# Chemical hazard assessment for sodium cyanide

Table F-6

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| **Laboratory Chemical Hazard Assessment and Overview** | | | | | | | | | | | | | |
| **Laboratory Director / Principal Investigator:**  **Location:**  **Chemical Name:** Sodium Cyanide (NaCN) **Trade name/Synonyms:** Hydrocyanic acid, sodium salt; Cyanogram:  **Description:** | | | | | | | | | | | | | |
| **High Hazard Substance (HHS) Checklist** | | | | | | | | | | | | | |
| **High Hazard Classification:** | | ⌧ High Acute Toxicity | | | | | | 🞎 Carcinogen | | | 🞎 Reproductive Toxin | | |
|  | | 🞎 Air Reactive / Pyrophoric | | | | | | 🞎 Water Reactive | | | 🞎 Explosive / Unstable | | |
| **Physical state/concentration**: Solid (powder) / ≥97.0 % | | | | | | | | | | | | | |
| **Maximum quantity kept on hand:** | | | | | | | | **Estimated rate of use (e.g., grams/month):** | | | | | |
| **Toxicity: LD50 Oral (Rat):** 4.8 mg/kg **LD50 Skin (Rabbit):** 10.4 mg/kg Other\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **OSHA HAZARD CLASSIFICATION:**  Target Organ Effect, Highly toxic by inhalation, Highly toxic by ingestion, Highly toxic by skin absorption  [**GHS CLASSIFICATION**](http://www.osha.gov/dsg/hazcom/ghs.html)**:** (http://www.osha.gov/dsg/hazcom/ghs.html)  H300: Acute toxicity, Oral (Category 1)  H310: Acute toxicity, Dermal (Category 1)  H330: Acute toxicity, Inhalation (Category 2)  H400: Acute aquatic toxicity (Category 1)  **GHS PICTOGRAM:**    **DANGER**: Acute Toxicity  **Reactivity and Incompatibility**: Incompatible with strong acids and strong oxidizers. Sodium cyanide easily dissociates to the free cyanide ion in the presence of acids, water or water vapor. Reacts with acids to liberate toxic and flammable hydrogen cyanide gas. Water or weak alkaline solutions can produce dangerous amounts of hydrogen cyanide in confined areas. Can react with carbon dioxide in ordinary air to form hydrogen cyanide gas. Hydrogen cyanide is a chemical asphyxiant and interferes with cellular uptake of oxygen. | | | | | | | | | | | | | |
| **Significant Route(s) of Exposure (check all that apply)** | | | | | | | | | | | | | |
| ⌧ Inhalation | ⌧ Skin contact | | | | 🞎 Percutaneous injection | | | | 🞎 Eye contact | | | ⌧ Ingestion | |
| **Additional Materials for Review (attached)** | | | | | | | | | | | | | |
| ⌧ Safety Data Sheet (SDS) 🞎 Laboratory/Experimental Protocol  ⌧ Other: Safe Weighing of Toxic Powders | | | | | | | | | | | | | |
| **Exposure Controls** | | | | | | | | | | | | | |
| **Ventilation/Isolation:** Personnel must work under/in the following equipment to minimize personal exposure**:** | | | | | | | | | | | | | |
| ⌧ Chemical hood | 🞎 Glove box/AtmosBag | | | | | | 🞎 BioSafety Cabinet 🞎 Balance Enclosure 🞎 Other (list): | | | | | | |
| If Glove box or AtmosBag, identify gas environment: | | | | | | | | | | | | | |
| **Personnel Protective Equipment (PPE)/Clothing**: Lab coats, close-toed shoes, clothing that covers the legs and gloves (disposable latex or nitrile) are the minimum PPE requirements for all personnel working in the lab. Identify additional PPE requirements for work with HHS: | | | | | | | | | | | | | |
| Protective clothing: | ⌧ Disposable lab coat | | | | | 🞎 Fire-resistant lab coat (e.g., Nomex) | | | | 🞎 Others (list): | | | |
| Face / Eyes: | 🞎 Face shield | | | ⌧ Safety goggles | | | | | | 🞎 Safety glasses | | | |
| Gloves (type): Nitrile (minimum layer thickness: 0.11 mm)  *Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove’s outer surface) to avoid skin contact with this product.* *After removal of gloves, wash hands thoroughly with soap and copious amounts of water.* | | | | | | | | | | 🞎 Respirator (type): | | | |
| **Use and Storage** | | | | | | | | | | | | | |
| **Authorized personnel:** Identify categories of laboratory personnel who could obtain approval to handle and use this HHS: | | | | | | | | | | | | | |
| ⌧ Principal Investigator | | ⌧ Employees/Staff | | | | | | 🞎 Students | | | 🞎 Volunteers | | |
| ⌧ Postdoctoral Employees | | 🞎 Other (describe): | | | | | |  | | |  | | |
| ⌧ Personnel must not work alone in the laboratory while handling this material | | | | | | | | | | | | | |
| **Procedure:** In additional to the institution’s chemical hygiene plan, identify what procedures/guidelines are available for the safe handling and use of this HHS. Check all that apply and list below. | | | | | | | | | | | | | |
| ⌧ Lab procedure(s) | | | 🞎 Journals: | | | | | 🞎 Manufacturers Guidelines | | | | | ⌧ Other: |
| List all procedures:   * Follow “*Safe Weighing of Toxic Powders*” procedures when weighing sodium cyanide powder. * All work MUST be done in a chemical fume hood that is operating properly. * Do not work alone when working with cyanides. * Keep container dry and avoid formation of dust and aerosols. When preparing solutions, add small volumes of dry sodium cyanide to large volumes of water (do not add small volumes of water to dry sodium cyanide. * Secure storage of solid sodium cyanide; in a dry well ventilated place. | | | | | | | | | | | | | |
