or plug.
CGA-PG06 - Close valve after each use and when empty.
CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F).
P363 - Wash contaminated clothing before reuse.

2.3. Other hazards

Other hazards which do not result in classification : None.

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substances

Name	Product identifier	%
Sulfur dioxide (Main constituent)	(CAS-No.) 7446-09-5	100

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures after inhalation : Remove to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration. If breathing is difficult, trained personnel should give oxygen. Call a physician.

First-aid measures after skin contact : In case of contact, immediately flush affected areas with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before reuse. Discard contaminated shoes.

First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an ophthalmologist immediately.

First-aid measures after ingestion : Ingestion is not considered a potential route of exposure.

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

Symptoms/effects after inhalation : Exposure to concentrations above the TLV of 2 ppm may irritate the eyes, nose, throat, and sinuses, resulting in choking, coughing, and sometimes bronchoconstriction.

Concentrations of 50-100 ppm are considered dangerous.

Exposures of 400-500 ppm are immediately life-threatening.

Exposure to high concentrations may result in pulmonary edema and paralysis.

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

Obtain medical assistance.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Use extinguishing media appropriate for surrounding fire.

5.2. Special hazards arising from the substance or mixture

Fire hazard : Not flammable.

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

5.3. Advice for firefighters

Firefighting instructions : **DANGER! Toxic, corrosive, liquefied gas.**

Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L—Fire Protection.

Special protective equipment for fire fighters : Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : **Danger: Toxic. Corrosive.** Wear a self-contained breathing apparatus and appropriate personal protective equipment (PPE). (gas tight, chemical-protective) Evacuate personnel to a safe area. Approach suspected leak area with caution. Remove all sources of ignition. Toxic, corrosive vapor can spread from spill. Ventilate area or move container to a well-ventilated area. Before entering the area, especially a confined area, check the atmosphere with an appropriate device.

6.1.1. For non-emergency personnel

No additional information available

6.1.2. For emergency responders

No additional information available

6.2. Environmental precautions

Prevent waste from contaminating the surrounding environment. Prevent soil and water pollution. Dispose of contents/container in accordance with container supplier/owner instructions.

6.3. Methods and material for containment and cleaning up

No additional information available

6.4. Reference to other sections

See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Wear leather safety gloves and safety shoes when handling cylinders. Protect containers from physical damage; do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Never insert an object (e.g. wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. Close the container valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. For other precautions in using this product, see section 16.

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Safe use of the product : Do not breathe gas/vapours. Use only with adequate ventilation or respiratory protection. Do not get liquid or vapor in eyes, on skin, or on clothing. Have safety showers and eyewash fountains immediately available.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Store in a cool, well-ventilated place. Store and use with adequate ventilation. Store only where temperature will not exceed 125°F (52°C). Firmly secure containers upright to keep them from falling or being knocked over. Install valve protection cap firmly in place by hand. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods.

OTHER PRECAUTIONS FOR HANDLING, STORAGE, AND USE: When handling product under pressure, use piping and equipment adequately designed to withstand the pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the container valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrical circuit.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Sulfur dioxide (7446-09-5)		
ACGIH	ACGIH OEL STEL [ppm]	0.25 ppm
USA OSHA	OSHA PEL TWA [1]	13 mg/m ³
USA OSHA	OSHA PEL TWA [2]	5 ppm
USA IDLH	IDLH [ppm]	100 ppm

8.2. Exposure controls

Appropriate engineering controls : Use only in a closed system. A corrosion-resistant, forced-draft fume hood is preferred. LOCAL EXHAUST: A corrosion-resistant system is acceptable.

In semiconductor process gas and other suitable applications, Linde recommends the use of engineering controls such as gas cabinet enclosures, automatic gas panels (used to purge systems on cylinder changeout), excess-flow valves throughout the gas distribution system, double containment for the distribution system, and continuous gas monitors.

Eye protection : Provide readily accessible eye wash stations and safety showers. Wear safety glasses when handling cylinders; vapor-proof goggles and a face shield during cylinder changeout or whenever contact with product is possible. Select eye protection in accordance with OSHA 29 CFR 1910.133.

Skin and body protection : Wear metatarsal shoes and work gloves for cylinder handling, and protective clothing where needed. Wear appropriate chemical gloves during cylinder changeout or wherever contact with product is possible.

