ionz

SAFETY DATA SHEET

Updated on 26/09/2024

1. Material Identification

Product Name : Sodium cyanide (Na(CN))
Catalog Number : io-2998
CAS Number : 143-33-9
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

>> H290 (48.4%): May be corrosive to metals [Warning Corrosive to Metals]

>> H300+H310+H330 (37.6%): Fatal if swallowed, in contact with skin or if inhaled [Danger Acute toxicity, oral; acute toxicity, dermal; acute toxicity, inhalation]

>> H300 (100%): Fatal if swallowed [Danger Acute toxicity, oral]

>> H310 (100%): Fatal in contact with skin [Danger Acute toxicity, dermal]

>> H315 (13.4%): Causes skin irritation [Warning Skin corrosion/irritation]

>> H318 (27%): Causes serious eye damage [Danger Serious eye damage/eye irritation]

>> H319 (16%): Causes serious eye irritation [Warning Serious eye damage/eye irritation]

>> H330 (100%): Fatal if inhaled [Danger Acute toxicity, inhalation]

>> H372 (47.9%): Causes damage to organs through prolonged or repeated exposure [Danger Specific target organ toxicity, repeated exposure]

>> H400 (98.8%): Very toxic to aquatic life [Warning Hazardous to the aquatic environment, acute hazard]

>> H410 (98.8%): Very toxic to aquatic life with long lasting effects [Warning Hazardous to the aquatic environment, long-term hazard]

Precautionary Statement Codes

>> P234, P260, P262, P264, P264+P265, P270, P271, P273, P280, P284, P301+P316, P302+P352, P304+P340, P305+P351+P338, P305+P354+P338, P316, P317, P319, P320, P321, P330, P332+P317, P337+P317, P361+P364, P362+P364, P390, P391, P403+P233, P405, P406, and P501

NFPA 704 Diamond

NFPA Health Rating

>> 3 - Materials that, under emergency conditions, can cause serious or permanent injury.

NFPA Fire Rating

>> 0 - Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand.

NFPA Instability Rating

>> 0 - Materials that in themselves are normally stable, even under fire conditions.

Health Hazards:

>> Super toxic; probable oral lethal dose in humans is less than 5 mg/kg or a taste (less than 7 drops) for a 70 kg (150 lb.) person. Sodium cyanide is poisonous and may be fatal if inhaled, swallowed or absorbed through the skin. Contact with sodium cyanide may cause burns to skin and eyes. Individuals with chronic diseases of the kidneys, respiratory tract, skin, or thyroid are at greater risk of developing toxic cyanide effects. (EPA, 1998)

ERG 2024, Guide 157 (Sodium cyanide, solution; Sodium cyanide, solid)

>> 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.

ERG 2024, Guide 157 (Sodium cyanide, solid; Sodium cyanide, solution)

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>> 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.

>> Sodium cyanide is not combustible itself, but contact with acids releases highly flammable hydrogen cyanide gas. Fire may produce irritating or poisonous gases. Runoff from fire control water may give off poisonous gases. Container may explode in the heat of fire. Avoid strong oxidizers such as nitrates and chlorates; acids and acid salts. Avoid contact with acids. Aqueous solutions rapidly decompose. (EPA, 1998)

ERG 2024, Guide 157 (Sodium cyanide, solution; Sodium cyanide, solid)

>> 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.

ERG 2024, Guide 157 (Sodium cyanide, solid; Sodium cyanide, solution)

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>> 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.

Hazards Identification

ERG Hazard Classes

>> Water-reactive material (WR)

3. Composition/Information On Ingredients

Chemical name : Sodium cyanide (Na(CN))
CAS Number : 143-33-9
Molecular Formula : CNNa
Molecular Weight : 49.0070 g/mol

4. First Aid Measures

First Aid:

>> Warning: Heart palpitations may occur within minutes after exposure. Caution is advised. Effects may be delayed.

