

Guide to Working with Solvents: The Management of Health Risks

Organic Solvents

A large number of organic solvents are in regular use in many University schools. If you use any of the solvents shown in the panel below, or any closely related materials, then you should read this guidance and be prepared to take what active steps you can to protect your own health.

Solvent	Solvent
Acetone	Methylene chloride
Ethyl acetate	Trichloroethylene
Methyl alcohol	Toluene
Methyl ethyl ketone	Glycol ethers
Perchloroethylene	Styrene
(Tetrachloroethylene)	n-hexane
Butyl alcohol	Xylene
Isopropyl acetate	White spirit

Health Effects of Solvents

The principal acute effects of exposure to solvents are irritation of the skin, eyes and lungs; headache, nausea and dizziness. Repeated or prolonged exposure to the skin may also cause dermatitis. Other possible effects, which are different from person to person, vary according to which solvent or solvent mixture a person is exposed to.

Find Out About the Solvent

The supplier of the solvent or of any other materials containing solvents (e.g. paints, etc) will provide a Hazard (Safety) Data Sheet. The Hazard Data Sheet will give you information about:

- Whether the solvent readily forms a vapour. High volatility solvents usually have a boiling point less than 50 oC and a vapour pressure greater than 25 kilo pascals, at room temperature.
- Whether Occupational Exposure Limits have been defined. The Occupational Exposure Standard (OES) is set at a level of vapour or

mist (in parts per million) that is not likely to damage health if a person is exposed by inhalation day after day. The Maximum Exposure Limit (MEL) is the level which must not be exceeded, when averaged over a specified reference period.

- Whether the solvent (or mixture) is absorbed through the skin.
- Whether there could be immediate or long term health effects.

Find Out If You Have a Problem

Think about how the solvent vapour, mist or liquid is being generated and how you might come into contact with it, take into account how much solvent is used and how long and how often you are exposed. It may become obvious that controls to reduce health risks need to be improved without recourse to measuring Occupational Exposure Levels.

Exposure levels of most solvent vapours can be measured with detector tubes which change colour upon exposure to solvent and give a reading of airborne concentration in ppm. You should consult either your School Safety Adviser or the Occupational Hygiene Unit (occupational.hygiene@ed.ac.uk) if you think an Occupational Exposure Level requires to be measured.

Remember that solvents cannot evaporate from closed containers! Apply high standards of housekeeping, close containers and store solvents correctly after use.

Decide What Action to Take

Consider whether it is practicable to find an alternative way of working which does not need to use a solvent, or replace the solvent with one that is less hazardous. If not, can you reduce the quantity of solvent in use, reduce the surface area which can evaporate or reduce the temperature?

Consider the use of local exhaust ventilation in order to prevent your exposure to any solvent vapour or mist. Best results are generally achieved by having the process enclosed as far as this is practicable. A fume cupboard is ideal. Extraction fans in the roof, walls or windows will reduce or prevent the built up of background concentrations of solvents vapours, but are not a substitute for ventilation designed to extract at the point of solvent vapour release. Remember that solvents vapours are heavier than air and will therefore tend to fall to the floor. Extraction of flammable solvents may require specially modified equipment.

Personal Protection Equipment (PPE)

If you cannot control your exposure to solvent contact by any other means, the last control option you have is to use PPE. Appropriate PPE will be selected from:

- Respirators (half-masked or full face fitted with a filtering cartridge; powered respirators blowing filtered air to a mask, visor, helmet or hood; breathing apparatus).
- Gloves (see selection panel below).
- Aprons.
- Boots.
- Eye Protection (safety glasses, goggles or visors).

You should always seek advice before using or relying upon respiratory equipment to protect your health. Respirators that filter air use cartridges to remove the solvent. These cartridges have a limited capacity and soon become saturated when exposure is high. Always follow the manufacturer's instructions.

You are likely to wear gloves when solvent contact with the skin is foreseeable. The panel below gives a guide on glove material choice. If there is only an occasional splashing on to the glove, then a "second choice" may be adequate. You should note that disposable vinyl "surgical" gloves do not appear in the table of glove materials.

Solvent	First Choice	Second Choice
Acetone	Butyl	<i>see note 1</i>
Butyl alcohol	Nitrile	Neoprene TM
Ethyl acetate	Butyl	Nitrile <i>see note 2</i>
Ethylene glycol	Butyl	Natural rubber / Neoprene TM
n-Hexane	Viton TM	Nitrile <i>see note 2</i>
Isopropyl acetate	Butyl	Nitrile
Methyl alcohol	Butyl	Nitrile
Methyl ethyl ketone	Butyl	Neoprene TM
Methylene chloride	Viton TM <i>see note 3</i>	Viton TM <i>see note 3</i>
Perchloroethylene	Viton TM	Nitrile
Styrene	Viton TM	Butyl
Toluene	Viton TM	Nitrile <i>see note 2</i>
Trichloroethylene	Viton TM	Nitrile <i>see note 2</i>
White spirit	Nitrile	Neoprene TM

(Stoddard solvent)		
Xylene	Viton TM	Nitrile <i>see note 2</i>

Notes

1. No other material suitable for selection.
2. Severe degradation will occur to this material and will limit the use of gloves to short periods only.
3. No material will provide more than short-term protection against methylene chloride. For exposures to a combination of methylene chloride and methyl alcohol, as found in paint stripper, there are no materials to offer more than short-term protection.

The University Occupational Hygiene and Safety Adviser has access to much more comprehensive tables for the selection of appropriate hand protection, should the substance in question not be listed above.

Planning to Protect Your Health at Work

The Control of Substances Hazardous to Health (COSHH) Regulations, 1994, impose legal duties to ensure that exposure to substances hazardous to health, such as organic solvents, is prevented and where this is not reasonably practicable, adequately controlled. You should therefore have access to a properly constructed assessment of the risks to your own health and safety which could arise out of your work with any hazardous agents and this assessment should define the measures to be taken to reduce any risks to the minimum that is reasonably achievable.

What to do if you think something about your work is making you ill?

- If you go to see your own General Practitioner, always describe your job and ask if your illness might be related to your own work.

And Finally

- Reduce your own exposure to organic solvents as far as you possibly can and, above all, take good care of your own health.
- This guidance note has been modelled closely upon the Health and Safety Executive's Booklet, INDG272 entitled "Health Risks Management - A Guide to Working with Solvents". If you would like a copy of this booklet, please get in touch with the Health and Safety Department Office, telephone number 51 4255.