WORKERS HEALTH CENTRE
People I Recovery I Work

Health And Safety Fact Sheet

Solvents at Work

Solvents are among the most commonly used chemicals in workplaces. Workers in different jobs regularly use solvents for degreasing, metal cleaning, adhesion and as paint thinners or lubricants.

Exposure to solvents can have both short- and long-term health effects on workers.

What is a solvent?

A solvent is a substance used to dilute or dissolve another substance to create a solution.

Water is the most common solvent as many substances are easily soluble in water. But some substances cannot be easily dissolved and require strong chemicals as solvents.

Most solvents used in industry are "organic", petroleum - based chemicals that have powerful properties to dissolve solids. They are often mixtures of several substances and can be extremely hazardous.

Some commonly used solvents are:

Substance	Used for
Acetone	industrial coating
Trichloroethylene	degreasing
Toluene	industrial coating, manufacture
Methylene chloride	paint removal
Methylethylketone (MEK)	printing ink
Perchloroethylene	dry cleaning
White spirit	paints, printing ink

Few industries are free of solvents but workers in the following industries may be particularly at risk:

- Cleaning
- Dry cleaning
- Chemical manufacturing
- Footwear
- Plastics
- Printing
- Spray painting
- Fitting and mechanical work

How do solvents enter the body?

There are three ways that solvents can enter the body:

1. ***Inhalation***

   Most solvents evaporate into the air very quickly. The fumes, dusts, gases and vapours are then breathed in and easily pass through the lungs into the blood stream.

2. ***Ingestion***

   Solvent droplets can form in the hairs inside the nose, be sniffed in or swallowed. Mouth contact with contaminated hands, food and cigarettes can result in the ingestion of solvents.

3. ***Skin absorption***

   Solvents can also be absorbed through the skin by direct contact and enter the bloodstream.

Health effects of solvents

Different solvents have different health effects. Some will depend on how exposure happens, how much and for how long.

Short term effects can be caused by single exposures, often to a large amount of solvent. Short term exposure can cause:

- Dermatitis or skin problems (drying, cracking, reddening or blistering of the affected area)
- Headaches
- Drowsiness
- Poor coordination
- Nausea (feeling sick)

These effects usually take place very quickly. In cases of exposure to very high concentrations of solvent vapour, unconsciousness and even death can occur.

Repeated (***long term***) exposure to solvents may affect:

- The brain and the nervous system (see below)
- The skin - causing dermatitis
- The liver - causing liver damage
- The blood-forming system
- The kidneys
- The fertility of both men and women
- The foetus in a pregnant woman

Some solvents, for example, benzene, can cause cancer.

Some solvents will have *synergistic* effects with other hazards and drugs. This means that the solvent will have greater health effects when it is in combination with other hazards. For example, after using an organic solvent, the effects from exposure will be greater if one smokes cigarettes or drinks alcohol soon afterwards.

Effects of solvents on the nervous system

There has been increasing attention on the damage to the nervous system from solvent exposures. This is called *neurotoxicity*. It may be short-term (usually with high exposure and rapidly reversible once exposure has ceased) or long-term. Chronic (or long-term) effects are caused by degeneration of parts of the nervous system because of repeated exposures.

Symptoms of neurotoxicity are:

ACUTE (short-term) NEUROTOXICITY	CHRONIC (long-term) NEUROTOXICITY
Dizziness	Personality changes
Euphoria	Irritability
Poor co-ordination	Sleep disorders
Unsteady gait	Short term memory loss
Fits	Reduced attention span
Coma	Dementia
	Peripheral neuropathy

Tests for neurotoxicity

There are useful tests to identify toxic effects on the peripheral nerves. Nerve conduction studies (NCS) and electromyographic studies (EMG) are used in cases where there is tingling or numbness of the hands or feet, or associated muscle weakness.

A set of neuropsychometric tests have been developed to find behavioural effects. They include tests for

- Motor speed

- Hand steadiness
- Perceptual speed
- Reaction speed, eye-hand coordination manual dexterity
- Verbal and visual memory and learning
- Cortical evoked potentials (electrical activity in the brain following sensory stimulation)

Contact SafeWork NSW (Chemical Analysis Branch) regarding these tests on 131 050.

