SAFETY DATA SHEET

Updated on 26/09/2024

1. Material Identification

Product Name : Calcium cyanide
Catalog Number : io-1906
CAS Number : 592-01-8
Identified uses : Laboratory chemicals, manufacture of chemical compounds
Company : Ionz

>> R&D Use only

2. Hazards Identification

GHS Classification:

Flammable liquid (category 2)
Acute toxicity, oral (Category 3)
Acute toxicity, dermal (Category 3)
Acute toxicity, inhalation (Category 3)
Specific target organ toxicity, single exposure (Category 1)

Pictogram(s)

GHS Hazard Statements

>> H300: Fatal if swallowed [Danger Acute toxicity, oral]

>> H410: Very toxic to aquatic life with long lasting effects [Warning Hazardous to the aquatic environment, long-term hazard]

Precautionary Statement Codes

>> P264, P270, P273, P301+P316, P321, P330, P391, P405, and P501

Health Hazards:

>> Inhalation or ingestion causes headache, nausea, vomiting and weakness; high concentrations are rapidly fatal. (USCG, 1999)

ERG 2024, Guide 157 (Calcium cyanide)

>> TOXIC and/or CORROSIVE; inhalation, ingestion or contact (skin, eyes) with vapors, dusts or substance may cause severe injury, burns or death.

>> Reaction with water or moist air may release toxic, corrosive or flammable gases.

>> Reaction with water may generate much heat that will increase the concentration of fumes in the air.

>> Fire will produce irritating, corrosive and/or toxic gases.

>> Runoff from fire control or dilution water may be corrosive and/or toxic and cause environmental contamination.

>> Special Hazards of Combustion Products: Decomposes in fire to give very toxic gases, including hydrogen cyanide. (USCG, 1999)

ERG 2024, Guide 157 (Calcium cyanide)

>> Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes.

>> UN1802, UN2032, UN3084, UN3093, UN1796 (above 50%), UN1826 (above 50%), and UN2031 (above 65%) may act as oxidizers. Also consult GUIDE 140.

>> Vapors may accumulate in confined areas (basement, tanks, hopper/tank cars, etc.).

>> Substance may react with water (some violently), releasing corrosive and/or toxic gases and runoff.

>> Corrosives in contact with metals may evolve flammable hydrogen gas.

>> Containers may explode when heated or if contaminated with water.

>> Not combustible but forms flammable gas on contact with water or damp air. Gives off irritating or toxic fumes (or gases) in a fire. See Chemical dangers

3. Composition/Information On Ingredients

Chemical name : Calcium cyanide
CAS Number : 592-01-8
Molecular Formula : C2CaN2
Molecular Weight : 92.1100 g/mol

4. First Aid Measures

First Aid:

>> EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

>> SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas.

>> INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing.

>> INGESTION: If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Generally, the induction of vomiting is NOT recommended outside of a physician's care due to the risk of aspirating the chemical into the victim's lungs. However, if the victim is conscious and not convulsing and if medical help is not readily available, consider the risk of inducing vomiting because of the high toxicity of the chemical ingested. Ipecac syrup or salt water may be used in such an emergency. IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. (NTP, 1992)

ERG 2024, Guide 157 (Calcium cyanide)

>> General First Aid:

>> Call 911 or emergency medical service.

>> Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and avoid contamination.

>> Move victim to fresh air if it can be done safely.

>> Administer oxygen if breathing is difficult.

>> If victim is not breathing:

>> DO NOT perform mouth-to-mouth resuscitation; the victim may have ingestedor inhaled the substance.

>> If equipped and pulse detected, wash face and mouth, then give artificial respiration using a proper respiratory medical device (bag-valve mask, pocket mask equipped with a one-way valve or other device).

>> If no pulse detected or no respiratory medical device available, provide continuouscompressions. Conduct a pulse check every two minutes or monitor for any signs of spontaneous respirations.

>> Remove and isolate contaminated clothing and shoes.

>> For minor skin contact, avoid spreading material on unaffected skin.

>> In case of contact with substance, remove immediately by flushing skin or eyes with running water for at least 20 minutes.

>> For severe burns, immediate medical attention is required.

>> Effects of exposure (inhalation, ingestion, or skin contact) to substance may be delayed.

>> Keep victim calm and warm.

>> Keep victim under observation.

>> For further assistance, contact your local Poison Control Center.

>> Note: Basic Life Support (BLS) and Advanced Life Support (ALS) should be done by trained professionals.

