

Safe Method of Use 20 - Formaldehyde

Purpose: This Safe Method of Use applies to **principal investigators (PIs), sector managers, designated laboratory person (DLPs)**, technical staff and students who use formaldehyde within the University of Auckland.

Note: the word ‘**shall**’ denotes a mandatory requirement and the word ‘**should**’ denotes a recommendation.

Exposure to formaldehyde can be irritating to the eyes, nose, and upper respiratory tract. In certain individuals, repeated skin exposure to formaldehyde can cause sensitisation that may result in allergic dermatitis. Formaldehyde is a human carcinogen¹ and a suspected reproductive hazard for both men and women². The aqueous solution formalin is 37-40 percent formaldehyde.

Paraformaldehyde is the crystallized polymer of formaldehyde that is weighed out and dissolved in solution for experimentation or cell and tissue fixation. Typically 3-10% formalin or paraformaldehyde solutions are used to perfuse or fix tissues.

WorkSafe New Zealand has provided a guidance value for Workplace Exposure Limit Time-Weighted average (WES-TWA) of 0.3 ppm, due to decrease to 0.1ppm in Nov 2022. This is the maximum average amount to be exposed to over a 8-hour working day. The Short-term exposure limit (WES-STEL) is currently advised at 0.6ppm, due to decrease to 0.3ppm by Nov 2022. This is the maximum average amount to be exposed to over a 15-minute period.

The odour threshold of formaldehyde varies between individuals, but can be lower than 0.5ppm. Therefore odour is not a reliable indicator of exposure.

A. Minimising Exposure to Formaldehyde

- All work with concentrated formalin solutions **shall** be done in a chemical fume hood.
- Significant formaldehyde exposures can occur while dissecting or working with tissue specimens perfused with or fixed in formaldehyde. Work with such specimens **shall** be conducted in a fume cupboard.
- Gloves **shall** be worn whenever formalin or tissues preserved or fixed with formaldehyde are handled. Butyl or nitrile gloves are recommended and **should** be worn when contact is anticipated. Latex gloves do not provide adequate protection.

- Formaldehyde splashed in the eye can cause irreversible damage to the cornea. Safety glasses **shall** always be worn when working with formaldehyde.
- For work with formalin that cannot occur in a fume hood, other controls **should** be implemented such as use of other ventilation, respirators, and/or air monitoring.

B. Storage

- All solutions of formaldehyde and tissues preserved in formalin **shall** be stored in tightly sealed, properly labelled, containers to prevent leakage, spills and evaporation.
- Labelling **shall** include the word “formaldehyde” and the concentration.
- Signs warning of flammability hazards **should** be posted on the doors to the area where over 10 litres of 37% formaldehyde are stored or utilised.

C. Spills and Disposal

- Trace amounts of formaldehyde solutions, such as puddles left on a tray after fixing tissue or examining a specimen may be flushed into a sink drain using copious water to dilute the material.
- Small spills of dilute formalin solutions **shall** be cleaned up immediately. Cover the spill with paper towel or other suitable absorbent material. Collect contaminated spill cleaning material into a waste container to be disposed of by a chemical disposal company.
- Consider purchasing formalin-neutralising spill kits and absorbent pads where formalin is in frequent use.
- In the case of a large spill without adequate ventilation, breathing apparatus must be used by those cleaning it up. Evacuate the area and call the Fire Service for assistance.
- Formalin waste **shall** be disposed of by a University-approved chemical disposal company.

D. Emergency Response Procedures:

- If formaldehyde contacts the body or eyes, flush with water for at least 15 minutes and seek medical attention.

- If spilled formaldehyde causes eye, nose, or throat irritation, immediately clear the area, close all doors to contain vapours, and contact the Lab Manager.
- In case of inhalation, ingestion or significant skin contact, call the National Poisons Centre 0800 POISON (0800 764 766)

References

1. IARC, Formaldehyde. In *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Vol 100F: Chemical agents and related occupations.*, IARC Press: Lyon, 2012; Vol. 100F, pp 401-435.
2. Duong, A.; Steinmaus, C.; McHale, C. M.; Vaughan, C. P.; Zhang, L., Reproductive and developmental toxicity of formaldehyde: A systematic review. *Mutat. Res., Rev. Mutat. Res.* **2011**, 728 (3), 118-138.
3. WorkSafe, Workplace exposure standards and biological exposure indices Edition 12-1. 2020.