>> Signs and Symptoms of Acute Sodium Cyanide Exposure: Signs and symptoms of acute exposure to sodium cyanide may include hypertension (high blood pressure) and tachycardia (rapid heart rate), followed by hypotension (low blood pressure) and bradycardia (slow heart rate). Cardiac arrhythmias and other cardiac abnormalities are common. Cyanosis (blue tint to the skin and mucous membranes) and cherry-red or bloody mucous membranes may occur. Tachypnea (rapid respiratory rate) may be followed by respiratory depression. Pulmonary edema and lung hemorrhage may also occur. Headache, vertigo (dizziness), agitation, and giddiness may be followed by combative behavior, dilated and unreactive pupils, convulsions, paralysis, and coma. Sodium cyanide is irritating to the skin and mucous membranes. Lacrimation (tearing) and a burning sensation of the mouth and throat are common. Increased salivation, nausea, and vomiting are often seen.

>> Emergency Life-Support Procedures: Acute exposure to sodium cyanide may require decontamination and life support for the victims. All exposed persons should be transported to a health care facility as quickly as possible. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

>> Inhalation Exposure:

>> 1. Move victims to fresh air. Emergency personnel should avoid self-exposure to sodium cyanide.

>> 2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.Warning: To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with sodium cyanide-contaminated persons or their gastric contents may result in self-poisoning.

>> 3. RUSH to a health care facility!

>> 4. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

>> Dermal/Eye Exposure:

>> 1. Remove victims from exposure. Emergency personnel should avoid self- exposure to sodium cyanide.

>> 4. Remove contaminated clothing as soon as possible.

>> 5. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

>> 6. Wash exposed skin areas twice with soap and water.

>> 7. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

>> Ingestion Exposure:

>> 1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. IMMEDIATELY begin administering 100% oxygen to all victims. Monitor victims for respiratory distress.Warning: To prevent self-poisoning, avoid mouth-to-mouth breathing; use a forced-oxygen mask. Direct oral contact with sodium cyanide-contaminated persons or their gastric contents may result in self-poisoning.

>> 2. RUSH to a health care facility!

>> 3. DO NOT induce vomiting. Ipecac is not recommended for ingestion of sodium cyanide.

>> 5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

>> 6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults. (EPA, 1998)

ERG 2024, Guide 157 (Sodium cyanide, solution; Sodium cyanide, solid)

>> 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.

ERG 2024, Guide 157 (Sodium cyanide, solid; Sodium cyanide, solution)

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>> 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).

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First Aid Measures

Inhalation First Aid

>> Administration of oxygen may be needed. Fresh air, rest. 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 skin with plenty of water or shower. Refer immediately for medical attention .

Eye First Aid

>> First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer 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

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

>> Full protective clothing including self-contained breathing apparatus, rubber gloves, boots, and bands around legs, arms, and waist should be provided. No skin surface should be exposed. Normal fire fighting procedures may be used.

>> Fight fire from maximum distance. Move container from area if you can do it without risk. Dike fire control water for later disposal. Do not scatter the material.

>> Use water. Use dry chemical, carbon dioxide, water spray, or foam for small fires, water spray, fog, or foam for large fires. (EPA, 1998)

>> 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)

>> NO hydrous agents. NO water. NO carbon dioxide. In case of fire in the surroundings, use appropriate extinguishing media. In case of fire: keep drums, etc., cool by spraying with water.

>> Sodium cyanide is non-combustible.

>> The agent itself does not burn.

>> Sodium cyanide releases highly flammable and toxic hydrogen cyanide gas on contact with acids or water.

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

>> Note: Most foams will react with the agent and release corrosive/toxic gases.

>> For small fires, do not use carbon dioxide; use dry chemical, dry sand, or alcohol-resistant foam.

>> For large fires, use water spray, fog, or alcohol-resistant foam. Move containers from the fire area if it is possible to do so without risk to personnel. Use water spray or fog; do not use straight streams. Dike fire control water for later disposal; do not scatter the material.

>> For fire involving tanks or car/trailer loads, fight the fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after the fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tanks. Always stay away from tanks engulfed in fire.

>> Run-off from fire control or dilution water may be corrosive and/or toxic, and it may cause pollution.

>> If the situation allows, control and properly dispose of run-off (effluent).

6. Accidental Release Measures

Toxic-by-Inhalation (TIH) Gas:

ERG Toxic-by-Inhalation (TIH) Gas(es) Produced When Spilled in Water

>> HCN - when spill Sodium cyanide, solid into water.

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: See ERG Table 1 - Initial Isolation and Protective Action Distances on the UN/NA 1689 datasheet.

>> 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 (Sodium cyanide, solution; Sodium cyanide, solid)

>> 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.

