

Working safely with sulfur dioxide and KMS in wineries

Sulfur dioxide and KMS are frequently used as disinfectants and preservatives in wineries, as well as cideries and meaderies. Unsafe handling of these substances can result in serious injury or death. This bulletin discusses the hazards and how to reduce the risks.

SO₂ as a hazardous substance

Sulfur dioxide (SO₂) is a colourless gas that has a strong smell and is heavier than air. When used directly in gaseous form, SO₂ is considered a toxic process gas under the Occupational Health and Safety Regulation. SO₂ can be generated by dissolving KMS (potassium metabisulfite) in wine or water.

When SO₂ comes into contact with moisture in a worker's airways, it forms sulfurous acid (H₂SO₃). This acid is corrosive and toxic, and it poses a respiratory hazard. If proper precautions are not taken while working with or around SO₂, serious injury or death can result.

How SO₂ is used and the risk of worker exposure

SO₂ may be used, directly in its gaseous form or indirectly via KMS solutions, at several stages of the winemaking process.

For example, SO₂ or KMS may be used to do the following:

- Preserve wine and barrels (separately)

- Kill wild yeasts on grape skins during crushing
- Stop fermentation
- Act as an antibacterial and antioxidant during wine development and aging
- Disinfect tanks and other equipment

The risk of SO₂ exposure is greatest when using SO₂ directly in its gaseous form. However, handling and using KMS also presents SO₂ exposure risks, especially when citric acid is added to a KMS solution. The acid maximizes the generation of SO₂. As a result, the risk of worker exposure increases. Where SO₂ odour is noticeable, monitoring is necessary to determine actual exposure levels. The 8-hour time-weighted average B.C. exposure limit for SO₂ is 2 parts per million.

Controlling risk when handling SO₂

Part 6 of the Regulation sets out requirements for toxic process gases. It includes sections relevant to handling SO₂ in wineries. (See the links at the end of this document.) In addition to meeting those requirements, you can control the risks associated with SO₂ in the following ways.

Develop and implement an exposure control plan when using SO₂ gas directly

In workplaces that use SO₂ gas directly, employers must develop and implement an exposure control plan (ECP) for SO₂ to minimize worker exposure. See section 5.54(2) of the Regulation for the required elements of an ECP.

Use a pressure regulator with an SO₂ gas cylinder

The Compressed Gas Association's Standard P-1 (2022), Safe Handling of Compressed Gases in Containers, advises using a pressure regulator to safely remove gas from a pressurized gas cylinder. The regulator reduces the pressure of the gas to the working pressure at which it is to be used.

Use of a pressure regulator for a corrosive gas requires diligent preventive maintenance and service, usually by a manufacturer's representative, on a regular basis. Contact the manufacturer for details. Pressurize and leak-check the gas-handling circuit prior to each use.

Implement other controls to reduce exposures

SO₂ used directly in gaseous form

Add SO₂ gas directly to wine gradually, below the liquid surface, to reduce off-gassing and the risk of worker exposure. SO₂ is water soluble and will dissolve into an excess of water. When treating barrels with SO₂ gas directly, control the delivery pressure and duration to limit the dose delivered. Wear appropriate goggles and a half- or full-facepiece respirator with acid gas cartridges.

KMS solutions

- If monitored levels of airborne SO₂ exceed 50 percent of the B.C. exposure limit, develop and implement an ECP.
- Wear safety eyewear and prepare KMS solutions in a well-ventilated area.

- Always add KMS to water. Never add water to KMS because the SO₂ initially generated will be released to air.
- To acidify a KMS solution, prepare the KMS solution first. Then add the citric acid gradually to acidify incrementally.
- If SO₂ odour is present, and monitoring to confirm safe SO₂ levels is not in place, wear respirators with acid gas cartridges. Store respirators in sealed containers.

KMS handling and storage

- Seal KMS containers immediately after removing the required amount of KMS. This prevents KMS from absorbing moisture from the air and releasing SO₂.
- Use a dedicated scoop for KMS, preferably one that is attached to the KMS container. This reduces the risk of cross-contamination from other materials (citric acid in particular).
- Ensure that areas where KMS is stored are well ventilated and dry.
- Do not store KMS near acids (e.g., citric acid) or oxidizers (e.g., sodium percarbonate), or near sources of water.
- Store KMS and its solutions in properly labelled, sealed containers.

Related OHS Regulation requirements

- [Sections 6.116 to 6.132, Toxic process gases](#) (emergency procedures; training to operate SO₂ equipment and machinery; critical controls and components; personnel restrictions for SO₂ systems; ventilation; monitoring; PPE, etc.)
- [Section 5.54, Exposure control plan](#)
- [Sections 8.32 to 8.45, Respirators](#)