

Safety Module

Safety Topic: Cyanides

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Compound CAS# 57-12-5 [cyanide anion]



- **Purpose** – Cyanides are highly toxic compounds that contain the cyanide anion (CN^-). The toxicity of cyanides results from their ability to bind iron and inhibit cytochrome oxidase, an enzyme in the ATP-generating electron transport chain. Cyanides are utilized in a wide variety of organic reactions and as ligands in inorganic complexes.
 - **Equipment** – lab coat, lab glasses, nitrile gloves, fume hood, bleach
 - **Process** – The toxicity of cyanides is dependent on the solubility of the cyanide compound. Inorganic cyanide salts are highly water soluble and react with water to liberate toxic and flammable HCN gas. Cyanogens and organic cyanides (ie. benzyl cyanides) can be hydrolyzed or decomposed to form the cyanide anion. Symptoms of sublethal acute cyanide exposure include dizziness, low blood pressure, headache, nausea, vomiting, and rapid heart rate and breathing. To prevent exposure, cyanides should always be stored away from acids and should be weighed out, measured, reacted, and worked up in a fume hood.
 - **Specific considerations** – Gloves should always be worn when working with cyanides and should be changed after contact. Reactions containing cyanides should always be worked up with a basic solution ($\text{pH} > 10$) to avoid the evolution of HCN. All materials and equipment contaminated by cyanides should be washed three times with an alkaline ($\text{pH} > 10$) 10% bleach solution. The washes should be collected and disposed of as hazardous waste.
- If you suspect someone has been exposed to cyanides, do not attempt mouth-to-mouth resuscitation, as you could be at risk for secondary exposure.
- **Waste handling** – All cyanide waste, including empty reagent bottles, should be segregated from the normal waste stream. Solutions and solid waste containing cyanides should be stored in a well-sealed plastic waste container and treated with strong base until the $\text{pH} > 10$. [Store in plastic to prevent the degradation of the glass under the highly basic conditions.]
 - **For more information see –**
 - <https://www.compoundchem.com/2015/02/26/cyanide/>



- <https://ehs.yale.edu/sites/default/files/files/potassium-sodium-cyanide-sop.pdf>