

# CYANIDE

## STANDARD OPERATING PROCEDURE

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### Section 1: Purpose

This document describes the standard operating procedures for utilizing cyanide-containing compounds. Specifically, the document aims to establish consistent operational procedures with the principal goal being safety.

### Section 2: Physical and Health Hazards

Cyanide is usually a white crystalline solid or powder. It often has a smell like bitter almonds, but, due to a variations in genetics, not everyone can smell it.

- Cyanide is a highly toxic chemical compound and deadly human poison by ingestion which requires immediate medical attention in the event of cyanide poisoning
- It also presents toxicity by skin absorption through open wounds and by inhalation of dust.
- This substance inhibits cellular respiration which leads to anoxia. Blue discoloration of the skin (cyanosis) tends to be associated with severe cyanide poisoning, but in most cases, cyanide poisoning causes a deceptively healthy pink to red skin color.
- Probable oral lethal dose in human is less than 5 mg/kg or a taste (less than 7 drops) for a 70 kg (150 lbs) person – It is **VERY TOXIC**

### Section 3: Occupational Exposure Hazard

- When inhaled, cyanide-containing compounds cause harmful corrosive effect to the respiratory tract. It may cause headache, weakness, or labored breathing nausea, and vomiting, which can be followed by weak and irregular heart beat, unconsciousness, convulsions and death.
- When ingested, it is highly poisonous! It is corrosive to the gastro-intestinal tract with burning. Larger doses may produce sudden loss of consciousness and prompt death from respiratory arrest. Smaller but still lethal doses may prolong the illness for one or more hours
- Skin contact with solution may cause severe pain and skin burns and even deep ulcers. Symptoms from the skin exposure are similar to those noted for inhalation
- Prolonged or repeated chronic skin exposure may cause a “cyanide” rash and nasal sores

## Section 4: Safe Work Methods

### Engineering Control

- Perform all work with cyanide in a chemical fume hood to avoid inhalation exposure
- Perform a dry run of your process to work out any potential pitfalls
- Use a sharp protective device when injecting the agent to lab animals or Equipment

### Personal Protective Equipment

- Wear Lab coat, safety glasses, or splash goggles, and nitrile gloves.
- Always wear full-length pants and closed-toe shoes.
- Always double-check your PPE before each use and leave all personal protective clothing in the lab when you leave work areas to prevent a cross contamination.

### Good Work Practices

- Restrict access to the work area
- Keep container sizes and quantities in the work area as small as possible
- Line work surfaces with removable absorbent paper
- Keep the Ph of the solution neutral or slightly alkaline to avoid creating HCN gas.

## Section 5: Exposure and First Aid

- In case of cyanide poisoning from ingestion and inhalation, start first aid treatment immediately, then get medical attention.
- A cyanide antidote kit (amyl nitrite) should be on site.
- Allow victim to inhale amyl nitrite for 15-30 seconds per minute. A new amyl nitrite ampule should be used every 3 minutes.
- If fully conscious, give oxygen. If unconscious or not fully conscious, give amyl nitrite and oxygen immediately. If not breathing, give amyl nitrate and oxygen immediately
- For skin or eye contact, immediately flush skin or eyes with plenty of water at least 15 minutes.

## Section 6: Waste Disposal

Cyanides must be detoxified to harmless waste before disposal.

- Treat the waste with alkaline sodium hypochlorite (<1g/L) in excess.
- Authorized person using this material is responsible for safe removal of contaminated waste, documentation preparation, use of proper waste container, and contact EHS for pick-up.
- Waste shall be removed and disposed in accordance with the Institute's EHS hazardous waste procedures.

## Section 7: Clean-up for Accidental Spills

- Ventilate closed spaces before entering
- Do not touch spilled material, stop leak if possible but do so without risk
- Sweep up and shovel cyanide into a covered container or plastic bag for later disposal
- DO NOT put water directly on leak or spilled cyanide as poisonous HCN gases will be released
- After cleanup, flush spill area with a dilute solution of sodium or calcium hypochlorite (household bleach).
- Place absorbent pad or vermiculate on spilled liquid material
- The contaminated and disposable materials and spill clean-up materials should be contained in a bag with label. Place them in a secured area and contact EHS for pick-up