



Formaldehyde in Laboratories

A report by the National Industrial Chemicals Notification and Assessment Scheme (NICNAS) published in 2006 identified workers in medicine-related laboratories as being at risk of experiencing health effects from the chemical formaldehyde. This information sheet summarises the main findings of the report and recommendations relevant to laboratories.

In laboratories, formaldehyde is most commonly present as a dissolved gas in a water-based solution called formalin. Examples of workplaces that may use formaldehyde solutions are histopathology and anatomical pathology laboratories, and hospital and forensic mortuaries. Students may also be exposed during the time they are in such places. Formaldehyde also exists in polymer form as paraformaldehyde, a white powder.

Formaldehyde solutions are used for fixing human tissue and organs after autopsy or biopsy, and as a preservative and disinfectant in embalming fluids, gels and surface packs. They are also used for flushing and cleaning kidney dialysis machines. Paraformaldehyde is also sometimes used in embalming e.g. packed around viscera. Analytical laboratories use formaldehyde as a reagent.

Main findings:

- Formaldehyde is toxic by inhalation, skin contact, and by swallowing.
- Formaldehyde solutions readily give off formaldehyde gas, which has a pungent odour.
- Formaldehyde levels in air and around workers' breathing zones in laboratories during use of formaldehyde solutions can be high, especially if there is inadequate ventilation or poor handling practices. Results higher than 0.5 parts per million (ppm), which is the level at which humans are known to start experiencing discomfort, and up to 4.8 ppm, have been reported in laboratories in Australia.
- Breathing formaldehyde gas can result in irritation of nerves in the eyes and nose, which may cause burning, stinging or itching sensations, a sore throat, watery eyes, blocked sinuses, runny nose, and sneezing.
- Skin contact with formaldehyde solution or paraformaldehyde can cause skin rashes, and can cause allergic skin reactions whenever the individual is subsequently exposed, even at low levels. Splashes into the eyes can cause irritation, corrosion of the cornea, and possibly blindness.
- Formaldehyde has been shown to cause nasal cancers in animals at levels not found in the majority of workplaces.

- Manual handling processes in laboratories increase the risk of spills and splashing on to the skin or eyes.
- Formaldehyde is a highly reactive, flammable gas and can form explosive mixtures in air. It presents a fire hazard when exposed to flame or heat. Formaldehyde solutions can be flammable when formaldehyde or methanol concentrations are high.
- Formaldehyde is incompatible with many chemicals and can react, sometimes violently, with some chemicals, including strong oxidisers (e.g. bleach) and acids.

Recommendations:

- Read the supplier's Material Safety Data Sheet before using formaldehyde products.
- Replace high concentration formaldehyde products with low concentrations or less hazardous products, wherever possible.
- Avoid having to dilute formaldehyde products by buying products with concentrations of formaldehyde appropriate for the intended use.
- Ensure that a ventilation system (e.g. local exhaust ventilation) is in place and is effective at maintaining exposure levels below the occupational exposure standard.
- In particular, ensure effective ventilation in areas where formaldehyde levels may be high, e.g.
 - use exhaust ventilation in storage and dispensing areas
 - use draught arrangements at dissection areas
 - use local exhaust ventilation at each specimen station
 - locate specimen vats in areas with isolated ventilation or use local exhaust ventilation over the vats.
- Avoid spraying and brushing of formaldehyde products. Only spray formaldehyde where necessary if adequate engineering and personal protective controls are in place.
- Follow relevant Australian standards and/or guidance from manufacturers in selection and use of personal protective equipment. Respirators with organic vapour cartridges should be used in situations where high formaldehyde levels and high frequency exposures may be encountered and where ventilation alone is insufficient to control the level of exposure to below the occupational exposure standard.
- Store formaldehyde products in accordance with the *National Standard for the Storage and Handling of Workplace Dangerous Goods* and the *National Code of Practice for the Storage and Handling of Workplace Dangerous Goods*.

