

1. Material Identification

Product Name : Sodium azide (Na(N₃))

Catalog Number : io-2993

CAS Number : 26628-22-8

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)

Note

>> Pictograms displayed are for 99.8% (408 of 409) of reports that indicate hazard statements. This chemical does not meet GHS hazard criteria for 0.2% (1 of 409) of reports.

Pictogram(s)



GHS Hazard Statements

>> H300+H310 (16.4%): Fatal if swallowed or in contact with skin [Danger Acute toxicity, oral; acute toxicity, dermal]

>> H300 (99.5%): Fatal if swallowed [Danger Acute toxicity, oral]

>> H310 (41.6%): Fatal in contact with skin [Danger Acute toxicity, dermal]

>> H373 (23%): May causes damage to organs through prolonged or repeated exposure [Warning Specific target organ toxicity, repeated exposure]

>> H400 (96.3%): Very toxic to aquatic life [Warning Hazardous to the aquatic environment, acute hazard]

>> H410 (99.5%): Very toxic to aquatic life with long lasting effects [Warning Hazardous to the aquatic environment, long-term hazard]

Precautionary Statement Codes

>> P260, P262, P264, P270, P273, P280, P301+P316, P302+P352, P316, P319, P321, P330, P361+P364, P391, P405, and P501

NFPA 704 Diamond



NFPA Health Rating

>> 4 - Materials that, under emergency conditions, can be lethal.

NFPA Fire Rating

- >> 1 – Materials that must be preheated before ignition can occur. Materials require considerable preheating, under all ambient temperature conditions, before ignition and combustion can occur.

NFPA Instability Rating

- >> 3 – Materials that in themselves are capable of detonation or explosive decomposition or explosive reaction but that require a strong initiating source or must be heated under confinement before initiation.

Health Hazards:

- >> Can cause death by affecting the central nervous system. Contact may cause burns to skin and eyes. (EPA, 1998)

ERG 2024, Guide 153 (Sodium azide)

- >> TOXIC and/or CORROSIVE; inhalation, ingestion or skin contact with material may cause severe injury or death.
- >> Methyl bromoacetate (UN2643) is an eye irritant/lachrymator (causes flow of tears).
- >> Contact with molten substance may cause severe burns to skin and eyes.
- >> Avoid any skin contact.
- >> Fire may produce irritating, corrosive and/or toxic gases.
- >> Runoff from fire control or dilution water may be corrosive and/or toxic and cause environmental contamination.
- >> When heated to decomposition, it emits very toxic fumes of nitrogen oxides; explosive. Forms explosive-sensitive materials with some metals such as lead, silver, mercury or copper. May form toxic hydrazoic acid fumes in fire. Containers may explode in fire. Avoid acids, benzoyl chloride and potassium hydroxide; bromine; carbon disulfide; copper; lead; nitric acid; barium carbonate; sulfuric acid; chromium (II) hypochlorite, dimethyl sulfate, water, dibromomalononitrile, lead, silver, copper, mercury. Hazardous polymerization may not occur. (EPA, 1998)

ERG 2024, Guide 153 (Sodium azide)

- >> Combustible material: may burn but does not ignite readily.
- >> When heated, vapors may form explosive mixtures with air: indoors, outdoors and sewers explosion hazards.
- >> Those substances designated with a (P) may polymerize explosively when heated or involved in a fire.
- >> Corrosives in contact with metals may evolve flammable hydrogen gas.
- >> Containers may explode when heated.
- >> Runoff may pollute waterways.
- >> Substance may be transported in a molten form.
- >> Combustible. Gives off irritating or toxic fumes (or gases) in a fire. Risk of fire and explosion on contact with acids or metals. Heating will cause rise in pressure with risk of bursting.