>> Specific First Aid:

>> For corrosives, in case of contact, immediately flush skin or eyes with running water for at least 30 minutes. Additional flushing may be required.

>> In case of skin contact with Hydrofluoric acid (UN1790), if calcium gluconate gel is available, rinse 5 minutes, then apply gel. Otherwise, continue rinsing until medical treatment is available.

>> In Canada, an Emergency Response Assistance Plan (ERAP) may be required for this product. Please consult the shipping paper and/or the "ERAP" section.

First Aid Measures

Inhalation First Aid

>> Administration of oxygen may be needed. Fresh air, rest. Artificial respiration may be needed. No mouth-to-mouth artificial respiration. Refer immediately for medical attention.

Skin First Aid

>> Wear protective gloves when administering first aid. Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer immediately for medical attention .

Eye First Aid

>> Rinse with plenty of water for several minutes (remove contact lenses if easily possible). Refer immediately for medical attention.

Ingestion First Aid

>> Rinse mouth. Administration of oxygen may be needed. NO mouth-to-mouth artificial respiration. Do NOT induce vomiting. Refer immediately for medical attention.

5. Fire Fighting Measures

>> Excerpt from ERG Guide 157 [Substances - Toxic and/or Corrosive (Non-Combustible / Water-Sensitive)]:

>> Note: Some foams will react with the material and release corrosive/toxic gases.

>> SMALL FIRE: CO2 (except for Cyanides), dry chemical, dry sand, alcohol-resistant foam.

>> LARGE FIRE: Water spray, fog or alcohol-resistant foam. If it can be done safely, move undamaged containers away from the area around the fire. Avoid aiming straight or solid streams directly onto the product. Dike runoff from fire control for later disposal.

>> FIRE INVOLVING TANKS, RAIL TANK CARS OR HIGHWAY TANKS: Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks in direct contact with flames. (ERG, 2024)

>> Use powder, dry sand. NO hydrous agents. NO water. NO carbon dioxide.

6. Accidental Release Measures

Isolation and Evacuation:

Isolation and evacuation measures to take when a large amount of this chemical is accidentally released in an emergency.

>> Excerpt from ERG Guide 157 [Substances - Toxic and/or Corrosive (Non-Combustible / Water-Sensitive)]:

>> IMMEDIATE PRECAUTIONARY MEASURE: Isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.

>> SPILL: Increase the immediate precautionary measure distance, in the downwind direction, as necessary.

>> FIRE: If tank, rail tank car or highway tank is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. (ERG, 2024)

Evacuation: ERG 2024, Guide 157 (Calcium cyanide)

>> Immediate precautionary measure

>> Isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.

>> Spill

>> For non-highlighted materials: increase the immediate precautionary measure distance, in the downwind direction, as necessary.

>> Fire

>> If tank, rail tank car or highway tank is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

Spillage Disposal:

Methods for containment and safety measures to protect workers dealing with a spillage of this chemical.

>> Evacuate danger area! Consult an expert! Personal protection: chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Do NOT wash away into sewer. Sweep spilled substance into covered containers. Carefully collect remainder. Then store and dispose of according to local regulations. Prevent contact with water or moist substances.

Accidental Release Measures

Public Safety: ERG 2024, Guide 157 (Calcium cyanide)

>> CALL 911. Then call emergency response telephone number on shipping paper. If shipping paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.

>> Keep unauthorized personnel away.

>> Stay upwind, uphill and/or upstream.

>> Ventilate closed spaces before entering, but only if properly trained and equipped.

Spill or Leak: ERG 2024, Guide 157 (Calcium cyanide)

>> ELIMINATE all ignition sources (no smoking, flares, sparks or flames) from immediate area.

>> All equipment used when handling the product must be grounded.

>> Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

>> Stop leak if you can do it without risk.

>> A vapor-suppressing foam may be used to reduce vapors.

>> DO NOT GET WATER INSIDE CONTAINERS.

>> Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.

>> Prevent entry into waterways, sewers, basements or confined areas.

>> Small Spill

>> Cover with DRY earth, DRY sand or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain.

>> Use clean, non-sparking tools to collect material and place it into loosely covered plastic containers for later disposal.

7. Handling And Storage

Safe Storage:

>> Store only in original container. Separated from water, acids, carbon dioxide and food and feedstuffs. Well closed. Fireproof. Dry. Store in an area without drain or sewer access. Provision to contain effluent from fire extinguishing.

