

POISON CHEMISTRY - CYANIDE COMPOUNDS

Cyanide is a fast-acting, bitter-tasting poison, and one of the deadliest known. Its compounds have famously been utilised in suicide pills over the years.

HISTORY



Cyanide has been used for centuries as a poison, but was first identified in 1782 by the Swedish chemist Scheele; in fact, it's thought Scheele's death may have been contributed to by cyanide exposure.



During WWI, the French attempted to use hydrocyanic acid, then cyanogen chloride, in chemical warfare. In WWII, The Nazis used hydrogen cyanide in the form of Zyklon B to kill millions in their concentration camps.



Hydrogen cyanide gas has previously been used for pest control, which sometimes led to accidental deaths. Today, cyanides are still used in the mining of gold and silver, and in organic synthesis reactions.

HCN KCN NaCN

HYDROGEN CYANIDE POTASSIUM CYANIDE SODIUM CYANIDE

(Note: KCN and NaCN both get converted to HCN by stomach acid)

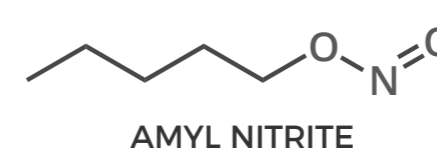


(HCN ONLY)

MEDIAN LETHAL DOSE: 3-8mg/kg

ORAL - VARIES DEPENDING ON FORM OF CYANIDE ADMINISTERED

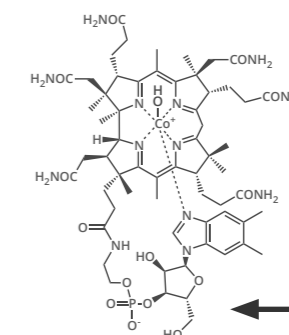
TREATMENT



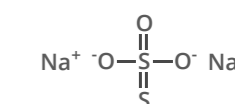
AMYL NITRITE



SODIUM NITRITE



SODIUM THIOSULFATE



VITAMIN B12a

The most prevalent antidotes are nitrites, which convert haemoglobin into methemoglobin, which then removes cyanide from cytochrome oxidase. Thiosulfate helps convert cyanide to thiocyanate so it can be excreted. Cobalt ions also form a stable complex with cyanide.

EFFECTS



DIZZINESS & HEADACHE



NAUSEA & VOMITING



RAPID BREATHING & HEART RATE



LOW BLOOD PRESSURE



LOSS OF CONSCIOUSNESS



RESPIRATORY FAILURE



CONVULSIONS & DEATH

Cyanide inhibits the cytochrome oxidase enzyme, preventing the body's cells from using oxygen. HCN smells of bitter almonds, but only ~40% of people have the genetic ability to smell it. Many fruit seeds also contain small amounts of cyanide-containing compounds.



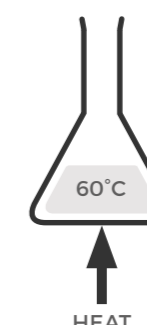
DETECTION

Sample added to 5% NaOH solution



1 MIN

Transferred to solution of 5% FeSO₄ & 1% FeCl₃



10 MINS

Adding hydrochloric acid solution gives prussian blue.



10-15 MINS

A common test for cyanide in the early 20th Century formed prussian blue, an iron-cyanide complex, in the presence of cyanide ions. There are several other chemical tests, including portable card-based tests, and instrumental methods can also be used.



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