

UNIVERSITY OF VICTORIA
Occupational Health, Safety and Environment

Chemical Safety – Special Hazards

Safe Work Procedure (SWP – 008)

Stench Chemicals

Last revised: 18 May 2022

REVISION HISTORY

	<i>Revision Date</i>	<i>Author</i>	<i>Position</i>
1.	18 May 2022	Paraskevi Lagaditis	OHSE consultant

DOCUMENT APPROVAL

Approved by: Laboratory Safety Committee

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Chair, Laboratory Safety Committee

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Date Approved

**This revision replaces all previous versions of this document. If a copy is printed, it is the users' responsibility to verify the copy is the most current version of the document.*



University
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PURPOSE

To provide guidance and instruction of the safe use in laboratories of stench chemicals. In addition to this general Safe Work Procedure (SWP), each lab must develop a lab-specific work procedure unique to the experiments and activities being performed. The Lab SWP must be reviewed by OHSE (see Procedures, #7)

SCOPE

The SWP applies towards the handling and disposal of stench chemicals, such in particular thiols (mercaptans) or selenides, where even a miniscule amount can create an overwhelmingly bad smell. The methods and procedures outlined could be used for other foul smelling chemicals, such as butyric acid, should typical means of handling, cleaning or disposing methods are ineffective in eliminating the smell. In the case of foul smelling pyrophorics, such as certain phosphines, please follow UVic's SWP on handling pyrophorics.

TRAINING

The following training is required to be completed prior to working with stench chemicals:

- [WHMIS](#)
- [Lab Safety for Lab Workers](#)
- Lab SWP with documented signoff by the individual and their supervisor.

Refresher training in the General and Lab SWP must be provided when:

- There has been an extended timeframe of inactivity, or
- There has been an incident or injury, or
- 2 years has elapsed since the original training.

REGULATION AND POLICY

The University of Victoria will follow WorkSafeBC Occupational Health and Safety Regulation Part 30 and the University of Victoria Occupational Health, Safety & Environment Department.

RESPONSIBILITY

It is the responsibility of personnel undertaking activities with special hazards to complete all required training and adhere to these safe work procedures, including any additional lab or job-specific procedures.

It is the PI's or supervisor's responsibility to ensure that individuals working with special hazards have been trained prior to commencing work and have demonstrated competency in safely performing all duties associated with the special hazard in accordance with these procedures.

DEFINITIONS

List key terms or regulatory abbreviations, as applicable

MATERIALS

- Zip-lock bags to collect all contaminated material (e.g. gloves, weigh boats/paper etc) used to handle stench chemicals.

- Wide mouth containers labeled as “stench contaminated waste” for secondary containment of zip-lock waste bags.
- Waste containers for solid or solution waste dedicated to stench chemicals are labeled with “stench contaminated waste”.
- A container or bucket for a bleach bath to decontaminate all reusable labware. It is recommended to also decontaminate disposable labware (such as pipette bulbs, syringes etc) before disposing.
- Even though handling of stench chemicals will be conducted in a fume hood, a bleach trap is recommended to minimize and prevent stench vapours in the fume hood, as shown in Figure 1.