Respiratory protection : When workplace conditions warrant respirator use, follow a respiratory protection program that meets or exceeds the requirements of the appropriate Health and Safety Regulations. Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure that the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).

Thermal hazard protection : Wear cold insulating gloves when transfilling or breaking transfer connections.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state : Gas
Appearance : Colorless, non-flammable gas.

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Molecular mass	: 64 g/mol
Colour	: Colourless.
Odour	: Pungent. choking
Odour threshold	: No data available
pH	: No data available
Relative evaporation rate (butylacetate=1)	: No data available
Relative evaporation rate (ether=1)	: Not applicable.
Melting point	: -75.5 °C
Freezing point	: No data available
Boiling point	: -10 °C
Flash point	: Not applicable.
Critical temperature	: 157.6 °C
Auto-ignition temperature	: Not applicable.
Decomposition temperature	: No data available
Flammability (solid, gas)	: No data available
Vapour pressure	: 330 kPa
Critical pressure	: 7884 kPa
Relative vapour density at 20 °C	: No data available
Relative density	: 1.5
Density	: 1.39 g/cm ³ (at 20 °C)
Relative gas density	: 2.3
Solubility	: Water: Completely soluble.
Partition coefficient n-octanol/water (Log Pow)	: Not applicable for inorganic products.
Partition coefficient n-octanol/water (Log Kow)	: Not applicable.
Viscosity, kinematic	: Not applicable.
Viscosity, dynamic	: Not applicable.
Explosive properties	: Not applicable.
Oxidizing properties	: None.
Explosive limits	: Non flammable.

9.2. Other information

Gas group	: Press. Gas (Liq.)
Additional information	: 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

None.

10.4. Conditions to avoid

Avoid moisture in installation systems.

10.5. Incompatible materials

Moisture. Fluorine. Chlorine trifluoride. Chlorates. Sodium Carbide. Aluminium. (powdered). Zinc and its alloys. Manganese. Alkali metals. Metal nitrates. Rubidium carbide. Metal oxides. metal acetylides. Metal hydrides. Stannous oxide. Sodium. Acrolein (propenal).

10.6. Hazardous decomposition products

None known.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity (oral) : Not classified
 Acute toxicity (dermal) : Not classified
 Acute toxicity (inhalation) : TOXIC IF INHALED.

Sulfur dioxide (f)7446-09-5	
LC50 Inhalation - Rat [ppm]	1260 ppm/4h
ATE US (gases)	1260 ppmv/4h

Skin corrosion/irritation : CAUSES SEVERE SKIN BURNS.
 Serious eye damage/irritation : CAUSES SERIOUS EYE DAMAGE.
 Respiratory or skin sensitisation : Not classified
 Germ cell mutagenicity : Not classified
 Carcinogenicity : Not classified

Sulfur dioxide (7446-09-5)	
IARC group	3 - Not classifiable

Reproductive toxicity : Not classified
 STOT-single exposure : Not classified
 STOT-repeated exposure : Not classified
 Aspiration hazard : Not classified
 Symptoms/effects after inhalation : Exposure to concentrations above the TLV of 2 ppm may irritate the eyes, nose, throat, and sinuses, resulting in choking, coughing, and sometimes bronchoconstriction.

Concentrations of 50-100 ppm are considered dangerous.

Exposures of 400-500 ppm are immediately life-threatening.

Exposure to high concentrations may result in pulmonary edema and paralysis.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : No known ecological damage caused by this product.

12.2. Persistence and degradability

Sulfur dioxide (7446-09-5)	
Persistence and degradability	Not applicable for inorganic products.

12.3. Bioaccumulative potential

Sulfur dioxide (7446-09-5)	
BCF - Fish [1]	(no bioaccumulation expected)
Partition coefficient n-octanol/water (Log Pow)	Not applicable for inorganic products.
Partition coefficient n-octanol/water (Log Kow)	Not applicable.
Bioaccumulative potential	No data available.

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12.4. Mobility in soil

Sulfur dioxide (7446-09-5)	
Mobility in soil	No data available.
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution.

