3M Science. Applied to Life.™

Hazard Awareness Bulletin
December 2022

Organic Solvents

Helping to reduce your exposure to Organic Solvents during metal production and fabrication.

What are Organic Solvents?

Organic solvents are carbon-based substances capable of dissolving or dispersing one or more other substances. Many classes of chemicals are used as organic solvents, including aliphatic hydrocarbons, aromatic hydrocarbons, amines, esters, ethers, ketones, and nitrated or chlorinated hydrocarbons.

Organic solvents are used in in paints, varnishes, lacquers, adhesives, glues, and in degreasing and cleaning agents, and in the production of dyes, polymers, plastics, textiles, printing inks, agricultural products, and pharmaceuticals.

Industrial organic solvents may be known by a variety of different names and commercial trade names and are often mixtures of several individual chemicals.

Examples of Common Organic Solvents

- acetone
- dichloromethane
- toluene
- methyl ethyl ketone
- 1-butanol
- petroleum spirits
- white spirit
- trichloroethylene
- xylene

How can Organic Solvents affect me?

Workplace exposures to organic solvents 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?

Certain organic solvents including carbon disulfide, n-hexane, toluene, p-xylene, ethylbenzene, n-propyl benzene, styrene, and trichloroethylene have been classified as ototoxins. Research has shown that exposure to ototoxins may cause hearing loss. Exposure to elevated noise levels may increase risk of hearing loss.

https://www.cdc.gov/niosh/docs/2018-124/pdfs/2018-124.pdf

Potential acute health effects of organic solvents from metal production or fabrication*

- Irritation of eyes, skin, nose, and throat
- Wheezing, chest tightness, breathlessness, and coughing
- Nervous system effects including central nervous system depression

Potential chronic health effects of organic solvents from metal production or fabrication*

- Nervous system effects including peripheral neuropathy
- Dermatitis and defatting of the skin
- Liver and kidney disorders
- Other systemic effects including cancer and reproductive disorders

*Chemical dependent

When do workplace exposures occur?

Inhalation
One of the main sources of worker exposure is from the inhalation of organic solvent vapors, particularly when spray applying solvent-based paints, coatings, foams and adhesives compounds. Other sources of exposure include surface cleaning/degreasing using solvents, handling, mixing and preparation of paints and the associated maintenance and cleaning of spray equipment after use.

The fine aerosol mists and vapors generated by spraying can be readily inhaled and organic solvents and other components they contain can be readily absorbed in your lungs.

Dermal
Direct organic solvent contact with the skin can cause irritation and defatting of the skin leading to dermatitis and other skin disorders. In addition, some organic solvents may be absorbed through the skin which can lead to a number of systemic effects.

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 organic solvents include:

Metal production, metal fabrication and related applications
- Painting of parts and equipment
- Cleaning and degreasing
- Paint stripping/removal

Other applications
- Petroleum, oil, gas, and chemical industries
- Furniture manufacturing
- Construction

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 reduce exposures 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, all the way to heavy-duty 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 health and 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 defective 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. In the U.S. contact Technical Service at 1-800-243-4630. In Canada contact Technical Service at 1-800-267-4414.

References and Resources

NIOSH Workplace Safety and Health Topics – Organic Solvents. https://www.cdc.gov/niosh/topics/organsolv/

OSHA Safety and Health Topics - Solvents. https://www.osha.gov/solvents

Smedley, J, Dick, F and Sadhra, S. Oxford Handbook of Occupational Health (second edition). 2013.

Organic Solvent Neurotoxicity, DHHS (NIOSH) Publication Number 87-104 (March 1987). https://www.cdc.gov/niosh/docs/87-104/default.html

Dick, F. Solvent neurotoxicity. Occup Environ Med. 2006 Mar; 63(3): 221–226. doi: 10.1136/oem.2005.022400

ILO - Solvents in the Workplace. https://www.ilo.org/wcmsp5/groups/public/---americas/---ro-lima/---sro port_of_spain/documents/presentation/wcms_250196.pdf

ILO - Chemical Safety Training Modules, Solvents. https://www.ilo.org/legacy/english/protection/safework/cis/products/safetytm/solvents.htm

Safety and Health Information Bulletin - Preventing Hearing Loss Caused by Chemical (Ototoxicity) and Noise Exposure. DHHS (NIOSH) Publication No. 2018-124. https://www.cdc.gov/niosh/docs/2018-124/pdfs/2018-124.pdf

Personal Safety Division
3M Center, Building 235-2W-70
St. Paul, MN 55144-1000

3M PSD products are occupational use only.

3M Canada
P.O. Box 5757
London, Ontario
N6A 4T1

In United States of America
Technical Service: 1-800-243-4630
Customer Service: 1-800-328-1667
3M.com/workersafety
In Canada
Technical Service: 1-800-267-4414
Customer Service: 1-800-364-3577
3M.ca/Safety