3. Composition/Information On Ingredients

Chemical name : Sodium azide (Na(N₃))

CAS Number : 26628-22-8

Molecular Formula : N₃Na

Molecular Weight : 65.0100 g/mol

4. First Aid Measures

First Aid:

- >> Warning: Effects may be delayed. Caution is advised. Vital signs should be monitored closely.
- >> Signs and Symptoms of Sodium Azide (Na(N₃)) Exposure: Ingestion or inhalation of sodium azide may cause dizziness, weakness, blurred vision, dyspnea (shortness of breath), hypotension (low blood pressure), slowed heart rate, and abdominal pain. Spasms, convulsions, and loss of consciousness may also occur. Dermal or eye exposure to sodium azide may result in pain and redness of exposed areas. Eye exposure may also lead to blurred vision.
- >> Emergency Life-Support Procedures: Acute exposure to sodium azide (Na(N₃)) may require decontamination and life support for the victims. 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 azide (Na(N₃)).
- >> 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. If breathing is labored, administer oxygen or other respiratory support.
- >> 3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.
- >> 4. Transport to a health care facility.

>> Dermal/Eye Exposure:

- >> 1. Remove victims from exposure. Emergency personnel should avoid self-exposure to sodium azide (Na(N₃)).
- >> 3. Remove and isolate contaminated clothing as soon as possible.
- >> 4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.
- >> 5. Wash exposed skin areas thoroughly with water.
- >> 6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.
- >> 7. Transport to a health care facility.

>> 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. If breathing is labored, administer oxygen or other respiratory support.
- >> 2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.
- >> 3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of sodium azide (Na(N₃)) is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step
- >> 4. Ipecac should not be administered to children under 6 months of age. Warning: Ingestion of sodium azide (Na(N₃)) may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step
- >> 4. The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.
- >> 4. 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.
- >> 5. Transport to a health care facility. (EPA, 1998)

ERG 2024, Guide 153 (Sodium azide)

>> 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 ingested or 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 continuous compressions. 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.
 - >> Removal of solidified molten material from skin requires medical assistance.
 - >> 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

- >> Fresh air, rest. Half-upright position. Refer immediately for medical attention.

Skin First Aid

- >> Rinse skin with plenty of water or shower. Seek medical attention if you feel unwell.

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. Do NOT induce vomiting. Give one or two glasses of water to drink. Refer immediately for medical attention.

5. Fire Fighting Measures

- >> Personnel protection: Avoid breathing dusts and fumes from burning material. Avoid bodily contact with the material. Wear boots, protective gloves and goggles. Do not handle broken packages without protective equipment. Wash away any material which may have contacted the body with copious amounts of water or soap and water. Evacuation: If fire becomes uncontrollable or container is exposed to direct flame, evacuate for a radius of 2500 feet. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering. Wear positive pressure breathing apparatus and special protective clothing.
- >> If material is on fire or involved in fire, use water in flooding quantities as fog. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use foam, carbon dioxide or dry chemical. Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do so without risk. Spray cooling water on containers that are exposed to flames until well after fire is out. For massive fire in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn. (EPA, 1998)
- >> Use dry sand, special powder. In case of fire: keep drums, etc., cool by spraying with water.

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 153 [Substances – Toxic and/or Corrosive (Combustible)]:
- >> 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 153 (Sodium azide)

- >> 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.

- >> Personal protection: particulate filter respirator adapted to the airborne concentration of the substance. Do NOT let this chemical enter the environment. Sweep spilled substance into covered plastic containers. If appropriate, moisten first to prevent dusting. Carefully collect remainder. Then store and dispose of according to local regulations.

Accidental Release Measures

Public Safety: ERG 2024, Guide 153 (Sodium azide)

- >> 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 153 (Sodium azide)

- >> ELIMINATE all ignition sources (no smoking, flares, sparks or flames) from immediate area.
- >> Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- >> Stop leak if you can do it without risk.
- >> Prevent entry into waterways, sewers, basements or confined areas.
- >> Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- >> DO NOT GET WATER INSIDE CONTAINERS.

7. Handling And Storage

Safe Storage:

- >> Separated from food and feedstuffs, acids and metals. See Chemical Dangers. Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.

Storage Conditions:

- >> Keep container tightly closed in a dry and well-ventilated place. Never allow product to get in contact with water during storage. Do not store near acids.