Isolation

>> When spilled in water

>> Small spill:

>> ISOLATE in all directions: 30 m (100 ft)

>> Large spill:

>> ISOLATE in all directions: 60 m (200 ft)

Protection

>> When spilled in water

>> Small spill:

>> PROTECT people from downwind during DAY time: 0.1 km (0.1 mi)

>> PROTECT people from downwind during NIGHT time: 0.1 km (0.1 mi)

>> Large spill:

>> PROTECT people from downwind during DAY time: 0.2 km (0.2 mi)

>> PROTECT people from downwind during NIGHT time: 0.9 km (0.6 mi)

Evacuation: ERG 2024, Guide 157 (Sodium cyanide, solid; Sodium cyanide, solution)

>> 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. Ventilation. Sweep spilled substance into covered dry, sealable, labelled containers. Cautiously neutralize remainder with sodium hypochlorite solution.

Accidental Release Measures

Public Safety: ERG 2024, Guide 157 (Sodium cyanide, solution; Sodium cyanide, solid)

>> 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 (Sodium cyanide, solution; Sodium cyanide, solid)

>> 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.

Public Safety: ERG 2024, Guide 157 (Sodium cyanide, solid; Sodium cyanide, solution)

>> 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.

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>> 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:

>> Separated from strong oxidants, acids, food and feedstuffs, carbon dioxide and products containing water. Dry. Well closed. Keep in a well-ventilated room. Store in an area without drain or sewer access.

Storage Conditions:

>> Store in a cool, dry, well-ventilated location. Separate from water, acids, carbon dioxide.

8. Exposure Control/ Personal Protection

>> C 5 mg/m3 (4.7 ppm) [10-minute] [*Note: The REL also applies to other cyanides (as CN) except Hydrogen cyanide.]

>> 5.0 [mg/m3], as CN

TLV-Ceiling

>> 5.0 [mg/m3], as CN

>> Ceiling limit: 5 mg/cu m, skin

>> (ceiling value): 5 mg/m

EU-OEL

>> 1 mg/m

Emergency Response: ERG 2024, Guide 157 (Sodium cyanide, solution; Sodium cyanide, solid)

>> 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.

Emergency Response: ERG 2024, Guide 157 (Sodium cyanide, solid; Sodium cyanide, solution)

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

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>> 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 severely 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.

>> Hydrogen cyanide has not been classified for cancer-causing (carcinogenic) effects, and no carcinogenic effects have been reported for hydrogen cyanide. No reproductive or developmental effects of hydrogen cyanide have been reported. Chronically exposed workers may complain of headache, eye irritation, easy fatigue, chest discomfort, palpitations, loss of appetite (anorexia), and nosebleeds (epistaxis). Workers such as electroplaters and picklers, who are exposed daily to cyanide solutions, may develop a “cyanide” rash, characterized by itching and by macular, papular, and vesicular eruptions. Exposure to small amounts of cyanide compounds over long periods of time is reported to cause loss of appetite, headache, weakness, nausea, dizziness, and symptoms of irritation of the upper respiratory tract and eyes.

Effects of Long Term Exposure:

>> The substance may have effects on the thyroid.

Exposure Prevention

>> AVOID ALL CONTACT! FIRST AID: USE PERSONAL PROTECTION.

Inhalation Prevention

>> Use local exhaust or breathing protection.

Skin Prevention

>> Protective gloves. Protective clothing.

Eye Prevention

>> Wear face shield or eye protection in combination with breathing protection.

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 (Sodium cyanide, solution; Sodium cyanide, solid)

>> 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.

Protective Clothing: ERG 2024, Guide 157 (Sodium cyanide, solid; Sodium cyanide, solution)

>> 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.

Exposure Summary

>> TIH (Toxic Inhalation Hazard) - Term used to describe gases and volatile liquids that are toxic when inhaled. Some are TIH materials themselves, e.g., chlorine, and some release TIH gases when spilled in water, e.g., chlorosilanes. [ERG 2016].

Maximum Allowable Concentration (MAK)

>> 3.8 [mg/m3], as CN, inhalable fraction[German Research Foundation (DFG)]

9. Physical And Chemical Properties

Molecular Weight:

>> 49.007

Exact Mass:

>> 48.99284329

Physical Description:

>> Sodium cyanide appears as a white crystalline solid, lump solid or powder. A deadly human poison by ingestion. Toxic by skin absorption through open wounds, by ingestion, and by inhalation of dust.

