Section: ALS Hazardous Materials
Subject: ADULT CHEMICAL TREATMENT GUIDE 5A: RED
Section #: 346.08
Issue Date: March 21, 2011
Revision Date:
Approved By: Michael Lozano, Jr., M.D., HCFR Medical Director

1. Covered Substances
    a. Cyanide – Hydrogen Cyanide, Hydrocyanic Acid (AC)
    b. Cyanogen Chloride (CK)
    c. Hydrogen Sulfide, Sulfides and aMercaptans
    d. Azides

2. Signs and Symptoms
    a. Cardiovascular – initially, pulse decreases and BP rises, in later stages, possible tachycardia, dysrhythmias and cardiovascular collapse can occur, there may also be palpitations and / or chest tightness.
    b. Respiratory – can cause immediate respiratory arrest, although initially there is usually an increase in the rate and depth of respirations, and later becoming slow and gasping, possible irritation of the respiratory tract, cough, dyspnea, tachypnea, and pulmonary edema.
    c. CNS – can cause immediate coma, although initially there is usually weakness, headache, and confusion; seizures are common.
    d. GI – nausea / vomiting, salivation may be profuse, possible garlic taste in mouth.
    e. Skin – pale, cyanotic, reddish color, dermatitis, and sweating.

3. General Supportive Care
    a. Ensure that personnel are using appropriate PPE.
        i. Obtain HIT assistance if needed.
    b. If the patient is *symptomatic of cyanide poisoning*, immediately institute emergency life support measures including the use of the hydroxocobalamin for injection (CyanoKit™).
    c. *Speed of treatment is critical for these patients*.
        i. For symptomatic victims, provide treatment with 100% O_2 and specific antidotes as needed.
        ii. Treatment should be given simultaneously with decontamination procedures.
    d. Decontamination:
        i. Remove the patient from the hazardous area.
            1. If victims can walk, lead them out of the Hot Zone to the Decon Zone.
            2. Victims who are unable to walk may be removed on backboards or gurneys; if these are not available carefully drag victims to safety.
            3. Consider appropriate management of chemically contaminated children, such as measures to reduce separation anxiety.
        ii. Victims who are able may assist with their own decontamination.
            1. Remove contaminated clothing while flushing exposed areas.
            2. Double-bag contaminated clothing and personal belongings.
            3. If indicated, irrigate exposed or irritated eyes with plain water or saline for at least 5 minutes.
        iii. Some of these products may pose the risk of frostbite.
        iv. Handle frostbitten skin and eyes with caution.
            1. Do not irrigate eyes that have sustained frostbite injury.
            2. Place frostbitten skin in warm water, about 108°F (42°C).
                a. If warm water is not available, wrap the affected part gently in blankets.
            3. Let the circulation reestablish itself naturally.

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4. Encourage the victim to exercise the affected part while it is being warmed.
5. Continue passive warming while initiating transport.

e. Initiate medical and/or trauma supportive care as indicated.
f. In cases of ingestion, do not induce emesis.
g. If the victim is alert, asymptomatic, and has a gag reflex; administer **activated charcoal** 1.0 gm/kg.
    i. A soda can and a straw may be of assistance when offering charcoal to a child.

4. Paramedic Level Care
    a. Dinitrobenzene will sensitize the myocardium to catecholamines, so place the patient in a calm reassuring environment if possible.
        i. If dysrhythmias develop, treat with the indicated HCFR protocol.
    b. For seizures, follow appropriate HCFR protocol.

5. MSOT – Medic Level Care
    a. Prior to the administration of hydroxocobalamin for injection (CyanoKit™), to smoke inhalation victims, **ALL** four of the following criteria must be present:
        i. Exposure to fire smoke in an enclosed area.
        ii. Patient must be ≥ 16 years of age.
        iii. Soot in the mouth as well as sputum (indication of significant smoke exposure).
        iv. Altered mental status.
    b. If the patient is exhibiting life-threatening symptoms of suspected cyanide poisoning, administer **hydroxocobalamin** (CyanoKit™).
        i. Follow product directions for administration of **hydroxocobalamin** (CyanoKit™), 5.0 gm IV over 15 minutes.
        ii. If severe exposure, contact Medic-1 for a repeat dose of **hydroxocobalamin** (CyanoKit™), 5.0 gm IV over 15 minutes to 2 hours, depending on the patients condition.
    c. For seizures, follow appropriate HCFR protocol.
    d. Treat hypotension with vasopressors rather than with fluids unless there are signs and symptoms of hypovolemic shock.
        i. **Phenylephrine** (Neo-synephrine™)
            1. *Adults*: 100 – 180 mcg/min IV as a brief initial infusion until the blood pressure stabilizes, with dosage titrated to a mean arterial pressure (MAP) of 75 – 100 mmHg.
                a. The usual maintenance infusion rate ranges between 40 and 60 mcg/min IV.
            2. *Pediatrics*: 20 mcg / kg IV bolus, followed by an initial IV infusion of 0.1 – 0.5 mcg/kg/min, with dosage titrated to a mean arterial pressure (MAP) of 75 – 100 mmHg.
    e. Consider **racemic epinephrine** aerosol for children who develop stridor:
        i. 0.5 ml of 2.25% **racemic epinephrine** (Vaponephrine™) solution in water q 20 min PRN – hold for tachycardia.
    f. Contact Medic-1 for treatment of hydrogen sulfide exposure using nitrite therapy.
        i. If approved by Medic-1, administer **sodium nitrite**.
            1. *Adults*: 300 mg IV (10ml of a 3% solution) slowly over more than 5 minutes.

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2. *Pediatrics*: 10 mg/kg to a max of 300 mg (0.33 ml/kg of a 3% solution – max 10 ml) slow IV push over more than 5 minutes.

6. Quality Assurance Points
   a. The antidotal efficacy of nitrite therapy is controversial, but is currently recommended if it can be started shortly after exposure. The usefulness of nitrite therapy given beyond the first few minutes after exposure is questionable. There is only anecdotal evidence that nitrite therapy is effective, and victims of hydrogen sulfide poisoning have survived without sequelae after supportive care alone. Nitrite therapy should not be allowed to interfere with the establishment of adequate ventilation and oxygenation.
   b. Sodium nitrite may produce hypotension when administered intravenously in large doses or rapidly.
   c. High methemoglobin levels may exacerbate ischemia in patients with poor underlying cardiopulmonary reserve as they decrease oxygen carrying capacity – monitor closely for ischemia.
   d. Sodium azide produces a clinical picture similar to that of cyanide poisoning. However, there is no specific antidote.
      i. Exposure to small quantities can produce symptoms including, but not limited to:
         1. Tachypnea
         2. Restlessness
         3. Dizziness
         4. Weakness
         5. Headache
         6. Nausea/Vomiting
         7. Tachycardia
         8. Red eyes (gas or dust exposure)
         9. Clear drainage from the nose (gas or dust exposure)
         10. Cough (gas or dust exposure)
         11. Skin burns and blisters (explosion or direct skin contact)
      ii. Exposure to larger quantities can produce symptoms including, but not limited to:
         1. Convulsions
         2. Hypotension
         3. Bradycardia
         4. Loss of consciousness
         5. Lung injury
         6. Respiratory failure leading to death