Occupational exposure standard

The current national occupational exposure standard for formaldehyde is 1 ppm 8-hour time-weighted average (TWA) and 2 ppm short-term exposure limit (STEL). The NICNAS report recommends that the occupational exposure standard be lowered to 0.3 ppm 8h TWA and 0.6 ppm STEL. Formaldehyde has been shown to cause nasal cancers in animals at levels not found in the majority of workplaces.

The basis for lowering the current exposure standard is sensory irritation. The recommended exposure standards not only provide adequate protection against discomfort of sensory irritation, but also provide a high level of protection against cancer. The recommended standard is being considered by the Office of the Australian Safety and Compensation Council, the national agency responsible for setting national occupational exposure standards.

Workplace hazardous substances regulations

Workplace health and safety regulations exist in each State or Territory for hazardous substances. These regulations place duties on people including employers, suppliers, and manufacturers in relation to hazardous substances used in the workplace. You should refer to the occupational health and safety authority in your particular State or Territory to find out what the specific requirements are.

**Department of Consumer
and Employment Protection**
1260 Hay Street, PERTH, WA, 6005
Worksafe Division – 1300 30 78 77
safety@docep.wa.gov.au

**Department of Employment
and Industrial Relations**
PO Box 820 LUTWYCHE QLD 4030
Workplace Health and Safety
Infoline 1300 369 915

Victorian WorkCover Authority
Advisory Service
GPO Box 4306
MELBOURNE VIC 3001
1800 136 089 or 03 9641 1444

WorkCover Authority of NSW
92-100 Donnison Street,
GOSFORD NSW 2250
02 4321 5000
WorkCover Assistance Service – 13 10 50
Hours: 8:30am- 5:00pm
Monday to Friday

Workplace Standards Tasmania
PO Box 56
ROSNY PARK , TAS, 7018
Phone: 03 6233 7657 (Outside Tasmania)
Local rate: 1300 366 322 (Inside Tasmania)
Fax: 03 6233 8338
Email: wstinfo@justice.tas.gov.au

Northern Territory Worksafe
Prevention Branch
GPO Box 4821 DARWIN NT 0801
Phone: 08 8999 5545

A.C.T. WorkCover
Level 3, Block B, Callam Offices
Easty Street
WODEN ACT 2606
Phone: 02 6205 0200
Fax: 02 6205 0336
Email: workcover@act.gov.au

SafeWork SA
Level 3
1 Richmond Road
KESWICK SA 5035
Phone: 08 8303 0400 or 1300 365 255
Fax: 08 8303 0277

FIRST AID FOR FORMALDEHYDE EXPOSURE

Inhaled	If inhaled, remove from contaminated area. Apply artificial respiration if not breathing.
Eye	In case of eye contact, hold eyelids apart and flush they eye continuously with running water. Continue flushing until advised to stop by Poisons Information Centre or a doctor, or at least for 15 minutes.
Skin	If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water.
Swallowed	If swallowed do NOT induce vomiting
First Aid Facilities	Ensure eye bath and safety showers are available and ready for use. For advice, contact a Poisons Information Centre (131 126) or a doctor at once.

Further Information

More information can be found in the Material Safety Data Sheet available from the supplier. A comprehensive source of information is the detailed assessment of formaldehyde published by the National Industrial Chemicals Notification and Assessment Scheme (NICNAS). This is available free of charge on the NICNAS web site at <http://www.nicnas.gov.au/Publications/CAR/PEC/PEC28.asp>, or by calling 1800 638 528. More information on the use of industrial chemicals can be found at the NICNAS web site: www.nicnas.gov.au

References

NICNAS (2006) Priority Existing Chemical Assessment Report No. 28: Formaldehyde. Sydney, National Industrial Chemicals Notification and Assessment Scheme.

NOHSC (2001) Storage and Handling of Workplace Dangerous Goods: National Standard [NOHSC:1015(2001)]. Sydney, National Occupational Health and Safety Commission

NOHSC (2001) Storage and Handling of Workplace Dangerous Goods: National Code of Practice [NOHSC:2017(2001)]. Sydney, National Occupational Health and Safety Commission