>> WHITE HYGROSCOPIC CRYSTALLINE POWDER WITH CHARACTERISTIC ODOUR. ODOURLESS WHEN DRY.

Color/Form:

>> White cubic crystals

Odor:

>> Odorless when perfectly dry, emits odor of hydrogen cyanide when damp

Boiling Point:

>> 2725 °F at 760 mmHg (EPA, 1998)

>> 1496 °C

Melting Point:

>> 1047 °F (EPA, 1998)

>> 564 °C

Flash Point:

>> Not combustible (EPA, 1998)

Solubility:

>> greater than or equal to 100 mg/mL at 68 °F (NTP, 1992)

>> Solubility in water, g/l at 20 °C: 480-520 (freely soluble)

Density:

>> 1.6 at 77 °F (USCG, 1999) - Denser than water; will sink

>> 1.6 g/cm³

Vapor Pressure:

>> 1 mmHg at 1502.6 °F (EPA, 1998)

>> Vapor pressure, kPa at 800 °C: 0.1

Stability/Shelf Life:

>> AQ SOLN ... RAPIDLY DECOMPOSES ON STANDING.

Autoignition Temperature:

>> Not flammable (USCG, 1999)

Decomposition:

>> ... If involved in a fire decomposes to produce hydrogen cyanide and oxides of nitrogen.

Viscosity:

>> 4 cP @ 30 °C (26% aqueous soln)

Corrosivity:

The ability of a chemical to damage or destroy other substances when it comes into contact.

>> Corrosive to aluminum.

Heat of Vaporization:

>> 3041 J/g

pH:

pH is an expression of hydrogen ion concentration in water. Specifically, pH is the negative logarithm of hydrogen ion (H+) concentration (mol/L) in an aqueous solution. The term is used to indicate basicity or acidity of a solution on a scale of 0 to 14, with pH 7 being neutral.

>> Aq soln strongly alkaline

Refractive Index:

>> INDEX OF REFRACTION: 1.452

10. Stability And Reactivity

>> Deliquescent. Soluble in water. Slowly decomposed by water and very rapidly by acids to give off hydrogen cyanide, a flammable poison gas.

>> Based on a scenario where the chemical is spilled into an excess of water (at least 5 fold excess of water), half of the maximum theoretical yield of Hydrogen Cyanide gas will be created in 12 minutes. Experimental details are in the following: "Development of the Table of Initial Isolation and Protective Distances for the 2008 Emergency Response Guidebook", ANL/DIS-09-2, D.F. Brown, H.M. Hartmann, W.A. Freeman, and W.D. Haney, Argonne National Laboratory, Argonne, Illinois, June 2009.

>> Water-Reactive

11. Toxicological Information

Toxicity Summary:

>> IDENTIFICATION: Other cyanides, such as sodium and potassium cyanide, are solid or crystalline hygroscopic salts widely used in ore extracting processes for the recovery of gold and silver, electroplating, case-hardening of steel, base metal flotation, metal degreasing, dyeing, printing, and photography. They are also widely used in the synthesis of organic and inorganic chemicals (e.g., nitriles, carboxylic acids, amides, esters, and amines; heavy metal cyanides) and in the production of chelating agents. HUMAN EXPOSURE: Cyanides are well absorbed via the gastrointestinal tract or skin and rapidly absorbed via the respiratory tract. Once absorbed, cyanide is rapidly and ubiquitously distributed throughout the body, although the highest levels are typically found in the liver, lungs, blood, and brain. There is no accumulation of cyanide in the blood or tissues following chronic or repeated exposure. Approximately 80% of