Storage Conditions:

>> Store in cool, dry, well-ventilated location. Separate from acids, oxidizing materials.

8. Exposure Control/ Personal Protection

>> 5.0 [mg/m3], as CN

TLV-Ceiling

>> 5.0 [mg/m3], as CN

>> Ceiling limit: 5 mg/cu m, skin. /Cyanide salts, as CN/

>> (ceiling value): 5 mg/m

MAK (Maximale Arbeitsplatz Konzentration)

>> (as CN): 2 mg/m

Emergency Response: ERG 2024, Guide 157 (Calcium cyanide)

>> Note: Some foams will react with the material and release corrosive/toxic gases.

>> Small Fire

>> CO2 (except for Cyanides), dry chemical, dry sand, alcohol-resistant foam.

>> Large Fire

>> Water spray, fog or alcohol-resistant foam.

>> If it can be done safely, move undamaged containers away from the area around the fire.

>> Avoid aiming straight or solid streams directly onto the product.

>> Dike runoff from fire control for later disposal.

>> Fire Involving Tanks, Rail Tank Cars or Highway Tanks

>> Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles.

>> Do not get water inside containers.

>> Cool containers with flooding quantities of water until well after fire is out.

>> Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.

>> ALWAYS stay away from tanks in direct contact with flames.

Inhalation Risk:

>> A harmful concentration of airborne particles can be reached quickly when dispersed.

Effects of Short Term Exposure:

>> The substance is irritating to the eyes, skin and respiratory tract. The substance may cause effects on the cellular respiration. This may result in convulsions and unconsciousness. Exposure could cause death. Medical observation is indicated.

Effects of Long Term Exposure:

>> The substance may have effects on the thyroid. This may result in impaired functions.

Fire Prevention

>> NO open flames, NO sparks and NO smoking. NO contact with water, carbon dioxide or acids. NO contact with hot surfaces.

Exposure Prevention

>> AVOID ALL CONTACT! IN ALL CASES CONSULT A DOCTOR!

Inhalation Prevention

>> Use local exhaust or breathing protection.

Skin Prevention

>> Protective gloves. Protective clothing.

Eye Prevention

>> Wear safety spectacles, face shield or eye protection in combination with breathing protection if powder.

Ingestion Prevention

>> Do not eat, drink, or smoke during work. Wash hands before eating.

Exposure Control and Personal Protection

Protective Clothing: ERG 2024, Guide 157 (Calcium cyanide)

>> Wear positive pressure self-contained breathing apparatus (SCBA).

>> Wear chemical protective clothing that is specifically recommended by the manufacturer when there is NO RISK OF FIRE.

>> Structural firefighters' protective clothing provides thermal protection but only limited chemical protection.

Maximum Allowable Concentration (MAK)

>> 2.0 [mg/m3], inhalable fraction, as CN[German Research Foundation (DFG)]

9. Physical And Chemical Properties

Molecular Weight:

>> 92.11

Exact Mass:

>> 91.9687389

Physical Description:

>> Calcium cyanide appears as white crystals or powder or gray-black powder (technical grade). Toxic by skin absorption through open wounds, by ingestion, and by inhalation.

>> COLOURLESS CRYSTALS OR WHITE POWDER WITH CHARACTERISTIC ODOUR.

Color/Form:

>> Colorless crystals or white powder

Odor:

>> Odor of hydrogen cyanide

Melting Point:

>> Decomposes > 662 °F (NTP, 1992)

Solubility:

>> Soluble in water with gradual liberation of HCN

>> Solubility in water: freely soluble

Density:

>> 1.853 at 68 °F (USCG, 1999) - Denser than water; will sink

>> Density (at 20 °C): 1.9 g/cm³

Vapor Pressure:

>> 0.03 [mmHg]

Decomposition:

>> ... /Calcium cyanide is/ ... readily hydrolyzed liberating hydrogen cyanide.

>> >350 °C

10. Stability And Reactivity

>> Water soluble with evolution of some hydrogen cyanide, a flammable poison gas. Release of gas is much more rapid if acid is present.

11. Toxicological Information

Exposure Routes:

>> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

Inhalation Exposure

>> Headache. Weakness. Dizziness. Cough. Chest tightness. Laboured breathing. Shortness of breath. Irregular heartbeat. Confusion. Convulsions. Unconsciousness.

Skin Exposure

>> MAY BE ABSORBED! Redness. Further see Inhalation.

