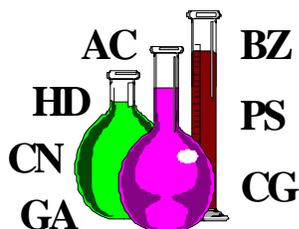


U.S. Army Center for Health Promotion and Preventive Medicine



Detailed Facts About Blood Agent Cyanogen Chloride

(CK)

218-06-1096

Physical Properties of Cyanogen Chloride

<i>Chemical Structure</i>	CNCl
<i>Chemical Formula</i>	CNCl
<i>Description</i>	Cyanogen chloride is a colorless gas with a sharp, pepperish odor similar to that of most tear gasses. The odor of CK often goes unnoticed because it is so irritating to the mucous membranes. CK is a liquid at temperatures below 55°F.
<i>Molecular Weight</i>	61.471
<i>Boiling Point</i>	12.8°C
<i>Vapor Pressure (mm Hg)</i>	1,000 @ 25°C
<i>Freezing Point</i>	-6.9°C
<i>Density</i>	Liquid = 1.18 Vapor = 2.1 (air = 1)
<i>Solubility</i>	Slightly soluble in water; dissolves readily in alcohol, carbon disulfide, acetone, benzene, carbon tetrachloride, chloropicrin, HD, and AC.
<i>Flash Point</i>	None
<i>Volatility</i>	2,600,000 mg/m ³ @ 12.8°C

Toxicity Values

IC ₅₀	= 7,000 mg-min/m ³
LC ₅₀	= 11,000 mg-min/m ³
NOAEL (inhalation)	= 1,525 mg-min/m ³
RfD (ingestion)	= 0.750 mg/l

Exposure Limit

Workplace Time-Weighted Average -	0.6 mg/m ³
General Population Limits -	No standard identified

Toxic Properties of Cyanogen Chloride

Cyanogen chloride irritates the eyes and respiratory tract, even in low concentrations. Acute exposure produces intense irritation of the lungs characterized by coughing and breathing problems, which may quickly lead to a pulmonary edema. Inside the body, cyanogen chloride converts to hydrogen cyanide, which inactivates the enzyme cytochrome oxidase, preventing the utilization of oxygen by the cells. The general action of CK, interference with the use of oxygen in the body, is similar to that of AC. However, CK differs from AC in that it has strong irritating and choking effects and slows breathing.

Overexposure Effects

CK is absorbed through the skin and mucosal surfaces and is dangerous when inhaled because toxic amounts are absorbed through bronchial mucosa and alveoli. It is similar in toxicity and mode of action to AC, but is much more irritating. CK can cause a marked irritation of the respiratory tract, hemorrhagic exudate of the bronchi and trachea as well as pulmonary edema. It is improbable that anyone would voluntarily remain in areas with a high enough concentration to exert a typical nitrile effect. The liquid form will burn skin and eyes. Long-term exposure will cause dermatitis, loss of appetite, headache, and upper respiratory irritation in humans.

Emergency and First Aid Procedures

Inhalation: if the patient is conscious, direct first aid and medical treatment toward the relief of any pulmonary symptoms; put patient immediately at bed rest with head slightly elevated; seek medical attention immediately; administer oxygen if there is any dyspnea or evidence of pulmonary edema; in case of long exposures, combined therapy, with oxygen plus amyl nitrite inhalations and artificial respiration is recommended.

Eye Contact: flush affected areas with copious amounts of water immediately; hold eyes open while flushing.

Skin Contact: wash skin promptly to remove the cyanogen chloride; remove all contaminated clothing, including shoes; do not delay.

Ingestion: give victim water or milk; do not induce vomiting.

Protective Equipment

Protective Gloves:	Wear Butyl or Neoprene rubber gloves.
Eye Protection:	Wear chemical safety goggles if dust or solutions of cyanide salts may come into contact with the eye; wear full-length face shields with forehead protection if dusts, molten salts, or solutions of cyanide salts contact the face.
Other:	Wear appropriate chemical cartridge respirator depending on the amount of exposure; rescue personnel should be equipped with self-contained breathing apparatus; have available and use as appropriate rubber suits, full-body chemical suits, safety shoes, safety shower, and eyewash fountain.

Reactivity Data

Stability:	Unstable; polymerizes without stabilizer; stable for less than 30 days in canister munitions; will polymerize to form the solid cyanuric chloride which is corrosive and may explode.
Decomposition:	2,4,6 - Trichloro-s-Triazine which can polymerize violently.
Polymerization:	Hazardous polymerization may occur; avoid high temperature storage and moisture.

<i>Persistency</i>	Short; vapor may persist in jungle and forest for some time under suitable weather conditions.
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References

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4. U.S. Army Chemical Command Materiel Destruction Agency, *Site Monitoring Concept Study*, 15 September 1993.
5. Genium's Reference Collection, *Material Safety Data Sheet No. 240*, Genium Publishing Corporation, Schenectady, New York, 1988.

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