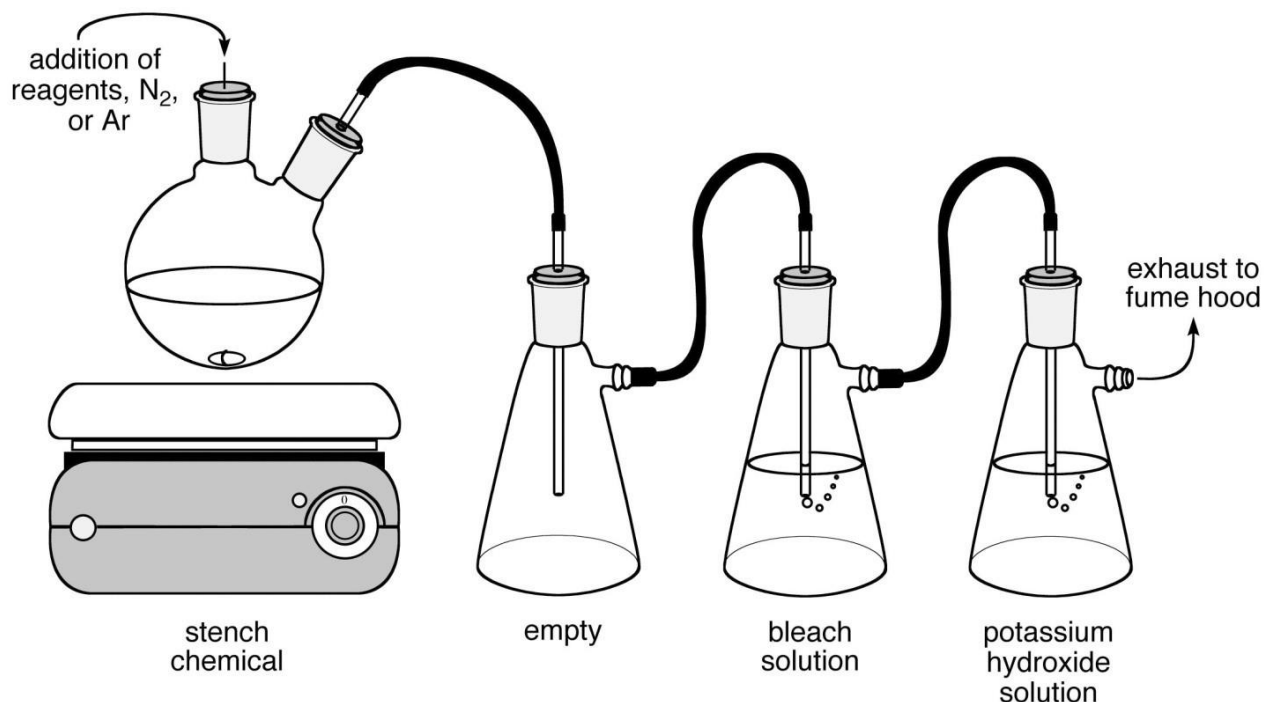


Figure 1: Bleach trap, a set up of three sequential Büchner funnels, to quench malodorous vapours from stench chemicals.

HAZARD

Stench chemicals are those where even a miniscule amount can create an overwhelmingly noxious smell.

Examples of stench chemicals:

- Thiols (mercaptans)
- Sulfides
- Selenides
- Valeric acid
- Phosphines
- Isonitriles (isocyanides)
- Butyric acid

Some of the stench chemicals in the list above have other associated hazards; for example, many phosphines are pyrophoric. Always refer the SDS of the specific chemical before attempting to use and plan accordingly.

PROCEDURE

1. Handling

- a. Always wear personal protective equipment (nitrile gloves, safety glasses and laboratory coat) when handling stench chemicals.
- b. All work and handling must be conducted in a fume hood with the sash as closed as possible.
- c. Avoid touching any handles, valves, or surfaces unnecessarily once handling a stench chemical bottle.
- d. Use the minimum amount of stench chemicals.
- e. Avoid pouring solutions of stench compounds.
 - i. Perform liquid transfers by using a syringe or cannula.
 - ii. Pipettes can be used but stench chemical vapours will permeate into rubber pipette bulbs and those must be decontaminated and discarded.
- f. Where possible, use Schlenk techniques and a Schlenk line.
- g. If Schlenk methods are not accessible, use a bleach trap (Figure 1).
 - i. A bleach trap is useful with thiols, sulfides, phosphines, and disulfides because they are oxidized to less malodorous products before venting to the environment
 - ii. Note: do not use this method if stench chemical is pyrophoric (use Schlenk techniques)
 - iii. Use a two-neck round bottom flask for reaction mixture where one neck inert gas (nitrogen or argon) flows into and the second neck is where the vapours vent out into the trap.
 - Optional: A three-neck round bottom flask can be used instead where one neck is for only inert gas flow, one neck is only for reagent and one neck is for vent to the trap
 - iv. A series of three Büchner funnels are connected for vapours to vent.
 - v. The first Büchner is an empty vent to prevent back flow
 - vi. The second Büchner is contains a bleach solution (approx. 5%) to oxidize stench vapours.
 - vii. The third Büchner contains a basic solution (sodium or potassium hydroxide) to quench hydrochloric acid (HCl) generated in the oxidation reaction between bleach and stench vapours.
 - viii. Use gas dispersion tubes for the bleach and base Büchner funnels for most efficient trapping.
 - ix. Cooling of traps (with ice baths) may be necessary for large scale reactions because the oxidation reaction between bleach and stench vapours is exothermic.
- h. When handling stench chemicals in a glove box, ensure any materials that have been in contact with a stench chemical are placed in a sealed container or sealable bag before taking out of the glove box to minimize smell during transport to a fume hood for final clean up.
- i. Do not use a rotary evaporator to concentrate reaction solutions. Use vacuum with a cold trap.

