Chemical Profiles

Sulfur Dioxide

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What are other names or identifying information for sulfur dioxide?

CAS Registry No.: 7446-09-5
Other Names: Sulphur dioxide, SO_2, Sulfur oxide, Sulfurous oxide
Main Uses: To make sulfuric acid, intermediate in bleaching processes, in food processing.
Appearance: Colourless gas.
Odour: irritating, pungent, suffocating

Canadian TDG: UN1079

What is the WHMIS classification?

According to the Commission des normes, de l'équité, de la santé et de la sécurité du travail (CNESST), sulfur dioxide can be classified as:

Gases under pressure - Liquefied gas

Acute toxicity - inhalation - Category 3

Skin corrosion/irritation - Category 1

Serious eye damage/eye irritation - Category 1

Germ cell mutagenicity - Category 2

The signal word is danger.

The hazard statements are:

- Contains gas under pressure; may explode if heated

- Corrosive to the respiratory tract; Toxic if inhaled
- Causes severe skin burns and eye damage
- Suspected of causing genetic defects

Please note that this classification was retrieved from the CNESST site on February 22, 2032 and was established by CNESST personnel to the best of their knowledge based on data obtained from scientific literature and it incorporates the criteria contained in the *Hazardous Products Regulations* (SOR/2015-17). It does not replace the supplier's classification, which can be found on its Safety Data Sheet.

What are the most important things to know about sulfur dioxide in an emergency?

Emergency Overview: Colourless gas. Suffocating odour. COMPRESSED GAS. Contains gas under pressure. May explode if heated. Will not burn. VERY TOXIC. Fatal if inhaled. Corrosive to the respiratory tract. A severe, short-term exposure may cause long-term respiratory effects (e.g., Reactive Airways Dysfunction Syndrome (RADS)). CORROSIVE. Causes severe skin burns and eye damage. May cause frostbite. SUSPECT MUTAGEN. Suspected of causing genetic defects.

What are the potential health effects of sulfur dioxide?

Main Routes of Exposure: Inhalation.

- **Inhalation:** VERY TOXIC, can cause death. Can cause severe irritation of the nose and throat. At high concentrations: can cause life-threatening accumulation of fluid in the lungs (pulmonary edema). Symptoms may include coughing, shortness of breath, difficult breathing and tightness in the chest. A single exposure to a high concentration can cause a long-lasting condition like asthma. If this occurs, many things like other chemicals or cold temperatures can easily irritate the airways. Symptoms may include shortness of breath, tightness in the chest and wheezing. [Reactive Airways Dysfunction Syndrome (RADS)].
- **Skin Contact:** CORROSIVE. The gas irritates or burns the skin. Permanent scarring can result. Direct contact with the liquefied gas can chill or freeze the skin (frostbite). Symptoms of mild frostbite include numbness, prickling and itching. Symptoms of more severe frostbite include a burning sensation and stiffness. The skin may become waxy white or yellow. Blistering, tissue death and infection may develop in severe cases.
- **Eye Contact:** CORROSIVE. The gas irritates or burns the eyes. Permanent damage including blindness can result. Direct contact with the liquefied gas can freeze the eye. Permanent eye damage or blindness can result.

- **Ingestion:** Not a relevant route of exposure (gas).
- **Effects of Long-Term (Chronic) Exposure:** May harm the respiratory system. Can irritate and inflame the airways.
- **Carcinogenicity:** Not known to cause cancer.
    - International Agency for Research on Cancer (IARC): Group 3 - Not classifiable as to its carcinogenicity to humans.
    - American Conference for Governmental Industrial Hygienists (ACGIH): A4 - Not classifiable as a human carcinogen.
- **Teratogenicity / Embryotoxicity:** Not known to harm the unborn child.
- **Reproductive Toxicity:** Not known to be a reproductive hazard.
- **Mutagenicity:** Suspect mutagen. May cause genetic damage based on animal information.

What are first aid measures for sulfur dioxide?

Inhalation: Take precautions to ensure your own safety before attempting rescue (e.g., wear appropriate protective equipment). Move victim to fresh air. If breathing is difficult, trained personnel should administer emergency oxygen. If breathing has stopped, trained personnel should begin artificial respiration (AR). DO NOT allow victim to move about unnecessarily. Symptoms of pulmonary edema may be delayed. Get medical attention immediately. Treatment is urgently required. Transport to a hospital.

Skin Contact: Gas: flush with gently flowing water Get medical attention. Liquefied gas: quickly remove victim from source of contamination. DO NOT attempt to rewarm the affected area on site. DO NOT rub area, flush with water, or apply direct heat. Carefully cut around clothing that sticks to the skin and remove the rest of the garment. Do not remove frozen clothing from frostbitten areas. Loosely cover the affected area with a sterile dressing. DO NOT allow victim to drink alcohol or smoke. Get medical attention immediately. Treatment is urgently required. Transport to a hospital. Double bag, seal, label and leave contaminated clothing, shoes, and leather goods at the scene for safe disposal.

Eye Contact: Gas: move victim to fresh air. Immediately flush the contaminated eye(s) with gently flowing water, occasionally lifting the upper and lower eyelids. Liquefied gas: avoid direct contact. Wear chemical protective gloves if necessary. Immediately flush with gently flowing water. DO NOT attempt to rewarm. Cover both eyes with a sterile dressing. DO NOT allow victim to drink alcohol or smoke. Get medical attention immediately. Treatment is urgently required. Transport to a hospital.