8. Exposure Control/ Personal Protection

REL-C (Ceiling)

- >> 0.1 ppm (0.3 mg/m³) (as HN₃), 0.3 mg/m³ (as NaN₃)

>> C 0.1 ppm (as HN₃) [skin] C 0.3 mg/m³ (as NaN₃) [skin]

>> none See Appendix G

TLV–Ceiling

>> 0.29 [mg/m³], as NaN₃

>> Ceiling Limit: 0.29 mg/cu m. /As sodium azide/

>> 0.29 mg/m

TLV–C (Ceiling)

>> 0.29 mg/m³ (as Sodium azide), 0.11 ppm (as Hydrazoic acid vapor) [1992]

EU–OEL

>> 0.1 mg/m

MAK (Maximale Arbeitsplatz Konzentration)

>> 0.2 mg/m

Emergency Response: ERG 2024, Guide 153 (Sodium azide)

>> Small Fire

>> Dry chemical, CO₂ or water spray.

>> Large Fire

>> Dry chemical, CO₂, alcohol-resistant foam or water spray.

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

>> 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, especially if powdered.

Effects of Short Term Exposure:

>> The substance is mildly irritating to the eyes and upper respiratory tract. The substance may cause effects on the cardiovascular system and central nervous system. This may result in lowering of blood pressure, cardiac disorders and central nervous system disorders. Ingestion of large amounts could cause death. Inhalation of dust may cause asthma-like reactions (RADS).

Fire Prevention

>> NO contact with acids or heavy metals. Do NOT expose to heat, friction or shock.

Exposure Prevention

>> PREVENT DISPERSION OF DUST! STRICT HYGIENE!

Inhalation Prevention

>> Use local exhaust or breathing protection.

Skin Prevention

>> Protective gloves.

Eye Prevention

>> Wear safety spectacles or eye protection in combination with breathing protection.

Ingestion Prevention

>> Do not eat, drink, or smoke during work.

Exposure Control and Personal Protection

Protective Clothing: ERG 2024, Guide 153 (Sodium azide)

- >> 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)

- >> 0.2 [mg/m³], inhalable fraction[German Research Foundation (DFG)]

9. Physical And Chemical Properties

Molecular Weight:

- >> 65.010

Exact Mass:

- >> 64.99899129

Physical Description:

- >> Sodium azide appears as a colorless crystalline solid. Density 1.85 g / cm³. Burns in air and may explode if large quantities are involved. Toxic by ingestion. Toxic oxides of nitrogen are produced in fires.
- >> COLOURLESS HEXAGONAL CRYSTALS.

Color/Form:

- >> Colorless hexagonal crystals

Odor:

- >> Odorless (with traces of water fishy smelling because of HN₃ formation)

Boiling Point:

- >> Decomposes in vacuum (EPA, 1998)

Melting Point:

- >> Decomposes at 527 °F to sodium and nitrogen (EPA, 1998)

Flash Point:

- >> Not flammable (EPA, 1998)

Solubility:

- >> 50 to 100 mg/mL at 72 °F (NTP, 1992)
- >> Solubility in water, g/100ml at 17 °C: 41.7 (good)

Density:

- >> 1.846 at 68 °F (EPA, 1998) – Denser than water; will sink
- >> Relative density (water = 1): 1.85

Vapor Pressure:

- >> 1 Pa at 20 °C
- >> Vapor pressure, Pa at 20 °C: 1

Stability/Shelf Life:

- >> Stable under recommended storage conditions.

Decomposition:

- >> Hazardous decomposition products formed under fire conditions – Sodium oxides.
- >> 275 °C

Corrosivity:

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

>> Very corrosive to aluminum, moderate to copper and lead

Ionization Potential:

>> 11.70 eV

Dissociation Constants:

>> pKb = 9.3

10. Stability And Reactivity

>> Soluble in water. Addition of water to sodium azide which was heated caused a violent reaction, [Angew. Chem. 1952, 64, 169]. Dust may form an explosive mixture in air.

CSL No

>> CSL00006

Reactants/Reagents

>> DICHLOROMETHANE + SODIUM AZIDE

Warning Message

>> Formation of diazidomethane which can explode. Azide reactions should not be performed in halogenated solvents.

GHS Category

>> Explosive

Reaction Class

>> Substitution

Reference Source

>> C&EN

Modified Date

>> 6/29/18

Create Date

>> 10/2/17

Functional Group

>> Azide

Reaction Scale

>> Not Available

Additional Information

>> Two comments were published as safety letters about this incident: 1. Frurip, David J.; Gorman, David B. Chemical Safety: Benzotriazole-1-Sulfonyl Azide. Chem. Eng. News 2012, 90 (15), 4. DOI: 10.1021/cen-09015-letters. (Letters: chemical safety). 2. Buske, Gary R. Chemical Safety: Benzotriazole-1-Sulfonyl Azide. Chem. Eng. News 2012, 90 (15), 4-5. DOI: 10.1021/cen-09015-letters. (Letters: chemical safety).

