

UNIVERSITY OF VICTORIA
Occupational Health, Safety and Environment

Chemical Safety – Special Hazards

Safe Work Procedure (SWP – 005)
Cyanides

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

Jody Spence
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.*



PURPOSE

To provide guidance and instruction of the safe use in laboratories of cyanide salts. 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 cyanide salts, where potassium cyanide (KCN) and sodium cyanide (NaCN) are the most common form. Other forms of cyanide salts found at UVic include copper cyanide or zinc cyanide and the general use and handling is similar. First aid emergency response is also covered because cyanide is a poison and requires immediate response upon exposure.

TRAINING

The following training is required to be completed prior to working with cyanide salts:

- [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, 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.

Only trained medical professionals are responsible to administer cyanide antidotes to exposed victims. Certain antidotes if not administered properly, such as the commonly known combination of amyl nitrite, silver nitrate and sodium thiosulfate, has a high potential for adverse medical conditions to the victim.

MATERIALS

Waste containers for solid or solution waste dedicated to cyanides are labeled with "cyanide contaminated waste" to ensure no other incompatible materials (in particular acids or oxidizers) is added and release hydrogen cyanide gas. Waste bags labeled as "cyanide contaminated waste" to collect all contaminated material (e.g. gloves, weigh boats/paper etc) used to handle cyanides. If needles or sharps must be used, sharps container specifically for cyanides will be in the fume hood vicinity for safe sharps disposal.

HAZARD

Potassium and sodium cyanides are corrosive and poisonous. The greatest hazard is formation of hydrogen cyanide (HCN) gas when the cyanide salts contact solutions with pH < 9.5 (water or acids). Hydrogen cyanide is a toxic and flammable gas. In the body, cyanide inhibits the enzyme cytochrome C oxidase in aerobic respiration resulting in tissue death. Before you work with cyanides, you should consider less hazardous alternatives to achieve the desired goal.

PROCEDURE

1. Handling

- a. Never work alone with cyanides.
- b. Always wear personal protective equipment (nitrile gloves, safety glasses and laboratory coat) when handling cyanides.
- c. Handle only in a fume hood.
- d. Ensure no acids are present in the fume hood while handling.
- e. Avoid heating cyanide salt to decomposition (HCN gas will be released).
- f. Avoid (or at least minimize) use of needles/sharps.

2. Storage

- a. Keep container tightly closed in a dry and well-ventilated place
- b. Never allow containers to get in contact with water during storage.
- c. Do not store near acids

3. Spills

- a. Follow OHSE's [general spill response instructions](#).
- b. Do not attempt to clean up any spill if not trained or comfortable.
- c. Specific steps for small cyanide spills in the fume hood
 - i. Solution:
 - Confine spill to small area with absorbent pads.
 - Clean surfaces with a pH 10 buffer solution.
 - Wipe surfaces with absorbent pads.
 - Clean surfaces with a dilute (~10%) bleach solution.
 - Collect all materials and label all containers or bags used in the clean-up for disposal through the hazardous waste system indicating the material is "cyanide contaminated waste".
 - Keep the waste containers or bags in a fume hood until hazardous waste pick-up day.
 - ii. Solid:
 - Cover gently solid spills with paper towels or absorbent pads.
 - Wet the covering with pH 10 buffer solution to prevent raising dust.
 - Wipe up the wetted towels or pads.
 - Clean surfaces with a pH 10 buffer solution.
 - Wipe surfaces with absorbent pads.
 - Clean surfaces with a dilute (~10%) bleach solution.
 - Collect all materials and label all containers or bags used in the clean-up for disposal through the hazardous waste system indicating the material is "cyanide contaminated waste".

- Keep the waste containers or bags in a fume hood until hazardous waste pick-up day.
- d. Specific steps for large cyanide spills in the fume hood or any spill outside the fume hood
 - 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 & Investigation Report](#) to document and review the spill incident.

4. Decontamination

- a. Rinse all glassware or equipment that came in contact with cyanides in the fume hood with a pH 10 buffer solution.
- b. Collect the buffer rinse and add to the cyanide waste container.
- c. Rinse the glassware or equipment with a dilute (~10%) bleach solution.
- d. Collect the dilute bleach rinse and add to the cyanide waste container.
- e. Rinse glassware or equipment with copious amounts of soap and water in the sink.

5. First Aid and Emergencies

- a. Speed is essential when exposure occurs.
- b. Protect yourself first and foremost. Call for help rather than entering a contaminated zone.
- c. Call 911 to summon an ambulance.
- d. Call Campus Security at 250-721-7599 for first aid.
- e. Skin contact:
 - i. Cyanide dust can be absorbed through the skin if the dust is dissolved in sweat or other moisture.
 - ii. Use the emergency shower immediately to flush skin with plenty of water for at least 15 minutes.
 - iii. Remove contaminated clothing.
 - iv. Seek medical aid immediately.
- f. Eye exposure:
 - i. Use the eye wash station immediately.
 - ii. Flush eyes with plenty of water for 15 minutes.
- g. Sharp/needle puncture:
 - i. Scrub exposed area thoroughly for 15 minutes using warm water and soap
- h. Ingestion:
 - i. Do not induce vomiting.
 - ii. Seek medical aid immediately.
- i. Inhalation:
 - i. Without contaminating or endangering yourself, move the individual out of contaminated area to fresh air while awaiting emergency responders.
 - ii. Do not give mouth-to-mouth or mouth-to-nose resuscitation, as this may cause cyanide exposure to the rescuer.
 - iii. Seek medical aid immediately.

6. Waste Disposal

- a. Materials (e.g. gloves, weigh boats, etc.) used for handling and working with cyanides must be disposed of as hazardous waste in a designated container or bag labeled "cyanide contaminated waste".
- b. Contaminated cyanides solutions are collected in appropriate user supplied containers labeled as "cyanide contaminated waste".
- c. Affix a green hazardous waste sticker on the containers or bags.
- d. Submit an online request for hazardous waste pick-up from OHSE.
- e. Store the hazardous waste containers/bags in a fume hood until hazardous waste pick-up day.

7. Lab SWP

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

- a. The type of cyanide salt used.
- b. Personal protective equipment to wear.
- c. How to decontaminate any surfaces or reusable labware.
- d. The clear delineation of fume hood work space with a sign stating "Cyanide, No acids"
- e. Spill containment and response.
- f. Emergency first aid response.

REFERENCES

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