Controlling exposure to solvents

Solvent exposure should be controlled, like other hazards, according to the hierarchy of control measures.

Eliminate or substitute

Organic solvents vary in the degree of risk they pose to health. Where possible the use of harmful solvents should be avoided and/or replaced with a less harmful product. For example, water-based solvents may be used instead of organic solvents. Sometimes the job may be done in a different way so that exposure to solvents is either eliminated or reduced such as high pressure cleaning or steam.

Engineering Controls

If elimination or substitution is not suitable, engineering measures may need to be applied. Engineering controls may include:

- Using mechanical handling methods or automating the tasks.
- Local exhaust ventilation at the point where the solvent is used
- Enclosing operations so that solvent exposure is isolated
- Mechanical or general ventilation to dilute the workplace air (however, this is not as effective as local exhaust ventilation to remove the contaminants).

Administrative Controls

When other approaches are not fully effective, certain administrative measures can minimise exposures. For example, prevent entry to areas where solvent vapour concentrations may build up by sign posting.

Personal protective equipment (PPE)

If none of those control measures are suitable or effective in your workplace, suitable personal protection should be provided for the exposed workers.

- Protective clothing to cover all exposed parts of the body and personal clothing.
- Boots, gloves, eye protection and suitable respirators to prevent splashes, skin contact and inhalation of vapours.

All personal protective equipment must be a type suitable for the particular chemicals in the solvent.

For details on types of protection, see the Workers Health Centre Fact Sheet titled ***Masks and other Respiratory Protection***.

PPE should be the final option in the hierarchy of control measures. It should be an interim measure until other controls are put in place.

Other control measures to prevent solvent exposures at work

- Provide information and increase awareness of people who work with solvents.
- Store solvents in a cool place, away from any potential ignition sources.
- Ensure the storage area should be well ventilated and firmly secured.
- Ensure that solvent containers have warning labels indicating the hazards of the substance and what should be done in case of an emergency.
- Contain spills or leak residues with sand or other appropriate absorbent. Do not allow spillage to enter drains or other waterways.

What you can do to work safely with solvents

Ensure you have access to information provided by your employer, union or from other sources. Before you start work with solvents you must have access to the safety data sheet. Read the label on the chemical container and follow the advice given in it. If you don't understand the information provided do not use the solvent until the information is made clear.

Understand any health effects from the chemical and make sure that you know what to do in case you come into contact with the solvent.

Reduce the amount you breathe in by

- Avoiding the use of products with solvents in them.
- Making sure there is good ventilation in the work area where solvents are used.
- Using the minimum amount needed for the job and keeping lids closed.
- Wearing suitable respiratory protection.

Reduce the amount you get on your skin by

- Avoiding any skin contact with solvent-containing products.
- Wearing suitable protective clothing (gloves, aprons, etc).
- Not using industrial solvents to remove grease and other dirt from your skin.

Take specific precautions if using solvents in confined spaces

Practice good hygiene by washing hands well before eating, drinking, smoking or going to the toilet

Ask your employer to assess any risks to your health from using solvents - this is a legal requirement and may include air monitoring, blood or urine tests and proper training in working safely with chemicals.

For further information see the Managing the Risks of Hazardous Chemicals in the Workplace Code of Practice 2012

http://www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/697/Managing%20Risks%20of%20Hazardous%20Chemicals2.pdf

and Industrial Organic Solvents Guide

http://www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/157/IndustrialOrganicSolvents_1990_PDF.pdf

For further information and advice contact the Workers Health Centre

The Workers Health Centre provides a range of quality services in occupational health and safety including:

➢ *Medical Screenings & Health Checks*	➢ *WHS Training*
➢ *Hearing Tests*	➢ *Rehabilitation & Return To Work*
➢ *Workplace Assessments*	➢ *Related Services In Psychology, Acupuncture And Massage Therapy*

For further information and advice ring us on 02 9749 7666

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