12.5. 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

Product/Packaging disposal recommendations	: Do not attempt to dispose of residual or unused quantities. Return container to supplier.
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SECTION 14: Transport information

In accordance with DOT

Transport document description (DOT)	: UN1079 Sulfur dioxide, 2.3
UN-No.(DOT)	: UN1079
Proper Shipping Name (DOT)	: Sulfur dioxide
Class (DOT)	: 2.3 - Class 2.3 - Poisonous gas 49 CFR 173.115
Hazard labels (DOT)	: Poison Gas 2.3 - Poison gas 8 - Corrosive



DOT Special Provisions (49 CFR 172.102)	: 3 - This material is poisonous by inhalation (see 171.8 of this subchapter) in Hazard Zone C (see 173.116(a) of this subchapter), and must be described as an inhalation hazard under the provisions of this subchapter. B14 - Each bulk packaging, except a tank car or a multi-unit-tank car tank, must be insulated with an insulating material so that the overall thermal conductance at 15.5 C (60 F) is no more than 1.5333 kilojoules per hour per square meter per degree Celsius (0.075 Btu per hour per square foot per degree Fahrenheit) temperature differential. Insulating materials must not promote corrosion to steel when wet. T50 - When portable tank instruction T50 is referenced in Column (7) of the 172.101 Table, the applicable liquefied compressed gases are authorized to be transported in portable tanks in accordance with the requirements of 173.313 of this subchapter. TP19 - The calculated wall thickness must be increased by 3 mm at the time of construction. Wall thickness must be verified ultrasonically at intervals midway between periodic hydraulic tests (every 2.5 years). The portable tank must not be used if the wall thickness is less than that prescribed by the applicable T code in Column (7) of the Table for this material.
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Additional information

Emergency Response Guide (ERG) Number	: 125
Other information	: No supplementary information available.
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 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.

Transport by sea

UN-No. (IMDG)	: 1079
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Proper Shipping Name (IMDG)	: SULPHUR DIOXIDE
Class (IMDG)	: 2 - Gases
Division (IMDG)	: 2.3 - Toxic gases
EmS-No. (1)	: F-C
MFAG-No	: 125
EmS-No. (2)	: S-U

Air transport

UN-No. (IATA)	: 1079
Proper Shipping Name (IATA)	: Sulphur dioxide
Class (IATA)	: 2 - Gases
Civil Aeronautics Law	: Gases under pressure/Gases toxic under pressure(Hazardous materials notice Appended Table 1 Article 194 of the Enforcement Regulations)

SECTION 15: Regulatory information

15.1. US Federal regulations

Sulfur dioxide (7446-09-5)

Listed on the United States TSCA (Toxic Substances Control Act) inventory

Listed on the United States SARA Section 302

SARA Section 302 Threshold Planning Quantity (TPQ)	500 lb
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All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory.

15.2. International regulations

CANADA

Sulfur dioxide (7446-09-5)

Listed on the Canadian DSL (Domestic Substances List)

EU-Regulations

Sulfur dioxide (7446-09-5)

Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

15.2.2. National regulations

Sulfur dioxide (7446-09-5)

Listed introduction on Australian Industrial Chemicals Introduction Scheme (AICIS Inventory)
 Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
 Listed on the Japanese ENCS (Existing New Chemical Substances) inventory
 Listed on the Japanese ISHL (Industrial Safety and Health Law)
 Listed on KECL/KECI (Korean Existing Chemicals Inventory)
 Listed on NZIoC (New Zealand Inventory of Chemicals)
 Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
 Listed on the Canadian IDL (Ingredient Disclosure List)
 Listed on INSQ (Mexican National Inventory of Chemical Substances)
 Listed on the TCSI (Taiwan Chemical Substance Inventory)

15.3. US State regulations

Sulfur dioxide(7446-09-5)

U.S. - California - Proposition 65 - Carcinogens List	No
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Sulfur dioxide(7446-09-5)	
U.S. - California - Proposition 65 - Developmental Toxicity	Yes
U.S. - California - Proposition 65 - Reproductive Toxicity - Female	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No
State or local regulations	U.S. - Massachusetts - Right To Know List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List U.S. - Pennsylvania - RTK (Right to Know) List

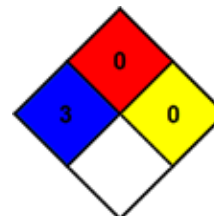
SECTION 16: Other information

Revision date : 03/25/2022

NFPA health hazard : 3 - Materials that, under emergency conditions, can cause serious or permanent injury.

NFPA fire hazard : 0 - Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand.

NFPA instability : 0 - Material that in themselves are normally stable, even under fire conditions.



SDS US (GHS HazCom 2012) - Linde 2022

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.