2. Storage

- a. When stench chemicals are provided by manufacturers in ampules, crack open the ampule in the fume hood and transfer the contents with a syringe into a Schlenk bomb for long term storage (degas Schlenk bomb).

- i. If stench chemical is air sensitive, perform this step a glove box and purge the glove box atmosphere.
- b. Ensure caps of stench chemical bottles are tight.
- c. Use Teflon or Parafilm tape to seal caps of stench chemical bottles.
- d. When storing in a non-ventilated cabinet (such as a flammable cabinet), use a secondary container to store stench chemical bottles, examples include
 - i. a wide mouth air tight container or
 - ii. a dedicated plastic desiccator devoted to stench chemical storage
- e. When using a secondary container for storage, ensure to only open the secondary container in a well ventilated workspace such as a fume hood

3. Spills

- a. Follow OHSE's [general spill response](#) instructions
- b. Do not attempt to clean up any spill if not trained. Seek assistance or call Campus Security (250-721-7599).
- c. Specific steps for small spills of stench chemicals:
 - i. Don personal protective equipment neoprene gloves, safety glasses, lab coat and closed toe shoes.
 - ii. Confine spill to small area with absorbent pads.
 - iii. Collect and double bag all materials.
 - iv. Clean surfaces with a solution of 3% hydrogen peroxide (H₂O₂) and sodium bicarbonate (NaHCO₃) to oxidize residual stench chemicals.
 - Do not use bleach to oxidize spills of stench chemicals to prevent hydrochloric acid by-product.
 - v. Wipe surfaces with absorbent pads.
 - vi. Collect and bag all materials.
 - vii. Label all bags with "stench contaminated waste" and dispose through hazardous waste system
 - viii. If waste bags have a stench, store in a fume hood until day of waste pick up.
 - Use a hazardous waste 20 L pail if waste bags still smell on day of pick up.
- d. Specific steps for large spills of stench chemicals:
 - i. Secure the area and warn others.
 - ii. Immediately evacuate the area.
 - iii. Post "do not enter" signs on the doors of the lab.
 - iv. Contact Campus Security at 250-721-7599.
- e. Complete a [Department Incident & Hazard Report Form](#) to document and review the spill incident.

4. Decontamination

- a. Use a bleach bath to clean all reusable (e.g. glassware) or disposable (e.g. syringe and needles) labware.
- b. Submerge and soak all labware for at least 24 h.

- c. Clean all labware after bleach soak as per regular cleaning methods.
- d. Dispose all bleach cleaned disposable material in appropriate containers.

5. First Aid and Emergencies

- a. Call 911 to summon an ambulance if there is a medical emergency.
- b. Call Campus Security at 250-721-7599 for first aid.
- c. If material has contacted the eyes, use emergency eyewash and flush for at least 15-20 minutes.
- d. For skin contact, flush affected area with running water for at least 15-20 minutes.

6. Waste Disposal

- a. Any reaction mixtures or solvent from cold traps must be collected in a separate waste bottle and disposed as hazardous waste.
- b. Do not dispose any solvents or liquids that have a stench into the non-halogenated or halogenated waste containers normally used for organic liquid waste.
- c. Dispose all solid chemical waste that has a stench in a separate container from other solid waste. Use Teflon or Parafilm tape to seal the container lid
- d. Collect bleach bath, bleach trap and base trap solutions into containers for hazardous waste disposal.
- e. Use a secondary container for any hazardous waste bottle that still releases a malodorous stench. Store in the fumehood until hazardous waste pick-up day.
- f. Affix green hazardous waste stickers on all containers that contain stench or stench quenched chemicals.
- g. Submit an online request for hazardous waste pick up.

7. Lab SWP

In addition to this general SWP, each lab that is using stench chemicals requires a Lab SWP that includes specific procedures for:

REFERENCES

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