

I. Associated Risks

Cyanides are the salts of hydrocyanic acid and are among the most poisonous substances known. Sodium and potassium cyanides are salts, often used in solution with water. The most dangerous cyanides are used as gases and include hydrogen cyanide and cyanogen. Hydrocyanic acid gas is liberated from solid cyanides by the actions of acids, water or even water vapor. The characteristic "bitter almond" smell associated with cyanides can not be detected by 20% of all people.

Poisoning may occur by gas, dust, or absorption through skin or mucous membranes (eyes, nose, lips) of dissolved solids or gases.

Symptoms:

- C Mild to moderate poisoning symptoms include headache, dizziness, unsteadiness of gait and a feeling of suffocation and nausea. As poisoning progresses there may be difficult breathing.
- C Severe poisoning symptoms include loss of consciousness, cessation of breathing, convulsions and death. Death is usually due to failure to breathe and may be extremely rapid.
- C A lethal dose of cyanide salt is only 0.2g for an adult. Aqueous HCN is twice as toxic. Alarming symptoms occur at much lower doses.

II. Risk Management

- C Cyanide compounds will be kept in a locked container.
- C All projects involving cyanide will be reviewed with the supervisor.
- C Working alone in the lab, or outside standard university working hours, is prohibited.
- C Without prior approval from the Department of Environmental Health and Safety, use of cyanide gas is prohibited.
- C Personal protective clothing is required.
- C Sufficient ventilation is required.
- C Work areas must be clearly identified.
- C A cyanide antidote kit, oxygen resuscitator and mask will be available and kept in immediate proximity to the work area. Contact Occupational Health Services for purchasing assistance.
- C Great care must be taken to ensure cyanide salts do not come in contact with acid, which liberates highly toxic hydrogen cyanide gas.
- C All experiments involving cyanide must be identified.

III. Operator Instructions

Training

- C All users will be WHMIS trained.
- C The MSDS for the cyanide compound in use will be reviewed.
- C The SOP will be reviewed. A signed copy will be inserted into your laboratory notebook.

STANDARD OPERATING PROCEDURE

FOR CYANIDE IN LABORATORY Room 419/429

Plant Ag SOP #	2002-5
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Use

- C Cyanides are used in a large number of chemical assays. However, if at all possible, processes should be altered to eliminate the need for cyanide.
- C If unavoidable, the use of any cyanide compound in the lab must be kept to an absolute minimum. The experimental procedure must be evaluated and all attempts made to minimize the extent of use, the production of cyanide gas byproducts, and the generation of hazardous wastes. If there is any possibility of a cyanide gas being generated, the process must be evaluated by the Department of Environmental Health and Safety.
- C Use of gaseous cyanide must be pre-approved by the Department of Environmental Health and Safety.
- C Before any experiment even begins, you must ensure that an emergency antidote kit is available in the lab, and that staff trained in its use are notified and available at all times that cyanide will be in use.
- C All persons working in the area should fully understand the hazards involved and be aware of the symptoms of cyanide poisoning.
- C Attention to personal hygiene is essential. Lab coats, face shields (protecting eyes, nose and mouth from splashes), impermeable gloves (such as PVC) and closed-toed shoes are mandatory. After use, gloves must be disposed of as hazardous waste. Do not touch equipment, doorknobs, phones, keyboards, etc.
- C Experiments must be carried out near emergency showers and eye wash facilities.
- C As per standard lab protocol, cyanide solutions must never be pipetted by mouth.
- C All materials in contact with cyanide will be treated as hazardous waste. Empty cyanide containers will also be treated as hazardous waste.

Emergency First Aid:

It is most important that all first aid measures be carried out with the utmost speed. First aid procedures for cyanide poisoning are as follows:

- C Send for medical assistance immediately - X2000
- C Call a person trained in first aid
- C If safe to do so, remove the patient to fresh air.
- C If pulse is absent, start CPR. Use an oxygen resuscitator and facemask for any artificial respiration - do not use mouth-to-mouth or nose because of the danger of poisoning to the rescuer.
- C If patient is conscious, and cyanide has been swallowed, induce vomiting.
- C Make the patient warm and prohibit walking about.
- C If trained to do so, administer the antidote.
- C Arrange for the urgent transfer of the patient and the antidote kit to the hospital.

Spills or leaks

For unconfined spills of liquid cyanide, evacuate the area closing doors as you leave, and call X2000 for assistance.

Despite the extreme toxicity and speed of action of cyanides, chemical work can be done in complete safety provided the numerous ways toxic exposure can occur are appreciated and circumvented by RIGID adherence to all safety protocols.