

Sulfur Dioxide 2018 1.0
Chemical Name:
Sulfur Dioxide (SO₂)
Identifying Data: UN # 1079

CAS # 7446-09-5

Classification: Toxic Gas

Placard
NFPA Rating
WHMIS 2015 Symbols

1079
2

Physical Properties:

Colour	Colourless (May appear white when combines with moisture in air)
Vapor Density	2.26 (Heavier than air)
Solubility	High 10% (Absorbs readily with water fog and body sweat, mucous membranes)
Boiling Point	-10C (may cause thermal burns to exposed skin)
Expansion Ratio	High (530 @ 15c)
Vapour Pressure	High (47psi/3.2 atm./ 2432 mmHg) @20C >40mmHg = Inhalation risk
IP	12.30 (Will not detect with PID)

General Description:

Colourless gas with choking suffocating odor. Very water soluble and will cause eye lids to close at higher concentrations. Patients will not stay in high concentrations due to irritating effects. Will cause burns at moist areas of body at high concentrations.

Commonly Found:

- Pulp and Paper Mills
- Burning Sulfur
- Hot springs
- Wine making
- Fruit Preservatives
- Sulfuric Acid base batteries when overcharging problems
- Production of/ Tech Cominco
- Transport/Rail/Truck/Cylinders

WorkSafe BC Permissible Limits
TWA 2 ppm STEL/Ceiling 5ppm IDLH 100ppm (SCBA must be worn at or above this level)

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Emergency Procedures to Consider for the Paramedic Specialist

- Do initial Size-up of incident.
- Evacuate immediate area and further as situation dictates. See ERG evacuation distance recommendations. High Vapour pressure and Toxic.
- Fire Departments may consider Turnout gear or Coveralls with SCBA for immediate emergency rescue for viable patients. Decon patients and DO NOT remove SCBA until rescuer has been thru Decon in order to prevent inhalation injury. *** This level of skin protection with SCBA may result in skin burns to rescuer in heavy concentrations. Consider Risk vs Benefit.***
- Advise operations to Shut off pumps, and isolate pipe and tank valves, padding air etc., from remote locations if possible.
- Roll cylinder leak so leak is in vapour space if possible and wearing appropriate PPE (SCBA).
- Capping Chlorine vessels will require Capping Kit A, B or C kits.
- SO2 Truck tankers may not be able to be capped with above Kits.
- Avoid direct water contact to leaking container surface.
- Provide Shelter in Place Instructions if requested:
 - * Stay indoors (unless evacuation has been called by local authorities)
 - * Close all windows and doors, seal with duct tape or wet towels
 - * Shut off furnace, exhaust fans, fireplaces, and air conditioners
 - * Wait for and follow advice from local police or authorities.
 - * If the smell is very strong, breathe through a wet cloth and turn on any nearby showers to absorb airborne vapor

ERG 2016 Recommended Evacuation

Small Spills < 200L		
Isolate in all Directions	Protect Down wind	
100M	Day 0.7km	Night 2.8km

Large Spills >200 L								
		First Isolate	Then Protect Downwind (KM)					
			Day			Night		
Low wind	<10kph	Low	Mod.	High	Low	Mod.	High	
Moderate wind	10-20Kph	wind	Wind	Wind	wind	Wind	Wind	
High wind	> 20Kph							
Rail Tank car		1000M	11+	11	7.6	11+	11	10.8
Hwy Tank truck or trailer		1000M	11+	7.6	5.1	11+	10	6.1
Multiple Ton Cylinders		600M	7.1	2.7	1.9	10.5	4.7	2.9
Multiple small Containers Or single Ton cylinder		300M	5.3	1.6	1.1	7.9	2.7	1.5

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TDG Reference: TIH/Guide 125
Emergency Decontamination:

- Decon of skin not usually required unless liquid involved or skin symptomatic.
- **Have patient self-Decon with direction as needed from safe distance.** Assist removing clothing if needed with appropriate PPE to prevent secondary contamination and injury.
- Use water for decontamination. Large volume/low pressure. Tepid if Immediately available.
- Eyes take precedence.
- Goal is to begin Decon within 1 minute of contact if possible (Time = Tissue).
- Ensure patient is fully decontaminated. Do not forget skinfolds, armpits, groin, buttocks and feet.
- Do not cause hypothermia. Focus on symptomatic areas (pain, visible burns).
- See Pre-Hospital Care below for further information.

PPE

- SCBA Turnout Gear/Coveralls for Emergency rescue and removal of viable victims or for quick isolation of valve. Follow IAP and use wind, water fog etc. to protect responders.
- Level A Protection compatible with Sulfur Dioxide to be worn for all leaks that do not require immediate medical intervention.
- Respiratory protection. SCBA recommended at all times.
- NIOSH approved respirator and cartridges can be used for Sulfur Dioxide vapour if within the allowable WorkSafe BC permissible concentrations. (Gas monitoring required).
- Acid resistant Gloves/Boots. Utilize chemical compatibility charts for permeation and degradation times to determine optimum PPE protection to be worn.
- Consider utilizing Level A, B Clothing (PPC) in higher or IDLH concentrations to prevent frostbite/corrosive burns to skin.

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Toxidrome: Irritant Gas Symptoms may include; Burning eyes, throat & skin, cough, chest tightness with increased heart rate and respiratory rate.

Primary route of exposure: Inhalation/Pulmonary irritant

Primary Targets of Toxicity:

- Airway and Breathing; caused by corrosive local toxic effects on mucous membranes of upper and lower airways. Will affect skin at higher concentrations or if skin is moist. Any Cardiovascular (Tachycardia, Bradycardia, hypotension) and/or Neurologic symptoms (confusion/DLOC/seizures) may be secondary due to hypoxia.
- Eye irritation due to high solubility of SO₂ vapor forming Sulfurous acid.
- Chemical burns may occur with contact to skin and mucus membranes, (eyes, oropharynx) as SO₂ combines with water to form Sulfurous acid.
- Due to the severe irritant local effects of SO₂, prolonged exposure is unlikely as patient's remove themselves immediately from contaminated area, thus self-limiting serious effects of exposure. This is not the case in the event the patient was trapped or in an enclosed space.
- Airway and Breathing; caused by corrosive local toxic effects on mucous membranes of upper and lower airways.
- Any cardiovascular effects or CNS symptoms may be secondary to hypoxia.

Pre -Hospital Care:

- Remove victim from hazardous area utilizing appropriate PPE for hazard.
- Remove all contaminated clothing from victim(s)
- Decon of skin not usually required unless liquid involved or skin symptomatic. Flush with water as per training for chemical burns.
- Apply High flow O₂ with NRB if required. Assist ventilations with BVM if required.
- Treat patient following support of ABC's as per training.
- Exposed patients with underlying lung disease (Asthma, COPD) may become symptomatic at lower concentrations than healthy individuals. Utilize their prescribed inhalers or bronchodilators as required.
- Contact BC Poison Control at 1-800-567-8911 or 604-682-5050 for Physician advisement on patient care.

Fire and Reactivity: Non- Flammable;

- Reacts with water to form sulfurous acid (H₂SO₃).

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Sulfur Dioxide 2018 1.0**References:**

WISER (Wireless Information System for Emergency Responders)

AHLS Provider Manual/4th edition.

<https://www.ccohs.ca>

WorkSafe BC/Exposure Limits

Canutec ERG 2016

ASTDR/Sulfur Dioxide

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