

## IDENTIFICATION

CAS 74-90-8

UN 1051

Synonyms include formic anammonide and formonitrile. Aqueous solutions are referred to as hydrocyanic acid and prussic acid.

Hydrogen cyanide is very volatile, producing potentially lethal concentrations at room temperature. At temperature below 78°F, hydrogen cyanide is colorless or pale blue liquid (hydrocyanic acid); at higher temperatures, it is a colorless gas. It has a faint bitter almond odor and a bitter burning taste. It is soluble in water. **Hydrogen cyanide is lighter than air.**

## PRECAUTIONS

- A. Persons whose clothing or skin is contaminated with cyanide containing solutions can secondarily contaminate personnel by direct contact or through off-gassing vapor.
  - 1. Avoid dermal contact with cyanide-contaminated victims and their bodily fluids.
  - 2. **Take special care with victims who may have ingested cyanide, as cyanide salts dissolve in the stomach and react with hydrochloric acid to produce hydrogen cyanide gas. Transport patients in vehicles with windows opened and/or good ventilation. These patients who meet *Death in the Field* criteria should be considered a Hot Zone.**
  - 3. Victims exposed only to hydrogen cyanide gas do not pose contamination risks to rescuers.
- B. Hydrogen cyanide is a volatile flammable liquid at room temperature; as a gas, it is flammable and potentially explosive.
- C. Hydrogen cyanide is absorbed well by inhalation and can produce death within minutes.
  - 1. Substantial absorption can occur through intact skin if vapor concentration is high.
  - 2. Exposure by any route may cause systemic effects.

## HEALTH EFFECTS

HCN is classified a systemic (chemical) asphyxiant. Cyanides interfere with the intracellular utilization of oxygen resulting in cellular dysfunction and cell death. Effects are most profound and first evidenced in the CNS and cardiovascular system. Initial symptoms may include CNS excitation and cardiovascular compensation followed by depression/collapse of both systems.

## ROUTES OF EXPOSURE

- A. Inhalation
  - 1. Hydrogen cyanide is readily absorbed from the lungs; symptoms of poisoning begin within seconds to minutes
  - 2. *The odor of cyanide does not provide adequate warning of hazardous concentrations. Perception of the odor is a genetic trait (20% to 40% of the general population cannot detect hydrogen cyanide); also rapid olfactory fatigue can occur.*
- B. Skin/Eye Contact: Exposure to hydrogen cyanide can cause skin and eye irritation and can contribute to systemic poisoning with delayed symptoms.
- C. Ingestion of hydrogen cyanide solutions or cyanide salts can be rapidly fatal

### **SIGNS AND SYMPTOMS**

- A. Signs and symptoms usually develop rapidly. Initial symptoms are nonspecific and include excitement, dizziness, n/v, HA and weakness.
- B. Progressive signs and symptoms may include: Drowsiness, tetanic spasm, convulsions, hallucinations and loss of consciousness.
- C. Cardiovascular – Can cause various life threatening dysrhythmias.
- D. Respiratory
  - 1. Victims may complain of shortness of breath and chest tightness
  - 2. Pulmonary findings may include rapid breathing and increased depth of respiration
  - 3. As poisoning progresses, respirations become slow and gasping; cyanosis may be present, and pulmonary edema may develop

### **RESCUER PROTECTION**

- A. Respiratory protection: Pressure demand self-contained breathing apparatus (SCBA) is recommended in response situations that involve exposure to potentially unsafe levels of hydrogen cyanide
- B. Skin protection: Chemical protective clothing is recommended because both hydrogen cyanide vapor and liquid can be absorbed through the skin to produce systemic toxicity.

### **DECONTAMINATION ZONE**

- A. Refer to Decontamination page.
- B. Transfer to Support Zone as soon as decontamination is complete.

### **SUPPORT ZONE**

- A. Be certain that victims have been decontaminated properly. Additional decontamination may be required for exposed skin and eyes.
- B. Decontaminated victims or those exposed only to vapor, pose no serious risks of secondary contamination to rescuers. In these cases, Support Zone personnel require no specialized protective gear.

### TREATMENT

Patients who rapidly regain consciousness and who have no other signs or symptoms may not require antidote treatment. Patients who remain comatose or develop shock should be treated promptly with the antidotes per OLMC direction. In cases of ingestion—**emesis and activated charcoal are contraindicated.**

- A. High flow **oxygen**, establish IV access, apply cardiac monitor and secure protected airway following Airway Management protocol.
- B. If Cyanide Toxicity is suspected based on findings (soot in mouth, nose or oropharynx, known exposure) and patient is comatose, in cardiac or respiratory arrest, or has persistent hypotension despite fluid resuscitation:
  1. Administer **Hydroxocobalamin (Cyanokit®) 5 g IV as an infusion** and monitor for clinical response. Contact OLMC for advice regarding a second 5 g dose.
  2. If Hydroxocobalamin (Cyanokit®) is not available, then administer **Sodium Thiosulfate 50 ml of 25% solution over 10-20 minutes.** Pediatric dose is 1.65 ml/kg
  3. Do NOT administer Hydroxocobalamin (Cyanokit®) and Sodium Thiosulfate to the same patient.
  4. Treat other presenting symptoms per appropriate protocol.
  5. Initiate emergent transport to appropriate facility.
  6. Patients in shock or having seizures should be treated according to existing protocols. These patients may be seriously acidotic; consider giving **sodium bicarbonate 50 mEq**, with OLMC direction.
- C. **MULTI-CASUALTY TRIAGE** - Patients who have only brief inhalation exposure and mild or transient symptoms may be discharged.