Eye Exposure

>> Redness. Pain.

Ingestion Exposure

>> Nausea. Vomiting. Further see Inhalation.

Target Organs:

Organs that are affected by exposure to this chemical. Information in this section reflects human data unless otherwise noted.

>> Reproductive

Adverse Effects:

An adverse effect is an undesired harmful effect resulting from a medical treatment or other intervention.

>> Other Poison - Chemical Asphyxiant

Antidote and Emergency Treatment:

>> /SRP: For patients treated with nitrites:/ Measurement of methemoglobin may be useful for assessing exposure. However, methemoglobin levels may be artificially low if not analyzed within a few hours after drawing the blood. Methemoglobin levels have been found to correlate with clinical symptoms in most cases. /Cyanide/

Human Toxicity Excerpts:

>> /SIGNS AND SYMPTOMS/ There are no qualitative differences in acute poisoning between cyanide compounds, since the cyanide ion is the common agent that primarily inhibits tissue cytochrome oxidase activity in rats, mice, and rabbits, with resulting anoxia. Although acute oral doses of cyanide cause cardiovascular, respiratory, and neuroelectric alterations, many studies have shown that the brain is the organ most sensitive to cyanide toxicity. Death from cyanide poisoning is believed to result from central nervous system depression, subsequent to inhibition of brain cytochrome oxidase activity. Typical signs of toxicity after inhalation of hydrogen cyanide in test species include rapid breathing, weak and ataxic movements, convulsions, loss of voluntary movement, coma, and decrease and irregularities in respiratory rate and depth preceding death.

Non-Human Toxicity Excerpts:

>> /LABORATORY ANIMALS: Acute Exposure/ In rodents, single doses of 4-22 mg CN-/kg as potassium, sodium, or calcium cyanide resulted in 50-90% lethality.

Non-Human Toxicity Values:

>> LD50 Rat oral 22 mg CN-/kg as calcium cyanide

Populations at Special Risk:

>> Workers with chronic diseases of kidneys, respiratory tract, skin, or thyroid are at greater risk of developing toxic cyanide effects than are healthy workers. /Cyanides/

12. Ecological Information

Resident Soil (mg/kg)

>> 7.80e+01

Industrial Soil (mg/kg)

>> 1.20e+03

Resident Air (ug/m3)

>> 9.40e+00

Industrial Air (ug/m3)

>> 3.90e+01

Tapwater (ug/L)

>> 2.00e+01

MCL (ug/L)

>> 1.30e+03

Chronic Oral Reference Dose (mg/kg-day)

>> 1.00e-03

Chronic Inhalation Reference Concentration (mg/m3)

>> 9.00e-03

Volatile

>> Volatile

Mutagen

>> Mutagen

Fraction of Contaminant Absorbed in Gastrointestinal Tract

>> 1

ICSC Environmental Data:

>> The substance is very toxic to aquatic organisms. The substance may cause long-term effects in the aquatic environment. It is strongly advised not to let the chemical enter into the environment.

13. Disposal Considerations

Spillage Disposal

>> Evacuate danger area! Consult an expert! Personal protection: chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Do NOT wash away into sewer. Sweep spilled substance into covered containers. Carefully collect remainder. Then store and dispose of according to local regulations. Prevent contact with water or moist substances.

Disposal Methods

>> SRP: Wastewater from contaminant suppression, cleaning of protective clothing/equipment, or contaminated sites should be contained and evaluated for subject chemical or decomposition product concentrations. Concentrations shall be lower than applicable environmental discharge or disposal criteria. Alternatively, pretreatment and/or discharge to a permitted wastewater treatment facility is acceptable only after review by the governing authority and assurance that "pass through" violations will not occur. Due consideration shall be given to remediation worker exposure (inhalation, dermal and ingestion) as well as fate during treatment, transfer and disposal. If it is not practicable to manage the chemical in this fashion, it must be evaluated in accordance with EPA 40 CFR Part 261, specifically Subpart B, in order to determine the appropriate local, state and federal requirements for disposal.

>> Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste number P021; D003, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste.

>> Cyanide salts should not be flushed into any drain which may contain or subsequently receive acid waste. ... Cyanide process waste solutions and flushings from spills should be passed through a cyanide waste disposal system. /Cyanide salts/

>> Calcium cyanide is a poor candidate for incineration.