DOI Link

>> 10.1021/cen-09002-letters

11. Toxicological Information

Toxicity Summary:

>> IDENTIFICATION AND USE: Sodium azide is a colorless to white crystalline solid, forming hydrazoic acid in water. It is used in organic synthesis, and in the preparation of hydrazoic acid, lead azide, and pure sodium. Other uses include the differential selection of bacteria, in automatic blood counters, and as a preservative for laboratory reagents. It is also a propellant for inflating automotive safety bags. Agricultural uses including nematocide, herbicide, and fruit rot control. HUMAN STUDIES: Potential symptoms of overexposure include irritation of eyes and skin, nausea, vomiting, restlessness, diarrhea, headache, dizziness, weakness, blurred vision, dyspnea, hypotension, tachycardia, bradycardia, tachypnea,

hypothermia, acidosis, convulsions, and kidney changes. Cases of fatal sodium azide poisoning induced by suicidal ingestion have been reported. Death occurs rapidly when significant doses are absorbed, either due to the direct effect of sodium azide or an indirect effect due to nitric oxide, cyanide ions or hydrazoic acid production from sodium azide. The minimal hypotensive dose in humans lies between 0.2 and 0.4 ug/kg. Neuropsychological and psychological tests, a questionnaire, and hematological and cardiac measurements were gathered from 41 exposed workers and 42 unexposed workers in a chemical production plant yearly for 3 years. The exposed workers presented significantly more acute symptoms of exposure (headache, vertigo, nausea, fatigue, cardiac palpitations, irritated or red eyes) than did the unexposed workers. However, only one chronic symptom was repeatedly and more significantly reported, namely trembling of the hands. Azide is one of the few known potent mutagens that does not increase sister-chromatid exchanges SCEs and/or break chromosomes. ANIMAL STUDIES: Sodium azide inhibits respiration of bovine cornea, presumably by poisoning cytochrome oxidase. Repeated intraperitoneal injections in rats (5 to 10 mg/kg every 15 to 30 min for 3 to 6 hr) resulted in severe intoxication; some survivors showed injury and demyelination of nerve fibers in the central nervous system and testicular damage, but no lesions of liver or kidney. Intramuscular injection of 8 to 10 mg/kg in monkeys produced convulsions and apnea and resulted in the deaths of many of these animals. Among those who survived, ataxia developed secondary to the lesions in the cerebellar cortex; repeated administration caused necrosis and demyelination of the optic nerves and destruction of the caudate nucleus and putamen of the lenticular nucleus. In a chronic rat study in which the maximum tolerated dose and half that level were given in the diet or by gastric intubation twice weekly for 18 months, sodium azide was determined to be noncarcinogenic. Sterility has been produced in male mice given sodium azide. Sodium azide effectively reverts *S. typhimurium* strain TA1530, indicating that it is a base substitution mutagen. It is ineffective on strains which are frameshift mutants. It is highly mutagenic in barley, rice, peas, yeast and Chinese hamster V79 cells. However, azide apparently does not produce chromosome breaks in barley or *Vicia*. ECOTOXICITY STUDIES: Sodium azide is a potent mutagen of salmon sperm DNA in an acidic environment. Heritable translocation noted in insects after oral mutation dose 100 mg/L. Sodium azide induced a high frequency of mutations in barley seeds. Sodium azide does not induce somatic crossing over and chromosome breaks in soybeans.

Evidence for Carcinogenicity:

Evidence that this chemical does or may cause cancer. The information here is collected from various sources by the Hazardous Substances Data Bank (HSDB).

>> A4; Not classifiable as a human carcinogen. /As sodium azide or as hydrazoic acid vapor/

Exposure Routes:

- >> The substance can be absorbed into the body by inhalation and by ingestion.
- >> inhalation, skin absorption, ingestion, skin and/or eye contact

Inhalation Exposure

- >> Cough. Headache. Nasal congestion. Fall in blood pressure. Shortness of breath.

Eye Exposure

- >> Redness. Pain.

