Lab Fact Sheet: Cyanide

Cyanide Antidote Program

1) Laboratories that use compounds that contain or may generate cyanide should obtain a Cyanide Antidote if there is a risk of exposure to a hazardous concentration of a cyanide-containing compound.

2) How to obtain the Cyanide Antidote

- The lab or individual must obtain a prescription by calling University Health Services: at Smith Campus Center 617-495-8414 (Cambridge/Allston) or Vanderbilt Hall 617-432-1370 (Longwood). The physician will write a prescription for the Cyanide Antidote (i.e., amyl nitrate vapules). The lab must provide a University billing code.
- University Health Services will obtain the Cyanide Antidote.
- When the Cyanide Antidote arrives at UHS, the researcher(s) should make an appointment with the physician at UHS to review its use.

3) General Recommendations for Working with Cyanides in the Laboratory

- Use a safer alternative, if feasible.
- Thoroughly review and understand the specific cyanide compound at ChemWatch Safety Data Sheet Database, ChemInfo Sheet, or equivalent chemical hazard information site before beginning work.
- Purchase the smallest feasible quantity of cyanide.
- Store cyanide in a secured area, separated from all acids, nitrites, nitrates, water, steam, heat, chlorates, and strong bases. Store cyanide in a sealable, secondary container (ideally polypropylene). Always remove cyanide from its secondary container in a chemical fume hood in order to safely vent any accumulated vapor.

4) Training

NOTE: Upon request, the EH&S Department will assist the lab in providing cyanide-specific lab safety training for persons that are at risk for exposure to cyanide.

- Each employee working in a lab that handles cyanide (or procedures that generate cyanide) must receive lab-specific instruction on the dangers of cyanides and be trained on:
  - Exposure routes and the associated acute and long-term adverse health effects: including oral, skin absorption and inhalation.
  - Signs and Symptoms
    - Irritation of the mucous membranes in the eyes, nose, and throat may indicate exposures.
    - Early or Mild Cyanide poisoning may be indicated by general weakness, heaviness of the arms and legs; difficulty breathing; headache; giddiness; nausea; vomiting; irritation of the nose, mouth, and throat.
    - Severe Cyanide Poisoning may be indicated by nausea, cyanosis; gasping for breath; unconsciousness or convulsions.

Note: Individuals with preexisting diseases of the central nervous system may have increased susceptibility to the toxicity of excessive exposures.
Prevention of exposure (proper lab protocol, use of laboratory apparatus and chemical fume hood, personal protective equipment)

Evacuation procedures

Medical response procedures for a suspected cyanide exposure (The UHS physician will review with the researcher(s) the indications of when and how to use the Cyanide Antidote.)

Buddy System requirements for work with cyanide. Co-researchers (buddies) should be able to recognize cyanide exposure and poisoning in others; carry out rescue or emergency procedures, including use of the Cyanide Antidote.

- Notify EH&S (Cambridge 617-496-3797, Longwood 617-432-1720) and provide the location (building and room number) where you will be performing the cyanide procedure. In addition, contact EH&S when your lab stops using cyanide.
- For Boston labs, EH&S will notify Boston Emergency Medical Services (dyer@bostonems.org and brinfield@bostonems.org, or 617-343-1125) so they can generate a "Premise Warning." (The EMS Premise Warning will prompt EMS to dispatch an antidote-kit-trained Advanced Life Support unit in the event of an emergency involving cyanide).
- Cyanide-containing waste must be collected in closed containers in a Hazardous Waste Satellite Accumulation Area with a Hazardous Waste tag. Check the "Toxic" box and any other hazards associated with the waste stream. Treat the empty container as hazardous waste.

5) Acknowledgement Signatures

- If non-specific symptoms occur while working with cyanide and exposure is not suspected, an emergency consultation can be obtained at University Health Services: either Vanderbilt Hall at 275 Longwood Avenue (Longwood Mon-Fri 9 am – 5 pm) or Smith Campus Center at 75 Mt. Auburn Street (Cambridge/Allston and Longwood after hours).
- Cyanide Antidote (amyl nitrate) will be returned to either of these University Health Services locations when no longer needed.

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References: Clinical Toxicology Review, Cyanide and Azide, Vol. 21, No. 12, Poisindex Managements for Cyanide.

Note: [http://www.inchem.org/documents/antidote/antidote/anto2.htm](http://www.inchem.org/documents/antidote/antidote/anto2.htm) provides a comprehensive evaluation of cyanide toxicity, symptoms, and antidotes.
Cyanide Work Sheet and Emergency Procedures

Maintain immediate access to this information during work involving cyanide.

• Do not work alone on procedures involving cyanide, or reactions that generate cyanide. A second person ("buddy") must be available to implement emergency response procedures. Notify others in the immediate area when you are working with cyanide.

• Review the Cyanide Antidote instructions and these procedures with your buddy and ensure that s/he is with you for the duration of the procedure that may generate cyanide.

• The Cyanide Antidote and these procedures should be conveniently placed near the cyanide work area and should be immediately accessible at all cyanide work times. At other times, it should be secured against tampering or theft.

• Wear eye protection, full lab coat, and clothing that cover your legs and feet, and gloves that are resistant to cyanide breakthrough. Check your glove manufacturer's chemical permeability chart. Consider double gloving. Perform all work in a properly functioning chemical fume hood that is free from clutter.

If an exposure occurs by inhalation or ingestion:

• Exit the area to a safe distance with fresh air immediately. Take the Cyanide Antidote and these instructions with you. (Note: if you do not leave the potential cyanide release area, Emergency Medical Services (EMS) ambulance personnel cannot enter a potentially-contaminated area. In addition, waiting for the Fire Department HazMat Unit to respond may result in significant delay in first aid treatment.)

• The person who calls for emergency medical treatment (9-911, then 2-1212) must be clear about symptoms. For example:
  • Is there a confirmed or suspected exposure?
  • Is there clear evidence that a cyanide exposure actually occurred (e.g., cyanide splash, multiple people affected)
  • Is the person exhibiting breathing difficulty or chest pains or not?
  • Has the person improved upon leaving the area?
  • What are the specific symptoms?
  • What is the route of exposure?

• Clean all spilled materials from the person’s body. Wear gloves to protect yourself from contact. Protect yourself. Do not enter a contaminated zone.

• Monitor the person for respiratory distress such as cough or difficult breathing, loss of consciousness.

• Antidotes should be used only in significant symptomatic patients (i.e., impaired consciousness, convulsions, acidosis, or unstable vital signs). Unnecessary inhalation of amyl nitrate prevents proper oxygenation of the patient’s blood and can cause significant hypotension.

• If the victim has difficulty breathing, is becoming confused and/or is losing consciousness, administer amyl nitrite. Follow the Cyanide Antidote instructions that you have rehearsed.

• Send a bystander to meet EMS at the ground floor so they will find you promptly.

• When EMS arrives, notify them what actions have been taken so they can continue with proper first aid administration.

¹"Poisindex Managements- Cyanide", provided by Poison Control Center (1-800-682-9211)