>> The cyanides are well known to be extremely toxic. Hydrogen cyanide /HCN/ is a gas, and calcium cyanide /CaCN2/ is a solid which releases HCN slowly in moist air or rapidly in acid: CaCN(2) should never be treated with acid in disposal. The cyanides are rapidly converted to the much less toxic cyanates by treatment with alkaline hypochlorite: CN- + ClO- --- pH 10-11.5 --- H2O ---> CNO- Cl-. This reaction forms the basis of the Manufacturing Chemists Association (USA) for the treatment of "package lots" of cyanide wastes: "Add with stirring to strong alkaline soln of calcium hypochlorite. Let stand 24 hr. Flush the cyanate down the drain with large excess of water." In fact, however, the cyanate is also oxidized in mild alkaline hypochlorite to carbon dioxide and nitrogen as shown by the equation: 2CNO- + 3ClO- + H2O --- pH 7.0-9.5 --- H2O ---> 2CO2 + N2 + 3Cl- + 2OH-. Thus the overall reaction for disposal of calcium cyanide with sodium hypochlorite would be: Ca(CN)2 + 6NaClO + H2O --- pH 9.5 ---> Ca(OH)2 + 6NaCl + 2CO2 + N2. Hydrogen cyanide is not persistent in the environment and very small amt of it could be disposed of alternatively by slow release to the atmosphere in a well ventilated outdoor location. Similarly very small amt of Ca(CN)2 could be disposed of by exposure to moist air followed by water dilution. Recommendable methods: Oxidation, landfill, & discharge to sewer. Peer-review: Cyanides can be incinerated either directly or after liberation of HCN by acid but unless extensive equipment is available this cannot be recommended. Acid treatment of cyanides liberates HCN. If this gas cannot be handled safely in properly designed equipment, acidification cannot be recommended. Alkaline oxidation of cyanide can be achieved with sodium hypochlorite, hydrogen peroxide. Depending on the cyanides present the product will be a sludge or soln which if sufficient reaction time has been allowed, will be largely free from free cyanide. Soluble cyanides can be reacted with alkaline ferrous sulfate (excess) and allowed to stand (stirred) several hr. The resulting sludge containing insoluble complex iron cyanides, will still contain small amt of free cyanide, but can be deposited in a landfill. Cyanide is efficiently destroyed in soln, by reaction with formaldehyde. (Peer-review conclusions of an IRPTC expert consultation (May 1985))

14. Transport Information

DOT

Calcium cyanide
6.1
UN Pack Group: I
Reportable Quantity of 10 lb or 4

IATA

Calcium cyanide
6.1,
UN Pack Group: I

15. Regulatory Information

Federal Drinking Water Standards:

Federal drinking water standards (e.g. maximum containment level (MCL)) for this chemical. These standards are legally enforceable.

>> EPA 200 ug/L /Cyanide ion/

Federal Drinking Water Guidelines:

Federal drinking water guidelines (e.g. maximum containment level (MCL)) for this chemical. In general, these guidelines are recommendations and not legally enforceable.

>> EPA 200 ug/L /Cyanide ion/

State Drinking Water Standards:

State drinking water standards (e.g. maximum containment level (MCL)) for this chemical. These standards are legally enforceable.

>> (CA) CALIFORNIA 150 ug/L /Cyanide ion/

Clean Water Act Requirements:

The Clean Water Act (CWA) of 1972 establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Under CWA, the U.S. Environmental Protection Agency (EPA) developed the Toxic Pollutant List (40 CFR Part 401.15) and the Priority Pollutant List (40 CFR Part 423, Appendix A). These lists are to be used by EPA and States to develop the Effluent Guidelines regulations and ensure water quality criteria and standards.

>> Calcium cyanide is designated as a hazardous substance under section 311(b)(2)(A) of the Federal Water Pollution Control Act and further regulated by the Clean Water Act Amendments of 1977 and 1978. These regulations apply to discharges of this substance. This designation includes any isomers and hydrates, as well as any solutions and mixtures containing this substance.

16. Other Information

Toxic Combustion Products:

Toxic products (e.g., gases and vapors) produced from the combustion of this chemical.

>> Not combustible, but if involved in a fire decomposes to produce oxides of nitrogen.

"The information provided is believed to be accurate but is not comprehensive and should be used as a reference. It reflects our current knowledge and is intended for safety guidance related to the product. This document does not constitute a warranty of the product's properties. Ionz is not responsible for any damages resulting from handling or contact with the product incorrectly."