absorbed cyanide is metabolized to thiocyanate in the liver by the mitochondrial sulfur transferase enzyme rhodanese and other sulfur transferases. Thiocyanate is excreted in the urine. Minor pathways for cyanide detoxification involve reaction with cystine to produce aminothiazoline- and iminothiazolidinecarboxylic acids and combination with hydroxycobalamin (vitamin B12a) to form cyanocobalamin (vitamin B12); these end-products are also excreted in the urine. The principal features of the toxicity profile for cyanide are its high acute toxicity by all routes of administration, with a very steep and rate-dependent dose-effect curve, and chronic toxicity, probably mediated through the main metabolite and detoxification product, thiocyanate. The toxic effects of cyanide ion in humans and animals are generally similar and are believed to result from inactivation of cytochrome oxidase and inhibition of cellular respiration and consequent histotoxic anoxia. The primary targets of cyanide toxicity in humans are the cardiovascular, respiratory, and central nervous systems. The endocrine system is also a potential target for long-term toxicity, as a function of continued exposure to thiocyanate, which prevents the uptake of iodine in the thyroid and acts as a goitrogenic agent. Sequele after severe acute intoxications may include neuropsychiatric manifestations and Parkinson-type disease. Cyanide from tobacco smoke has been implicated as a contributing factor in tobacco-alcohol amblyopia. Long-term exposure to lower concentrations of cyanide in occupational settings can result in a variety of symptoms related to central nervous system effects. Cyanides are weakly irritating to the skin and eye; alkali salts have not been identified. ANIMAL/PLANT STUDIES: The principal features of the toxicity profile for cyanide are its high acute toxicity by all routes of administration, with a very steep and rate-dependent dose-effect curve, and chronic toxicity, probably mediated through the main metabolite and detoxification product, thiocyanate. The toxic effects of cyanide ion in humans and animals are generally similar and are believed to result from inactivation of cytochrome oxidase and inhibition of cellular respiration and consequent histotoxic anoxia. The primary targets of cyanide toxicity in animals are the cardiovascular, respiratory, and central nervous systems. The endocrine system is also a potential target for long-term toxicity, as a function of continued exposure to thiocyanate, which prevents the uptake of iodine in the thyroid and acts as a goitrogenic agent. In a 13-week repeated-dose toxicity study in which cyanide was administered in drinking-water, there were no clinical signs associated with central nervous system effects or histopathological effects in the brain or thyroid of rats or mice. There were slight changes in the reproductive tract in male rats, which, although they apparently would not affect fertility in rats. The examination of neurotoxicity in this study was limited to clinical observation and optical microscopy in autopsy. The few available studies specifically intended to investigate neurotoxicity, while reporting adverse effects at exposure levels of 1.2 mg cyanide/kg body weight per day in rats and 0.48 mg cyanide/kg body weight per day in goats, suffer from weaknesses that preclude their quantitative assessment. In relation to characterization of concentration-response for repeated-dose toxicity for inhalation (relevant principally to the occupational environment), in three separate studies in rats, there were no adverse systemic effects in rats exposed to acetone cyanohydrin, which is rapidly hydrolysed to hydrogen cyanide at physiological pH, at concentrations up to 211 mg/m3 (corresponding to a concentration of 67 mg hydrogen cyanide/m3). The steepness of the dose-effect curve is illustrated by the observation of 30% mortality among rats exposed part of the day to 225 mg acetone cyanohydrin/m3 (71 mg hydrogen cyanide/m3). Adverse effects of exposure to the low concentrations of cyanide that are generally present in the general environment (<1 ug/m3 in ambient air; <10 ug/litre in water) are unlikely. /Cyanide/

EPA Human Health Benchmarks for Pesticides:

This section provides the EPA human health benchmarks non-enforceable drinking water levels related to adverse health effects from drinking water exposure to contaminants that have no drinking water standards or health advisories.

Chemical Substance

>> Sodium cyanide

Acute or One Day PAD (RfD) [mg/kg/day]

>> 0.004

Acute or One Day HHBPs [ppb]

>> 30

Acute HHBP Sensitive Lifestage/Population

>> Children

Reference (PDF)

>> Human Health Benchmarks for Pesticides - 2021 Update

Carcinogen Classification:

This section provides the International Agency for Research on Cancer (IARC) Carcinogenic Classification and related monograph links. In the IARC Carcinogenic classification, chemicals are categorized into four groups: Group 1 (carcinogenic to humans), Group 2A (probably carcinogenic to humans), Group 2B (possibly carcinogenic to humans), and Group 3 (not classifiable as to its carcinogenicity to humans).

>> No indication of carcinogenicity to humans (not listed by IARC).