Ingestion: Not applicable (gas).

First Aid Comments: Some of the first aid procedures recommended here require advanced first aid training. All first aid procedures should be periodically reviewed by a medical professional familiar with the chemical and its conditions of use in the workplace.

What are fire hazards and extinguishing media for sulfur dioxide?

Flammable Properties: Does not burn.

Suitable Extinguishing Media: Not combustible. Use extinguishing agent suitable for surrounding fire.

Specific Hazards Arising from the Chemical: Heat from fire can cause a rapid build-up of pressure inside cylinders. Explosive rupture and a sudden release of large amounts of gas may result. Cylinder may rocket. Contact with some powdered metals may cause fires and explosions.

What are the stability and reactivity hazards of sulfur dioxide?

- **Chemical Stability:** Normally stable.
- **Conditions to Avoid:** Water, moisture or humidity.
- **Incompatible Materials:** Reacts violently with: halogens (e.g., chlorine), strong bases (e.g., sodium hydroxide). In the presence of water, corrosive to: aluminum alloys, carbon steel.
- **Hazardous Decomposition Products:** On reaction with water: sulfurous acid solution.
- **Possibility of Hazardous Reactions:** None known.

What are unintentional release measures for sulfur dioxide?

Personal Precautions: Use personal protective equipment as required. Increase ventilation to area or move leaking container to a well-ventilated and secure area.

Methods for Containment and Clean-up: Stop or reduce leak if safe to do so. Knock down gas with fog or fine water spray. The resulting sulfuric acid solutions are very corrosive and very toxic. Dike and recover contaminated water for appropriate disposal.

Other Information: Contact supplier, local fire and emergency services for help.

What handling and storage practices should be used when working with sulfur dioxide?

Handling: In event of a spill or leak, immediately put on escape-type respirator and exit the area. Immediately report leaks, spills or failures of the safety equipment (e.g. ventilation system). Get medical attention for all exposures. Symptoms can be delayed. Secure cylinder in an up-right position. Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. Keep containers tightly closed when not in use or empty. Use corrosion-resistant tools and equipment.

Storage: Store in an area that is: cool, dry, well-ventilated, temperature-controlled, separate from incompatible materials, out of direct sunlight and away from heat and ignition sources. Restrict access to authorized personnel only. Have escape-type respiratory protective equipment readily available, in case of leaks or spills. Always secure (e.g. chain) cylinders in an upright position to a wall, rack or other solid structure. Empty containers may contain hazardous residue. Store separately. Keep closed.

What is the American Conference of Governmental Industrial Hygienists (ACGIH®) recommended exposure limit for sulfur dioxide?

ACGIH® TLV® - STEL [C]: 0.25 ppm A4

Exposure Guideline Comments: TLV® = Threshold Limit Value. STEL = Short-term Exposure Limit. C = Ceiling limit. A4 = Not classifiable as a human carcinogen.

Adapted from: 2022 TLVs® and BEIs® - Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati: American Conference of Governmental Industrial Hygienists (ACGIH)

NOTE: In many (but not all) Canadian jurisdictions, the exposure limits are similar to the ACGIH® TLVs®. Since legislation varies by jurisdiction, contact your local jurisdiction for exact details. A list is available in the OSH Answers on Canadian Governmental Occupational Health & Safety Departments.

A list of which acts and regulations that cover exposure limits to chemical and biological agents is available on our website. Please note that while you can see the list of legislation for free, you will need a subscription to view the actual documentation.

What are the engineering controls for sulfur dioxide?

Engineering Controls: Use a local exhaust ventilation and enclosure, if necessary, to control the amount in the air. Use stringent control measures such as process enclosure to prevent product release into the workplace. Use a corrosion-resistant exhaust ventilation system separate from other ventilation systems. Exhaust directly to the outside, taking any necessary precautions for environmental protection. Provide eyewash and safety shower if contact or splash hazard exists.

What Personal Protective Equipment (PPE) is needed when working with sulfur dioxide?

Eye/Face Protection: Wear chemical safety goggles and face shield when contact is possible.

Skin Protection: Wear chemical protective clothing e.g. gloves, aprons, boots. Suitable materials include: Viton®, Viton®/butyl rubber, Kemblok ®, Saranex®™, Chemprotex® 300, ChemMAX® (3, 4 Plus), AlphaTec® (4000, EVO, VPS), Tychem® (9000, Responder® CSM, 10000, 10000FR) Zytron® 500.

Not recommended: natural rubber, nitrile rubber, Tychem® (6000, 6000 FR)

Respiratory Protection:

Up to 20 ppm: (APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against sulfur dioxide*; or Any supplied-air respirator*.Up to 50 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*; Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern*.Up to 100 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern; Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern; Any powered, air-purifying respirator with a tight-fitting facepiece and cartridge(s) providing protection against the compound of concern*; Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode*; Any self-contained breathing apparatus with a full facepiece; Any supplied-air respirator with a full facepiece.*Reported to cause eye irritation or damage; may require eye protection.

APF = Assigned Protection Factor

Recommendations apply only to National Institute for Occupational Safety and Health (NIOSH) approved respirators. Refer to the NIOSH Pocket Guide to Chemical Hazards for more information.

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