Ingestion Exposure

- >> Abdominal pain. Nausea. Sweating. Fall in blood pressure. Increased heart rate. Weakness. Blurred vision. Shock or collapse. See Effects of short-term exposure
- >> irritation eyes, skin; headache, dizziness, lassitude (weakness, exhaustion), blurred vision; low blood pressure, bradycardia; kidney changes

Target Organs:

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

- >> Eyes, skin, central nervous system, cardiovascular system, kidneys

Adverse Effects:

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

- >> Other Poison – Chemical Asphyxiant
- >> Reproductive Toxin – A chemical that is toxic to the reproductive system, including defects in the progeny and injury to male or female reproductive function. Reproductive toxicity includes developmental effects. See Guidelines for Reproductive Toxicity Risk Assessment.
- >> Toxic Pneumonitis – Inflammation of the lungs induced by inhalation of metal fumes or toxic gases and vapors.
- >> ACGIH Carcinogen – Not Classifiable.

Interactions:

>> Pentachlorophenol (PCP) is used in industrial and domestic applications, including as a biocide and a wood preservative. Metabolism of PCP undergoes oxidative dechlorination, forming tetrachlorocatechol (TCC) and tetrachlorohydroquinone (TCHQ). Both sodium azide (NaN(3)) and TCC appear naturally in soil. None of them are cytotoxic by themselves or facilitate autooxidation. Here, we show that their combination leads to synergistic cytotoxicity (>6 log bacterial killing) to *Escherichia coli*. The rate of oxygen consumption in a cell-free system showed that NaN(3) increases TCC oxidation by 520-fold. The synergism coefficient to cells was calculated as 96 or greater, and we have shown the formation of a new compound. It is suggested that the intermediate species, o-tetrachlorosemiquinone, and an unknown, nitrogen-centered free radical, both visualized by electron-spin resonance, are harmful species responsible for the synergistic cytotoxicity of TCC/NaN(3), rather than the endproduct formed during the reaction. Desferrioxamine and 2-(4-carboxyphenyl)-4,4,5,5-tetramethylimidazoline-1-oxyl-3-oxide offered nearly complete protection, but through radical scavenging rather than through chelating properties. The mechanism of damage for TCC compared to its analogue, TCHQ, were investigated, and whereas the cellular damage of TCHQ/NaN(3) is through a site-specific mechanism, in the case of TCC/NaN(3) it is through the accumulation of the component(s) in the bacterial cell membrane, eventually leading to dysfunction, as evidenced by electron microscopy.

Antidote and Emergency Treatment:

>> Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand-valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR if necessary. Immediately flush contaminated eyes with gently flowing water. Do not induce vomiting. If vomiting occurs, lean patient forward or place on the left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Obtain medical attention.
/Sodium Azide (NaN3) and Related Compounds/

Human Toxicity Excerpts:

>> /SIGNS AND SYMPTOMS/ Potential symptoms of overexposure are irritation of eyes, skin; nausea, vomiting, restlessness, diarrhea; headache, dizziness, weakness, blurred vision; dyspnea; hypotension, tachycardia, bradycardia, tachypnea; hypothermia; acidosis; convulsions; kidney changes.

Non-Human Toxicity Excerpts:

>> /LABORATORY ANIMALS: Acute Exposure/ Sodium azide, a salt of hydrazoic acid, inhibits respiration of bovine cornea, presumably by poisoning cytochrome oxidase.

Human Toxicity Values:

Quantitative human toxicity values (e.g., lethal dose) for this compound.

>> DNA inhibition human fibroblast 50 mg/L.

Non-Human Toxicity Values:

>> LD50 Mouse sc 23 mg/kg

National Toxicology Program Studies:

Reports from the National Toxicology Program, an interagency program supported by three government agencies (NIH, FDA, and CDC) within the Department of Health and Human Services. This program plays a critical role in generating, interpreting, and sharing toxicological information about chemicals of public health concerns.

>> Toxicology and carcinogenicity studies were conducted by administering sodium azide (greater than 99% pure) in distilled water by gavage to groups of male and female F344/N rats ... 5 days per week for ... 2 years. ... Two year studies were conducted by administering 0, 5, or 10 mg/kg sodium azide to groups of 60 male and 60 female rats. ... Under the conditions of these 2 yr gavage studies, there was no evidence of carcinogenic activity of sodium azide in male or female F344/N rats administered 5 or 10 mg/kg.