| Vacuum system used? 🞎 Yes 🞎 No If yes, 🞎 Cold trap 🞎 Filter 🞎 other (list): | | | | | | | | | | | | | |
| Administered to animals? 🞎 Yes 🞎 No If yes, is a RARC Protection and Control from completed? 🞎 Yes 🞎 No | | | | | | | | | | | | | |
| **Use Location:** | | | | | | | | **Storage Location:** | | | | | |
| Bldg(s)/ Room(s): | | | | | | | | Bldg(s)/ Room(s): | | | | | |
| Identify location(s) where HHS is used (check all that apply):  🞎 Entire lab 🞎 Chemical hood 🞎 Designated area  🞎 Other (list): | | | | | | | | Identify location(s) where HHS is stored (check all that apply):  🞎 Refrigerator/freezer 🞎 Hood 🞎 Double containment 🞎 Vented cabinet 🞎 Flammable liquid storage cabinet 🞎 Other (list): | | | | | |
| **Hazard Communication and Signage:** Confirm hazards of HHS are communicated to laboratory personnel and visitors where HHS is stored and used.  ⌧ All containers are clearly labeled with the identity of the High Hazard Substance.  ⌧ Designated storage and use locations within laboratory have signage identifying the HHS hazards present in those locations. | | | | | | | | | | | | | |
| **Medical Attention and First-Aid** | | | | | | | | | | | | | |
| All laboratory personnel who work with hazardous chemicals have access to medical attention and first-aid, including follow-up examinations which the examining physician determines to be necessary. Laboratory personnel should seek medical attention when:   * signs or symptoms associated with a hazardous chemical exposure are experienced, or * exposure monitoring reveals an exposure level routinely above acceptable levels, or * a spill, leak, explosion or other event results in the likelihood of a hazardous exposure.   Emergency Medical Provider:  Location:  Contact Information: | | | | | | | | | | | | | |
| Are specific First-Aid supplies/procedures required (e.g., antitoxin) for work with this material? ( Yes ( No  If Yes, attach the specific procedures to be followed post exposure to this form.  Acute Effects:  In most cases, cyanide poisoning causes a deceptively healthy pink to red skin color. However, if a physical injury or lack of oxygen is involved, the skin color may be bluish. Reddening of the eyes and pupil dilation are symptoms of cyanide poisoning. Cyanosis (blue discoloration of the skin) tends to be associated with severe cyanide poisonings. Trained emergency response personnel should administer a standard cyanide antidote kit (small inhaled doses of amyl nitrite, followed by intravenous sodium nitrite, followed by intravenous sodium thiosulfate). Working with a significant quantity of sodium cyanide requires the presence of an antidote kit containing amyl nitrite ampoules. Actions to be taken in case of cyanide poisoning should be planned and practiced before beginning work with cyanides.  Inhalation: Corrosive to the respiratory tract. Sodium cyanide inhibits cellular respiration and may cause blood, central nervous system, and thyroid changes. May cause headache, weakness, dizziness, labored breathing nausea and vomiting, which can be followed by weak and irregular heartbeat, unconsciousness, convulsions, coma and death. Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic. Get medical attention immediately.  Ingestion: Corrosive to the gastrointestinal tract with burning in the mouth and esophagus, and abdominal pain. 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. Bitter almonds odor may be noted on the breath or vomitus. Other symptoms may be similar to those noted for inhalation exposure. If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.  Skin Contact: Corrosive. May cause severe pain and skin burns. Solutions are corrosive to the skin and eyes, and may cause deep ulcers which heal slowly. May be absorbed through the skin, with symptoms similar to those noted for inhalation. In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately.  Eye Contact: Corrosive. Symptoms may include redness, pain, blurred vision, and eye damage. Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.  Chronic Effects:  Prolonged or repeated skin exposure may cause a "cyanide" rash and nasal sores.  Cancer Hazard:  Unknown.  It is a mutagen and should be treated as a possible carcinogen.  FIRST AID PROCEDURES  1. Personal Protection By First Aid Personnel  First aid personnel providing first aid treatment to a patient exposed to sodium cyanide solid should observe  the following precautions for their own personal protection:  · Avoid contact with contaminated skin, clothing and equipment by wearing protective gloves;  · Wear chemical goggles as a minimum level of eye protection to prevent sodium cyanide dust entering eyes;  · Avoid inhalation of sodium cyanide dust during rescue in contaminate areas by wearing suitable respiratory protection;  · Respiratory protection suggested is: an air supplied breathing apparatus, or positive pressure self contained breathing apparatus.  