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Sulfur Dioxide

Hazard Awareness Bulletin
April 2023

Helping to reduce your exposure to Sulfur Dioxide during metal production and fabrication.

What is Sulfur Dioxide?

Sulfur dioxide is a dense, colorless gas with a pungent odor at room temperature. It can be readily pressurized or cooled to form a colorless liquid. Sulfur dioxide readily dissolves in water to form sulfurous and sulfuric acids.

Sulphur dioxide and to a lesser extent sulfuric acid are generated during the burning of fossil fuels and particularly coal, for example coking ovens, also the refining of metals, ores and smelting processes, including copper and aluminum.

Sulfur dioxide is a common air pollutant, created mainly through the combustion of fossil fuels (coal, natural gas and petroleum products), but also from forest / grass fires and volcanic eruptions.

A large number of occupational exposures and deaths occur when encountering the gas during confined space entries.

How can Sulfur Dioxide affect me?

Workplace exposures to sulfur dioxide have been associated with a range of potential health effects – some can result from short-term acute exposures, others from long-term, repetitive, chronic exposures.

Did you know?

- Chronic Obstructive Pulmonary Disease (COPD) is a serious long-term lung disease which results in irreversible narrowing of the airways over time, reducing the flow of air into the lungs due to inflammation of the air passages and damage to lung tissue.
- In extreme cases the reduced air flow to the lungs is highly debilitating and can be fatal. Other symptoms include a persistent cough (>3 months of the year), wheezing, and increased phlegm production. COPD includes the conditions bronchitis and emphysema.

Potential acute health effects associated with metal production or fabrication

- Eye and upper respiratory tract irritation
- Skin irritation (as sulfuric acid)
- Gastrointestinal issues
- Potential trigger for asthma attack in some people
- Coughing. Wheezing, breathlessness, and chest pain
- Pulmonary edema and death

Potential chronic health effects associated with metal production or fabrication

- Chronic Obstructive Pulmonary Disease, (COPD)
- Reduced pulmonary function

When do workplace exposures occur?

Inhalation
Workplace exposures to sulfur dioxide in the metal production and fabrication industries are from inhaling the gas, often generated as a by-product of metal production or some other process.

Dermal
The secondary route of exposure is through contact with the skin and eyes with sulfur dioxide gas or solution (as sulfuric acid).

Industries / Applications where workplace exposures may occur
Examples of metal production and fabrication applications, as well as other industries and processes in which individuals may be exposed to sulfur dioxide:

Metal production, metal fabrication and related applications
- Metal foundries and metal coating
- Smelting of sulfide ores to yield copper, zinc, and other metals
- Coke ovens
- Aluminum smelting
- Pyrolysis of solvents and degreasers on the metal surface during welding to form sulfur dioxide

Other applications
- Paper and textile industries due to bleaching, biocidal and preservative properties
- Petroleum, oil, gas, and chemical industries
- Vehicle exhaust emissions
- Fossil fuel power plants
- Mining
- Food industry as a preservative

What can I do to help protect my workers?

Use appropriate controls
Employers need to conduct a risk assessment, including a determination of exposure levels compared to exposure limits to understand what control measures may be needed.

If required, controls from the hierarchy of controls should be implemented and their effectiveness measured. For example, local exhaust ventilation (LEV) can be a highly effective engineering control used in welding, grinding, and many other applications.

Get the equipment that you need
In addition to implementing other control measures, Personal Protective Equipment (PPE) such as Respiratory Protective Equipment (RPE) is commonly used to help reduce exposures and risks to workers.

Respiratory Protective Equipment (RPE) – air-purifying respirators
3M has a range of RPE that can help reduce your exposure to dusts, mists, metal fume, as well as gases and vapors commonly encountered in metal production and fabrication. These include disposable particulate respirators, reusable half- and full-facepiece respirators, and battery powered air-purifying respirators combined with a range of robust facepieces, headtops, and helmets.

Respiratory Protective Equipment (RPE) – supplied air respirators
3M also has a wide range of supplied air respirators, suitable for use in some of the most demanding work environments.

Other PPE

3M can also provide a wide range of other safety solutions including:

- Head, eye, and face protection
- Disposable and reusable ear plugs and ear muffs
- Protective Communication solutions
- Disposable protective coveralls
- Fall protection
- Confined space solutions

Find your respirator

Use our interactive disposable respirator selector to help you find a respirator that meets your protection needs.

Find your respirator

Use our respirator selection guide to help you find a respirator that meets your protection needs.

Find your respirator

Use our interactive powered & supplied air respirator selector to help you find a respirator that meets your protection needs.

View all 3M PPE Solutions

Training

A key component of an effective PPE program is training for both workers and those responsible for health and safety in the workplace.

For example, workers wearing PPE should be trained in and understand:

- How PPE works, what it does, and its limitations
- Inspection, maintenance, and cleaning of the PPE as well as identifying damaged PPE and knowing proper disposal
- Proper fitting and use of the PPE
- The nature of all hazardous substances present and the potential effects upon their health

Stay Informed

When selecting the appropriate protective equipment, local, state, provincial, or national regulations, laws, and guidelines need to be followed.

One of the tasks of the occupational safety and health specialist is to monitor constantly changing legal regulations, occupational exposure limits, etc.

Technical Help

At any time, you can get in touch with one of our PPE professionals for personalized help on the selection and use of 3M products. They can help you through the process of selecting suitable products based on your risk assessment, as well as helping you understand how to fit, use, and maintain your PPE – helping you to stay protected.

References and Resources

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