ionz

SAFETY DATA SHEET

Updated on 26/09/2024

1. Material Identification

Product Name : 2,4-Dinitrophenol
Catalog Number : io-2269
CAS Number : 51-28-5
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

>> This chemical does not meet GHS hazard criteria for 93.2% (68 of 73) of all reports. Pictograms displayed are for 6.8% (5 of 73) of reports that indicate hazard statements.

GHS Hazard Statements

>> Not Classified

>> Reported as not meeting GHS hazard criteria by 68 of 73 companies (only 6.8% companies provided GHS information). For more detailed information, please visit ECHA C&L website.

Pictogram(s)

Precautionary Statement Codes

>> P210, P230, P240, P250, P260, P261, P262, P264, P270, P271, P273, P280, P301+P316, P302+P352, P304+P340, P316, P319, P321, P330, P361+P364, P370+P380, P372, P373, P391, P401, P403+P233, P405, and P501

Health Hazards:

>> DUST: POISONOUS IF INHALED OR IF SKIN IS EXPOSED. SOLID: POISONOUS IF SWALLOWED. (USCG, 1999)

ERG 2024, Guide 153 (Dinitrophenol, solution)

>> 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.

ERG 2024, Guide 113 (Dinitrophenol, wetted with not less than 15% water)

>> Some are toxic and may be fatal if inhaled, ingested or absorbed through skin. Specifically, Dinitrophenol, wetted (UN1320); Dinitrophenolates, wetted (UN1321), Sodium dinitro-o-cresolate, wetted (UN1348); and Barium azide, wetted (UN1571) are known to be toxic.

>> Contact may cause burns to skin and eyes.

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

>> Runoff from fire control or dilution water may cause environmental contamination.

>> Combustible. May explode if subjected to heat or flame. POISONOUS GAS IS PRODUCED WHEN HEATED. Vapors are toxic. Can detonate or explode when heated under confinement. (USCG, 1999)

ERG 2024, Guide 153 (Dinitrophenol, solution)

>> 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.

ERG 2024, Guide 113 (Dinitrophenol, wetted with not less than 15% water)

>> Flammable/combustible material.

>> May be ignited by heat, sparks or flames.

>> DRIED OUT material may explode if exposed to heat, flame, friction or shock; treat as an explosive (GUIDE 112).

>> Keep material wet with water or treat as an explosive (GUIDE 112).

>> Runoff to sewer may create fire or explosion hazard.

>> Combustible. Gives off irritating or toxic fumes (or gases) in a fire. Risk of fire and explosion.

3. Composition/Information On Ingredients

Chemical name : 2,4-Dinitrophenol
CAS Number : 51-28-5
Molecular Formula : C6H4N2O5
Molecular Weight : 184.1100 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: DO NOT INDUCE VOMITING. Phenols are very toxic poisons AND corrosive and irritating, so that inducing vomiting may make medical problems worse. IMMEDIATELY call a hospital or poison control center and locate activated

charcoal, egg whites, or milk in case the medical advisor recommends administering one of them. If advice from a physician is not readily available and the victim is conscious and not convulsing, give the victim a glass of activated charcoal slurry in water or, if this is not available, a glass of milk, or beaten egg whites and IMMEDIATELY transport victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, assure 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 153 (Dinitrophenol, solution)

>> 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.

>> 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.

ERG 2024, Guide 113 (Dinitrophenol, wetted with not less than 15% water)

>> 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.

>> 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.

Skin First Aid

>> Remove contaminated clothes. Rinse and then wash skin with water and soap. 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

>> Rest. Refer immediately for medical attention.

5. Fire Fighting Measures

>> The primary hazard is from blast effect where the entire load can explode instantaneously and not from flying projectiles and fragments. /Dinitrophenol, dry/

>> Excerpt from ERG Guide 113 [Flammable Materials (Wet / Desensitized Explosive)]:

>> CARGO FIRE: DO NOT fight fire when fire reaches cargo! Cargo may EXPLODE! Stop all traffic and clear the area for at least 1600 meters (1 mile) in all directions and let burn. Do not move cargo or vehicle if cargo has been exposed to heat.

>> TIRE OR VEHICLE FIRE: Use plenty of water - FLOOD it! If water is not available, use CO2, dry chemical or dirt. If possible, and WITHOUT RISK, use unmanned master stream devices or monitor nozzles from maximum distance to prevent fire from spreading to cargo area. Pay special attention to tire fires as re-ignition may occur. Stand by, at a safe distance, with extinguisher ready for possible re-ignition. (ERG, 2024)

>> Use water in large amounts. In case of fire: keep drums, etc., cool by spraying with water. Combat fire from a sheltered position.

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 113 [Flammable Materials (Wet / Desensitized Explosive)]:

>> IMMEDIATE PRECAUTIONARY MEASURE: Isolate spill or leak area immediately for at least 100 meters (330 feet) in all directions.

>> LARGE SPILL: Consider initial evacuation for 500 meters (1/3 mile) in all directions.

>> 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 (Dinitrophenol, 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.

Evacuation: ERG 2024, Guide 113 (Dinitrophenol, wetted with not less than 15% water)

>> Immediate precautionary measure

>> Isolate spill or leak area immediately for at least 100 meters (330 feet) in all directions.

>> Large Spill

>> Consider initial evacuation for 500 meters (1/3 mile) in all directions.