2. Swallowed  Immediately:  · Remove the patient from the source of contamination to fresh air, if hydrogen cyanide gas (HCN) is present;  · If the patient is not breathing, do not use mouth to mouth, or mouth to nose ventilation, because of the danger to the rescuer, instead use a resuscitation bag and mask (Oxy-Viva);  · If pulse is absent, start external cardiac massage and follow standard Advanced Cardiovascular Life Support (ACLS) guidelines;  · Give 100% oxygen by mask (Oxy-Viva) if available;  · Remove all contaminated clothing and footwear into a sealable collection bag, launder  contaminated clothing thoroughly and wash the affected areas with soap and copious amounts of  water.  3. Eyes  Persons with potential eye exposure should not wear contact lenses.  Immediately irrigate eye with copious amounts of water, while holding eyelids open, for at least 15 minutes.  Seek medical assistance immediately.  4. Skin  Wash affected area with copious amounts of water for at least 15 minutes.  Remove contaminated clothing and launder before reuse.  Seek medical assistance following skin contact.  5. Inhalation  Proceed as for 2. Swallowed above. | | | | | | | | | | | | | |
| **Decontamination** | | | | | | | | | | | | | |
| Are special decontamination procedures required for this HHS? ⌧ Yes 🞎 No If Yes, provide information below:  Identify items that require decontamination:  ⌧ Work areas ⌧ Non-disposable equipment ⌧ Glassware ⌧ Disposable lab equipment and supplies | | | | | | | | | | | | | |
| 🞎 Other (list): | | | | | | | | | | | | | |
| Decontamination Method (describe): Decontaminate work space and equipment with 10% bleach solution. Avoid creating dust. Contaminated pipette tips, tubes, weighing trays, gloves, paper towel, napkins and any other clean up debris must be disposed of as hazardous waste. After removal of gloves, wash hands thoroughly with soap and copious amounts of water. | | | | | | | | | | | | | |
| **Emergency Procedures and Spill Response** | | | | | | | | | | | | | |
| Emergency Safety Equipment: In addition to an eyewash station, emergency shower and ABC fire extinguisher, are any other specialized emergency spill control or cleanup supplies required when working with this HHS? 🞎Yes ⌧ No  If yes, list all required supplies/equipment with locations:  Spill Response Procedures:  Remove everyone from the area. Close all doors leading to the lab and restrict access to the area. Call safety office immediately after at \_\_\_\_\_\_\_\_\_\_\_. | | | | | | | | | | | | | |
| **Waste Management and Disposal** | | | | | | | | | | | | | |
| **Identify waste management methods for all research and waste byproducts associated with this HSS:**  ⌧ Chemicals wastes are collected and disposed as EPA hazardous waste including chemically contaminated sharps.  🞎 Neutralization or deactivation in laboratory prior to disposal (describe method and requires EHS preapproval).  ⌧ HHS is EPA Acutely Toxic Chemical. Collect Sharps and used containers as Hazardous Waste.  🞎 Other disposal method (describe method and requires EHS preapproval).  Chemical Waste Storage Location: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | | | | | | | | | | | | |
| **Training** | | | | | | | | | | | | | |
| All laboratory personnel must at a minimum completed safety training on an annual basis. Additionally, laboratory personnel who handle or use the High Hazard Substance must demonstrate specific competency and familiarity regarding the safe handling and use of this HHS prior to purchase or use. The Principal Investigator is responsible for ensuring all laboratory personnel handling and using this HHS are trained in the following: | | | | | | | | | | | | | |
| ( Review of HHOP and associated documentation including Exposure Controls and PPE.  ( Review Safety Data Sheet including Signs and Symptoms of Exposure  ( Hands-on training with the Principal Investigator or other knowledgeable and experienced senior laboratory staff on the safe handling and use of the High Hazard Substances.  ( New personnel must work under close supervision of Principal Investigator or other knowledgeable and experienced senior laboratory staff.  ( Other (list): | | | | | | | | | | | | | |

This file is excerpted from “Identifying and Evaluating Hazards in Research Laboratories: Guidelines developed by the Hazard Identification and Evaluation Task Force of the American Chemical Society’s Committee on Chemical Safety”.

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