Health Effects:

>> Exposure to high levels of cyanide for a short time harms the brain and heart and can even cause coma, seizures, apnea, cardiac arrest and death. Chronic inhalation of cyanide causes breathing difficulties, chest pain, vomiting, blood changes, headaches, and enlargement of the thyroid gland. Skin contact with cyanide salts can irritate and produce sores. (L96, L97)

Exposure Routes:

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

>> inhalation, skin absorption, ingestion, skin and/or eye contact

Inhalation Exposure

>> Nausea. Dizziness. Drowsiness. Sore throat. Headache. Confusion. Weakness. Shortness of breath. Convulsions. Unconsciousness.

Skin Exposure

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

Eye Exposure

>> Redness. Pain. Further see Inhalation.

Ingestion Exposure

>> Burning sensation. Nausea. Vomiting. Diarrhoea. See Inhalation.

>> irritation eyes, skin; asphyxia; lassitude (weakness, exhaustion), headache, confusion; nausea, vomiting; increased resp rate; slow gasping respiration; thyroid, blood changes

Target Organs:

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

>> Reproductive

>> Eyes, skin, cardiovascular system, central nervous system, thyroid, blood

Adverse Effects:

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

>> Other Poison - Chemical Asphyxiant

>> Dermatotoxin - Skin burns.

Toxicity Data:

>> LD50: 6440 ug/kg (Oral, Rat) (T14) LD50: 4300 ug/kg (Intraperitoneal, Rat) (T14) LD50: 3660 ug/kg (Subcutaneous, Mouse) (T14)

Treatment:

Treatment when exposed to toxin

>> Antidotes to cyanide poisoning include hydroxocobalamin and sodium nitrite, which release the cyanide from the cytochrome system, and rhodanase, which is an enzyme occurring naturally in mammals that combines serum cyanide with thiosulfate, producing comparatively harmless thiocyanate. Oxygen therapy can also be administered. (L97)

Interactions:

>> FASTED MONGREL DOGS WERE SUBJECTED TO SODIUM THIOSULFATE INFUSION FOLLOWED BY SODIUM CYANIDE ADMIN (1 MG/KG) 30 MIN LATER. A PHARMACOKINETIC MODEL SHOWED THAT SODIUM THIOSULFATE INCREASED THE RATE OF CONVERSION OF CYANIDE TO THIOCYANATE BY A FACTOR OF 36.5; ALSO, IT REDUCED THE APPARENT VOLUME OF DISTRIBUTION OF CYANIDE.

Antidote and Emergency Treatment:

>> Basic Treatment: Establish a patent airway. Suction if necessary. Watch for signs of respiratory insufficiency and assist ventilations if necessary. Administer oxygen by nonrebreather mask at 10 to 15 l/min. Administer amyl nitrite ampules as per protocol and physician order ... . Monitor for shock and treat if necessary ... . Monitor for pulmonary edema and treat if ... . Anticipate seizures and treat if necessary ... . For eye contamination, flush eyes immediately with water. Irrigate each eye continuously with normal saline during transport ... . Do not use emetics. For ingestion, rinse mouth and administer 5 ml/kg up to 200 ml of water for dilution if the patient can swallow, has a strong gag reflex, and does not drool ... . /Cyanide and related compounds/

Human Toxicity Excerpts:

>> SYMPTOMATOLOGY: 1. Massive doses may produce, without warning, sudden loss of consciousness and prompt death from respiratory arrest. With smaller but still lethal doses, the illness may be prolonged for 1 or more hours. 2. Upon ingestion, a bitter, acrid, burning taste is sometimes noted, followed by a feeling of constriction or numbness in the

throat. Salivation, nausea and vomiting are not unusual ... 3. Anxiety, confusion, vertigo, giddiness, and often a sensation of stiffness in the lower jaw. 4. Hyperpnea and dyspnea. Respirations become very rapid and then slow and irregular. Inspiration is characteristically short while expiration is greatly prolonged. 5. The odor of bitter almonds may be noted on the breath or vomitus ... 6. In the early phases of poisoning, an increase in vasoconstrictor tone causes a rise in blood pressure and reflex slowing of the heart rate. Thereafter, the pulse becomes rapid, weak, and sometimes irregular. ... A bright pink coloration of the skin due to high concentrations of oxyhemoglobin in the venous return may be confused with that of carbon monoxide poisoning. /Cyanide/

Non-Human Toxicity Excerpts:

>> CYANIDES SUCH AS ... HYDROGEN CYANIDE, POTASSIUM CYANIDE AND SODIUM CYANIDE ARE ACUTELY POISONOUS, INTERFERING WITH METABOLIC PROCESSES & CAUSING RAPID DEATH. IN SEVERE POISONING, PUPILS ARE CHARACTERISTICALLY WIDELY DILATED.