>> 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: complete protective clothing including self-contained breathing apparatus. Do not allow to dry out. Do NOT let this chemical enter the environment. Sweep spilled substance into containers. Carefully collect remainder. Store and dispose of according to local regulations.

Accidental Release Measures

Public Safety: ERG 2024, Guide 153 (Dinitrophenol, 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.

>> 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 (Dinitrophenol, solution)

>> 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.

Public Safety: ERG 2024, Guide 113 (Dinitrophenol, wetted with not less than 15% water)

>> 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 113 (Dinitrophenol, wetted with not less than 15% water)

>> 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 or walk through spilled material.

>> Small Spill

>> Flush area with large amounts of water.

>> Large Spill

>> Wet down with water and dike for later disposal.

>> KEEP "WETTED" PRODUCT WET BY SLOWLY ADDING FLOODING QUANTITIES OF WATER.

7. Handling And Storage

Safe Storage:

>> Fireproof. Store in an area without drain or sewer access. Provision to contain effluent from fire extinguishing. Cool. Separated from combustible substances, reducing agents and food and feedstuffs.

Storage Conditions:

>> /Dinitrophenol/ ... should be stored in a cool ventilated place away from area of acute fire hazard and away from powerful oxidizing agents. /Dinitrophenol/

8. Exposure Control/ Personal Protection

Emergency Response: ERG 2024, Guide 153 (Dinitrophenol, solution)

>> 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.

Emergency Response: ERG 2024, Guide 113 (Dinitrophenol, wetted with not less than 15% water)

>> CARGO Fire

>> DO NOT fight fire when fire reaches cargo! Cargo may EXPLODE!

>> Stop all traffic and clear the area for at least 1600 meters (1 mile) in all directions and let burn.

>> Do not move cargo or vehicle if cargo has been exposed to heat.

>> TIRE or VEHICLE Fire

>> Use plenty of water - FLOOD it! If water is not available, use CO2, dry chemical or dirt.

>> If possible, and WITHOUT RISK, use unmanned master stream devices or monitor nozzles from maximum distance to prevent fire from spreading to cargo area.

>> Pay special attention to tire fires as re-ignition may occur. Stand by, at a safe distance, with extinguisher ready for possible re-ignition.

Inhalation Risk:

>> A nuisance-causing concentration of airborne particles can be reached quickly when dispersed.

Effects of Short Term Exposure:

>> The substance may be irritating to the eyes and skin.

Effects of Long Term Exposure:

>> Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the metabolism. This may result in cataract, cardiovascular disorders and nervous system impairment.

Fire Prevention

>> NO open flames, NO sparks and NO smoking. Do NOT expose to friction or shock. Use non-sparking handtools. Prevent deposition of dust. Closed system, dust explosion-proof electrical equipment and lighting.

Exposure Prevention

>> PREVENT DISPERSION OF DUST! STRICT HYGIENE!

Inhalation Prevention

>> Use local exhaust or breathing protection.

Skin Prevention

>> Protective gloves. Protective clothing.

Eye Prevention

>> Wear safety goggles.

Ingestion Prevention

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

Exposure Control and Personal Protection

Protective Clothing: ERG 2024, Guide 153 (Dinitrophenol, 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.

Protective Clothing: ERG 2024, Guide 113 (Dinitrophenol, wetted with not less than 15% water)

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

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

9. Physical And Chemical Properties

Molecular Weight:

>> 184.11

Exact Mass:

>> 184.01202123

Physical Description:

>> 2,4-dinitrophenol appears as solid yellow crystals. Explosive when dry or with less than 15% water. The primary hazard is from blast of an instantaneous explosion and not flying projectiles and fragments. slightly soluble in water and soluble in ether and solutions of sodium or potassium hydroxide.

>> CRYSTALS WITH CHARACTERISTIC ODOUR.

Color/Form:

>> Pale yellow platelets or leaflets from water

Odor:

>> SWEET, MUSTY ODOR

Taste:

The sensation of flavor perceived in the mouth and throat on contact with a substance.

>> BITTER TASTE

Boiling Point:

>> Sublimes (when carefully heated) (NTP, 1992)

Melting Point:

>> 234 to 237 °F (NTP, 1992)

>> 112 °C

Solubility:

>> >27.6 [ug/mL] (The mean of the results at pH 7.4)

>> Solubility in water, g/l: 6 (poor)

Density:

>> 1.68 at 68 °F (USCG, 1999) - Denser than water; will sink

>> Relative density (water = 1): 1.68

Vapor Density:

>> 6.35 (NTP, 1992) - Heavier than air; will sink (Relative to Air)

>> Relative vapor density (air = 1): 6.36

Vapor Pressure:

>> 0.00039 [mmHg]

LogP:

>> 1.67 (estimated)

Stability/Shelf Life:

>> Appear to be stable in acid solution, but are susceptible to decomposition by UV radiation in alkaline solutions. /Dintrophenols/

Decomposition:

>> When heated to decomposition it emits toxic fumes of /nitroxides/.

Heat of Combustion:

>> 648.0 KG CAL/G MOL WT @ 20 °C

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.

>> pH range: 2.6 Colorless, 4.4 Yellow

Ionization Efficiency:

The ratio of the number of ions formed to the number of electrons or photons used in an ionization process.

Ionization mode

>> