NATIONAL ACCELERATOR LABORATORY

ENVIRONMENT, SAFETY, HEALTH, AND QUALITY DIVISION

Potassium Cyanide Safe Handling Guideline

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URL: http://www-group.slac.stanford.edu/esh/eshmanual/references/chemsafetyGuidePotassiumCyanide.pdf

Synonyms

Potassium salt of hydrocyanic acid

Reactivity and Physical Concerns

Incompatible with acids; reaction will produce highly toxic hydrogen cyanide gas. Moisture may also release cyanide gas. In addition to toxicity, hydrogen cyanide is flammable. Potassium cyanide itself is not flammable but may explode if heated above 450° C with chlorates or nitrites. In case of a fire in the presence of cyanides, **do not use** carbon dioxide extinguishing agents. Reaction between cyanides, carbon dioxide and water (moisture) can liberate hydrogen cyanide. Use dry chemical extinguishers or copious amounts of water.

Exposure Hazards

Routes of Exposure

Inhalation, ingestion, skin contact, eye contact

May be fatal if swallowed, inhaled, or absorbed through skin. Contact with acids liberates poisonous hydrogen cyanide gas. Contact with mucous membranes or concentrated solutions may cause burns to skin, eyes, and respiratory tract. Affects blood, cardiovascular system, central nervous system, and thyroid.

Exposure may cause headache, weakness, dizziness, labored breathing nausea and vomiting, which can be followed by weak and irregular heartbeat, unconsciousness, convulsions, coma, and death. Ingestion may result in bitter almond odor that may noted on the breath or vomitus.

Chronic Exposure

Prolonged or repeated skin exposure may cause a rash and nasal sores.

First Aid

In case of cyanide poisoning, remove victim to a safe area and start first aid treatment immediately, then call 911. Trained emergency response personnel should administer a cyanide antidote kit (amyl nitrite, sodium nitrite and sodium thiosulfate). Actions to be taken in case of cyanide poisoning should be planned and practiced before beginning work with cyanides. Oxygen and amyl nitrite can be given by a first responder before medical help arrives. Allow victim to inhale amyl nitrite for 15-30 seconds per minute until sodium nitrite and sodium thiosulfate can be administered intravenously. A new amyl nitrite ampoule should be used every 3 minutes. If conscious but symptoms (nausea, difficult breathing, dizziness, etc.) are evident, give oxygen. If consciousness is impaired (non-responsiveness, slurred speech, confusion, drowsiness) or the patient is unconscious but breathing, give oxygen and amyl nitrite by means of a respirator. If not breathing, give oxygen and amyl nitrite immediately by means of a positive pressure respirator (artificial respiration).

In case of skin contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Contaminated articles of clothing should be treated

as hazardous waste. Obtain medical attention immediately. (See Chemical Safety: Accidental Exposure Requirements [SLAC-I-730-0A09S-041].)

Exposure Limits

- Permissible exposure limit: 5 mg/m^3 (OSHA TWA)
- NIOSH recommended exposure limit: 5 mg/m^3 (NIOSH ceiling limit)
- Immediately dangerous to life and health: 25 mg/m^3 (as CN)

Exposure Controls

Engineering Controls

Local exhaust ventilation is required. Secondary containment of all storage and use is required if an exposure risk to employees or the environment is present.

Administrative Controls

Procedures must be developed for all cyanide use applications and should be reviewed and approved by ESHQ. Depending upon quantities, certain regulatory permits and/or registrations may be required. Personnel working with the materials must receive detailed training on the hazards, safe use, and emergency procedures.

Personal Protective Equipment

Prevent skin/eye contact through the use of impervious gloves, clothing, boots, apron, and eye goggles or full face shield.

If the airborne exposure limit may be exceeded and engineering controls are not feasible, wear a supplied air, full-face-piece respirator, supplied airline respirator, or self-contained breathing apparatus (SCBA). This substance has poor warning properties.

Disposal

Material is regulated as hazardous waste. Contact the Waste Management Group for specific disposal requirements and procedures. Containers and other materials that are contaminated with cyanides must also be treated as hazardous waste.

Medical Monitoring (if applicable)

Workers using cyanide may need pre-placement and annual medical exams.

Emergency Response

In the event of a spill that poses a threat to health and/or the environment, immediately evacuate the area and call 911. Then call SLAC Site Security (ext. 5555 or 650-926-5555 from a cell phone) and notify your supervisor.

For other spills, notify your supervisor then SLAC Site Security; these may be cleaned up with appropriate spill response supplies by trained personnel who have been authorized via work planning and control. (See Spills: Response, Cleanup, and Reporting Procedure [SLAC-I-750-0A16C-006].)

Standards and Regulations

- OSHA. PEL: 29 CFR 1910.1000 Table Z-1; Respiratory Protection: 29 CFR 1910.134
- EPA. Release: 40 CFR 355.40; Waste: 40 CFR 261.21-261.24
- *California Fire Code*, Chapters 27 through 41 (24 CCR Part 9)

Other References

- EPA. *Technology Transfer Network Air Toxics Website*, "Cyanide Compounds", http://www.epa.gov/ttn/atw/hlthef/cyanide.html
- NIOSH. International Chemical Safety Card: Potassium Cyanide (ICSC 0671)
- NIOSH. *NIOSH Pocket Guide to Chemical Hazards* (NIOSH 2005-151), "Potassium Cyanide"