Non-Human Toxicity Values:

>> LD50 Rat oral 6440 ug/kg

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)

>> 2.00e+02

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.

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. Ventilation. Sweep spilled substance into covered dry, sealable, labelled containers. Cautiously neutralize remainder with sodium hypochlorite solution.

Disposal Methods

>> Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste number D003; P106, 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/

>> Sodium cyanide is a poor candidate for incineration.

>> SMALL AMOUNTS OF AMMONIUM CHLORIDE-BUFFERED, AQUEOUS SODIUM CYANIDE WERE DECONTAMINATED WITH CALCIUM HYPOCHLORITE AT LESS THAN OR EQUAL TO 12 DEGREES, WHILE LARGER AMOUNTS OF CYANIDE WASTE WERE TREATED WITH HYPOCHLORITE FROM ANY SOURCE AT PH 10 TO CONVERT CYANIDE ION TO CYANATE ION.

14. Transport Information

DOT

Sodium cyanide (Na(CN))
6.1
UN Pack Group: I
Reportable Quantity of 10 lb or 4

IATA

Sodium cyanide (Na(CN))
6.1,
UN Pack Group: I

15. Regulatory Information

DHS Chemicals of Interest (COI):

This section provides the Department of Homeland Security (DHS) Chemicals of Interest (COI) and related information (Ref: 6 eCFR part 27 - https://www.ecfr.gov/current/title-6/chapter-I/part-27).

Chemicals of Interest(COI)

>> Sodium cyanide

Sabotage: Minimum Concentration (%)

>> A Commercial Grade

Sabotage: Screening Threshold Quantities

>> A Placarded Amount

Security Issue: Sabotage/Contamination

>> Chemical or material that can be mixed with readily available materials.

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.

>> Sodium 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.

TSCA Requirements:

This section provides information on requirements concerning this chemical under the Toxic Substances Control Act (TSCA) of 1976. TSCA provides EPA with authority to require reporting, record-keeping and testing requirements, and restrictions relating to chemical substances and/or mixtures. Certain substances are generally excluded from TSCA, including, among others, food, drugs, cosmetics and pesticides.

>> Section 8(a) of TSCA requires manufacturers of this chemical substance to report preliminary assessment information concerned with production, use, and exposure to EPA as cited in the preamble in 51 FR 41329.

Regulatory Information

The Australian Inventory of Industrial Chemicals

>> Chemical: Sodium cyanide

>> Specific Information Requirement: Obligations to provide information apply. You must tell us within 28 days if the circumstances of your importation or manufacture (introduction) are different to those in our assessment.

REACH Registered Substance

>> Status: Active Update: 29-06-2022 https://echa.europa.eu/registration-dossier/-/registered-dossier/15159

>> Status: Active Update: 26-03-2018 https://echa.europa.eu/registration-dossier/-/registered-dossier/23214

New Zealand EPA Inventory of Chemical Status

>> Sodium cyanide: HSNO Approval: HSR002740 Approved with controls

16. Other Information

Toxic Combustion Products:

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

>> Toxic oxides of nitrogen are produced in fires involving this material. /Sodium cyanide solution; sodium cyanide, solid/

Other Safety Information

Chemical Assessment

>> PEC / SN / Other assessments - Sodium cyanide: Environment

>> IMAP assessments - Sodium cyanide: Environment tier I assessment

>> IMAP assessments - Sodium and potassium cyanides: Human health tier II assessment

Methods of Dissemination

>> Indoor Air: Sodium cyanide can be released into indoor air as fine droplets, liquid spray (aerosol), or fine particles.

>> Water: Sodium cyanide can be used to contaminate water.

>> Food: Sodium cyanide can be used to contaminate food.

>> Outdoor Air: Sodium cyanide can be released into outdoor air as fine droplets, liquid spray (aerosol), or fine particles.

>> Agricultural: If sodium cyanide is released as fine droplets, liquid spray (aerosol), or fine particles, it has the potential to contaminate agricultural products.

"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."