HYDROGEN CYANIDE SAFETY TIPS

POISON

TEXAS AGRICULTURAL EXTENSION SERVICE
THE TEXAS A&M UNIVERSITY SYSTEM
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Hydrocyanic acid and its sodium, potassium and calcium salts are among the most potent and rapidly acting poisons known. Cyanides are rapidly absorbed through the gastrointestinal tract, the lungs and the skin. In addition to the hazard of exposure to the gas (hydrogen cyanide) by absorption through the lungs and even through the skin in sufficient concentration, absorption of sodium cyanide, potassium cyanide and calcium cyanide (salts of hydrocyanic acid) may occur by inhalation of the dust. Absorption through the skin and mucosal surfaces from exposure to hydrogen cyanide in water solution and to solutions of the salts may occur.

A few breaths of a high concentration of hydrogen cyanide, or the ingestion of 50 to 100 milligrams of its salts, result in cessation of respiration and collapse. If adequate therapy is not given immediately, death quickly follows.

Physical Properties

Hydrogen cyanide (hydrocyanic acid) is a white liquid at temperatures below 26.5°C (79.7°F). The acid is volatile and produces a highly toxic, colorless gas. Hydrogen cyanide is infinitely soluble in water and alcohol, and to a lesser extent in ether. The sodium, potassium and calcium salts of hydrocyanic acid (sodium cyanide, potassium cyanide and calcium cyanide) are readily soluble in water. The salts, odorless when dry, produce a gas (hydrogen cyanide) upon exposure to moisture and air. The salts absorb moisture from air and then react with CO₂ (carbon dioxide) in the air to produce gaseous hydrogen cyanide. Hydrogen cyanide is also liberated by treatment of the salts with acids. The gas has the

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Physical state

<table>
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<tr>
<th>Calcium Cyanide</th>
<th>Potassium Cyanide</th>
<th>Sodium Cyanide</th>
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<tr>
<td>white powder (amorphous)</td>
<td>white crystalline solid</td>
<td>white crystalline solid</td>
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<tr>
<td>Estimated fatal dose</td>
<td>0.25 gram¹</td>
<td>0.25 gram¹</td>
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¹Approximate; fatalities have reportedly resulted from one-fourth of this amount (reference 8).

distinctive odor of bitter almonds or “peach pits.” Strong solutions of hydrogen cyanide (hydrocyanic acid) are corrosive to the skin in addition to the hazard of poisoning through absorption. The salts may be available in various forms (granules, powder and solid).

**Symptoms of Poisoning**

Symptoms of poisoning in humans include an increased rate of respiration followed by slow, shallow, irregular breathing, unconsciousness and convulsions. Other symptoms include constriction of the throat, fullness or flushing of the head, anxiety, confusion, dizziness, nausea and sometimes vomiting. Low concentrations produce nausea, headache, dizziness and a feeling of suffocation. A bitter, acrid, burning taste is sometimes noted upon ingestion.

Death occurs with asphyxial symptoms since the cyanide acts as a chemical asphyxiant, depriving tissues of necessary oxygen.

**Care, Handling, Storage**

1. Be familiar with all information on the product label. Use all protective measures prescribed on the label and follow directions carefully. If gas mask protection is suggested, be certain to obtain an appropriate type of mask and use it properly.
2. Handle only that amount of cyanide required at a given time.
3. Do not get in eyes or on skin or clothing. In case of contact, remove clothing and wash thoroughly.
4. Avoid contact with the skin—use gloves. If gloves are exposed to cyanides through spills etc., destroy them. Contaminated gloves can be a source of continuous exposure while worn.
5. Goggles will afford protection to the eyes.
6. A long-sleeved shirt or jacket buttoned at the collar will minimize skin exposure.
7. In the event of skin exposure, remove con-
taminated clothing immediately and thoroughly wash exposed areas of the skin with soap and water.

8. Good habits of personal hygiene are essential. Do not smoke, eat or chew during the period of working with cyanide salts.

9. Wash thoroughly with soap and water following use of cyanides.

10. The cyanide salts evolve hydrocyanic acid rather easily. The gas is highly toxic and flammable. Maintain cyanides in sound, tightly closed containers in a dry, cool, well-ventilated storage unit out of direct sunlight, and away from areas of fire hazard. The storage unit should be secured and identified.

11. Inventory all cyanides.

Emergency Treatment

The success of first aid efforts or other treatment is related to the speed of handling the emergency situation. The following is quoted from the label of a cyanide salt.

"Antidote: Carry victim to fresh air. Have him lie down. Remove contaminated clothing but keep him warm. Start treatment immediately. CALL A PHYSICIAN IMMEDIATELY!

IF INHALED. Break an amyl nitrite pearl in a cloth and hold lightly under nose for 15 seconds. Repeat five times at about 15-second intervals. Give artificial respiration if breathing has stopped.

IF SWALLOWED. Break an amyl nitrite pearl in a cloth and hold lightly under nose for 15 seconds. If victim is conscious, or when consciousness returns, give a tablespoon of salt in a glass of warm water and repeat until vomit is clear. Repeat inhalation of amyl nitrite five times at 15-second intervals. Give artificial respiration if breathing has stopped.

NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

Warning: Contains cyanide. Contact with Acid Liberates Poison Gas. Do not breathe vapor or dust. Do not get in eyes or on skin. Wash thoroughly after handling."
You may wish to contact your family physician to describe your work with cyanide salts and for additional information regarding amyl nitrite ampuls.

Selected References


Educational programs conducted by the Texas Agricultural Extension Service serve people of all ages regardless of socio-economic levels, race, color, sex, religion or national origin.