TSCA Test Submissions:

Under the Toxic Substances Control Act (TSCA), EPA has broad authority to issue regulations designed to require manufacturers (including importers) or processors to test chemical substances and mixtures for health and environmental effects. This section provides information on test reports submitted for this chemical under TSCA.

>> Sodium azide (CAS # 26628-22-8) was evaluated for subchronic toxicity and neurotoxicity in dogs (breed, number unspecified) administered oral doses of 1, 3, and 10 mg/kg/day (duration unspecified). On 27th and terminal (unspecified) weeks of study ataxia was reported in 2 high-dose females and 1 mid-dose male. Treatment was also associated with altered clinical chemistry values including depressed alkaline phosphatase levels in all male and most female groups, decreased LDH in all treated males, and decreased serum glutamic oxalocetic transaminase in most treated animals. Bodyweights, relative organ weights, food consumption, ophthalmic and neurological examinations, hematology, urinalysis, and gross pathology showed no toxic effects. A draft pathology report subsequently documented compound-related histomorphologic changes in mid and anterior cerebrum of affected females, characterized by gliosis, conspicuous vasculature from endothelial swelling and condensation of the neuropil, and demyelination with degenerative changes in the caudate nucleus. This submission included a summarized version of this study only; no further information or data was provided.

12. Ecological Information

Resident Soil (mg/kg)

>> 3.10e+02

Industrial Soil (mg/kg)

>> 4.70e+03

Tapwater (ug/L)

>> 8.00e+01

MCL (ug/L)

>> 4.00e+00

Chronic Oral Reference Dose (mg/kg-day)

>> 4.00e-03

Volatile

>> Volatile

Mutagen

>> Mutagen

Fraction of Contaminant Absorbed in Gastrointestinal Tract

>> 1

ICSC Environmental Data:

>> The substance is very toxic to aquatic organisms. This substance does enter the environment under normal use. Great care, however, should be taken to avoid any additional release, for example through inappropriate disposal.

13. Disposal Considerations

Spillage Disposal

>> Personal protection: particulate filter respirator adapted to the airborne concentration of the substance. Do NOT let this chemical enter the environment. Sweep spilled substance into covered plastic containers. If appropriate, moisten first to prevent dusting. Carefully collect remainder. Then store and dispose of according to local regulations.

Disposal Methods

>> Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste number P105, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste.

>> Product: Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber; Contaminated packaging: Dispose of as unused product.

- >> 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.
- >> Disposal may be accomplished by reaction with sulfuric acid solution and sodium nitrate in a hard rubber vessel. Nitrogen dioxide is generated by this reaction and the gas is run through a scrubber before it is released to the atmosphere. Controlled incineration is also acceptable (after mixing with other combustible wastes) with adequate scrubbing and ash disposal facilities.
- >> Put into approved storage containers and ship to an approved disposal area.

14. Transport Information

DOT

Sodium azide (Na(N₃))

6.1

UN Pack Group: II

Reportable Quantity of 1000 lb or 454 kg

IATA

Sodium azide (Na(N₃))

6.1,

UN Pack Group: II

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 azide

Theft: Minimum Concentration (%)

- >> A Commercial Grade

Theft: Screening Threshold Quantities (in pounds unless otherwise noted)

- >> 400

Security Issue: Theft - EXP/IEDP

- >> Explosive/Improvised Explosive Device Precursor material that, if stolen or diverted, can be converted into weapons using simple chemistry, equipment, or techniques.

Regulatory Information

REACH Registered Substance

- >> Status: Active Update: 16-12-2022 <https://echa.europa.eu/registration-dossier/-/registered-dossier/14174>
- >> Status: Active Update: 28-03-2018 <https://echa.europa.eu/registration-dossier/-/registered-dossier/23379>

New Zealand EPA Inventory of Chemical Status

- >> Sodium azide: HSNO Approval: HSR003078 Approved with controls

16. Other Information

Toxic Combustion Products:

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

>> Poisonous gases are produced in fire, included nitrogen oxides.

"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. lonz is not responsible for any damages resulting from handling or contact with the product incorrectly."