

The ToxGuide™ is developed to be used as a pocket guide. Tear off at perforation and fold along lines.

Sources of Exposure

General Populations

- Cyanide-containing substances occur naturally in the fruits, seeds, roots, and leaves of numerous plants including almonds, pits from stone fruits (e.g., apricots, peaches, plums, cherries), sorghum, cassava, soybeans, spinach, lima beans, sweet potatoes, maize, millet, sugarcane, and bamboo shoots.
- Anthropogenic sources are responsible for much of the cyanide in the environment. Sources of cyanide include vehicle exhaust, biomass burning, discharges from metal-finishing industries, iron and steel mills, and organic chemical industries, and cigarette smoke.

Occupational Populations

- Facilities where cyanides are produced or used include steel, electroplating, mining, and chemical industries, extraction of gold and silver ores, metal cleaning, manufacture of synthetic fibers, various plastics, dyes, pigments, and nylon, and as reagents in analytical chemistry. Cyanides are also used as insecticides and fumigants.

Toxicokinetics and Normal Human Levels

Toxicokinetics

- Cyanide gas and salts are rapidly absorbed following inhalation or oral exposure. It is more slowly absorbed through the skin.
- Absorbed cyanide is rapidly distributed throughout the body.
- Cyanide is transformed to thiocyanate in the body, with a plasma half-time of 20 minutes to 1 hour.
- Cyanide metabolites are excreted in the urine, with small amounts excreted through the lungs.

Normal Human Levels

- Cyanide concentrations in blood plasma can range from 0 to 14 µg/dL.

Biomarkers/Environmental Levels

Biomarkers

- Blood cyanide and thiocyanate can be used as biomarkers of recent exposure.
- A bitter almond-like smell can be detected in the breath of a poisoned person, but this is not always found.

Environmental Levels

Air

- The cyanide content of unpolluted air averages 0.160-0.166 ppm.
- The range of cyanide levels in smoke from cigarettes is 10-400 µg/cigarette for mainstream smoke and 0.006- 0.27 µg/cigarette for sidestream smoke.

Sediment and Soil

- Mean and median concentrations of cyanides in topsoil samples taken at hazardous waste sites were 1,017 and 4.02 mg/kg, respectively. In subsurface soil, the mean and median concentrations were 813 and 15.4 mg/kg, respectively.

Water

- The cyanide content in most public water systems using groundwater did not exceed the 0.2 mg/L.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2006. Toxicological Profile for Cyanide (Update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

ToxGuide™

for

Cyanide

CN

CAS# 74-90-8

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U.S. Department of Health and
Human Services
Public Health Service
Agency for Toxic Substances
and Disease Registry
www.atsdr.cdc.gov

Contact Information:
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Chemical and Physical Information

Hydrogen cyanide is a gas and cyanide salts are solids

- Cyanides are a family of compounds containing the highly reactive cyanide anion. The cyanide compounds most commonly found in the environment include hydrogen cyanide and two cyanide salts -- sodium cyanide and potassium cyanide
- Hydrogen cyanide is a gas. Sodium cyanide and potassium cyanide are soluble in water.
- Cyanogenic glycosides are cyanide compounds produced naturally in many plants. When hydrolyzed or digested, these glycosides produce hydrogen cyanide.
- Cyanides form strong complexes with many metals, for example iron forming ferrocyanide and ferricyanide complexes.

Routes of Exposure

- Inhalation – Minor route of exposure for the general population. Primary route of occupational exposure.
- Oral– Primary route of exposure for general population. The intake of naturally occurring cyanide in food is likely to be higher than the intake of cyanide from drinking water and inhalation exposure.
- Dermal – Minor route of exposure.

Cyanide in the Environment

- Cyanide enters air, water, and soil from both natural processes and industrial activities.
- In air, cyanide is mainly present as hydrogen cyanide. The half-life of hydrogen cyanide in the atmosphere is about 1-5 years.
- Most cyanide in surface water will form hydrogen cyanide and evaporate.
- Cyanide does not bioaccumulate in fish.
- Cyanides are fairly mobile in soil. At soil surfaces, cyanide compounds will form hydrogen sulfide and evaporate. In subsurface soil, cyanide at low concentrations will probably biodegrade under both aerobic and anaerobic conditions.

Relevance to Public Health (Health Effects)

Health effects are determined by the dose (how much), the duration (how long), and the route of exposure.

Minimal Risk Levels (MRLs)

Inhalation

- No acute-, intermediate-, or chronic-duration inhalation MRLs were derived for cyanide.

Oral

- An MRL of 0.05 mg CN/kg/day has been derived for intermediate-duration oral exposure (15-364 days).
- No acute or chronic-duration oral MRLs were derived for cyanide.

Health Effects

- High inhalation, oral, or dermal exposure levels result in convulsions, unconsciousness and death.
- Lower exposures may result in headache or dizziness.
- Nonlethal inhalation exposure may produce upper respiratory irritation and dyspnea.
- Alterations in male reproductive tissue (decreased epididymal and testicular weight and spermatid counts) were found in animals orally exposed to cyanide.

Children's Health

- Children exposed to cyanide are likely to exhibit the same effects as adults.
- It is not known if children are more susceptible to cyanide poisoning than adults.