

## Readiness Review

All Ames Laboratory activities must be approved by the Safety Review Committee via the READINESS REVIEW procedure prior to the work being conducted. Ask your supervisor if you have any questions about the Readiness Review for your activity, and make sure you are approved to proceed.

The Iowa State University Laboratory Safety Manual serves as the Chemical Hygiene Plan for the Laboratory.

## Hazards of Cyanide Compounds

Potassium and sodium cyanide are highly toxic compounds that may be ingested or absorbed through the skin. In reaction with acid or water, they will produce hydrogen cyanide gas, a deadly poison.

### HEALTH HAZARDS

Acute toxicity is high; ingestion of NaCN or KCN or exposure to their salts or their aqueous solutions by eye or skin contact can be fatal; exposure to as little as 50-150 milligrams can cause immediate collapse and death.

- **SYMPTOMS** of nonlethal exposure to cyanide include weakness, headache, dizziness, rapid breathing, restlessness, nausea, and vomiting.
  - Cyanide salts are corrosive and toxic.
  - Decomposition products of HCN and nitrogen oxides are extremely hazardous.
  - LD50 (Lethal Dose for 50% of test subjects) is: KCN, 8.5mg/kg, oral – rat; NaCN, 6.4 mg/kg, oral – rat

### REACTIVITY HAZARDS

Violent reactions or explosions may occur in combination with strong oxidizers such as acids or acid salts, chlorates, nitrates and nitrites. Reactions may produce HCN gas, a highly flammable, deadly poison.

### Storage/Disposal

- Store separately from incompatible chemicals, especially acids and oxidizers.
- Store in a secure, cool and dry location.

### Personal Protection Equipment

- Eye Protection: Splash-proof safety goggles.
- Gloves: Nitrile, latex, neoprene
- Ventilation: Use in a hood with at least 100 fpm face velocity.
- Respirator: Contact ESH&A.
- Clothing: Lab coat and impervious apron if significant dermal exposure potential exists.

### Handling Precautions

- Conduct all work in an operational laboratory ventilation hood.
- A dry chemical fire extinguisher should be available. CO2 extinguishers should not be used.
- Avoid heating any cyanide salt to decomposition, as it will release HYDROGEN CYANIDE gas. Hydrogen cyanide is a toxic and flammable gas.
- Do not work alone.

- Decontaminate work area before leaving for the day. Wash surfaces using a pH 10 buffer solution and rinse with dilute bleach.

### Avoid mixing cyanide salts with the following compounds:

- Acids, will release HCN
- Chlorates, potential explosive
- Nitrates and Nitrites, which are potentially explosive
- Oxidizers have the potential for explosion

### First Aid

- If exposure is due to the release of hydrogen cyanide (HCN), immediately leave the area and call 911 for assistance.
- If skin contact has been made by cyanide-bearing compounds, immediately flush skin with water for 15 minutes.
- Notify your supervisor, ESH&A and/or Occupational Medicine if an exposure has occurred.

### Spill Remediation

- Personal protective equipment (PPE) requirements for spill response may be greater than those for routine handling. Evacuate to a safe location and call for help if adequate PPE is not available.
- Get assistance with large spills by calling 911 or the ESH&A office (294-2153).
- Spills of cyanide salts should be treated very cautiously. **DO NOT ALLOW SPILLED MATERIAL TO COME INTO CONTACT WITH YOUR SKIN.**

- Absorb small liquid spills onto an inert material.
- Dry spills can be shoveled into a secure container for later disposal.
- After a spill has occurred, ventilate any closed areas before re-entry.
- Segregate cyanide waste solutions and collect inside the hood. Gloves and other potentially contaminated material should also be collected as hazardous waste.
- Contact ESH&A, 4-2153, for assistance in spill remediation and disposal of hazardous spill products.
- Notify your supervisor of any spill that has occurred.

## Physical Properties

Both potassium and sodium cyanide

Appearance: Colorless to white granules with a faint odor of bitter almonds.

Solubility: Deliquescent solid. Soluble in glycerol and water, slightly soluble in methanol.

### Potassium Cyanide

Formula: KCN  
CAS#: 151-50-8  
Molecular Weight 65.11

### Sodium Cyanide

Formula: NaCN  
CAS#: 143-33-9  
Molecular Weight: 49.01

## Regulatory Information

### Shipping Description:

UN 1689, Sodium Cyanide, Solid, 6.1, PGI  
RCRA: P106

UN 1680, Potassium Cyanide, Solid, 6.1, PGI  
RCRA: PO98

OSHA PEL (as CN): TWA 5 mg/m<sup>3</sup>, skin  
IDLH(As CN): 25 mg/m<sup>3</sup> (NIOSH, 2003)

**NOTE: This information is not intended to replace the Safety Data Sheet (SDS). Always have access to a current, vendor-specific SDS in your lab for each chemical.**

## References

<http://cameochemicals.noaa.gov>

**Health Care and First Aid** in Hazards In The Chemical Laboratory, 4th ed., Bretherick, I., Ed., Royal Society of Chemistry, London, England, 1986, p. 132-4.

**Handling And Use Of Chemicals** in CRC Handbook of Laboratory Safety, 3rd., ed., Furr, A.K., Ed., CRC Press, **Boca Raton, FL, 1990, p. 299-302.**

Prudent Practices for Handling Hazardous Chemicals In Laboratories, National Academy Press, Washington, D.C., 1995, p. 394-395.

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Environment, Safety, Health & Assurance  
G40 TASF – 294-2153

# Cyanide Compounds

## Safe Handling Precautions for Sodium and Potassium Cyanide

Ames Laboratory users of cyanide compounds must complete activity-specific training prior to work. See your supervisor or ESH&A with any questions.

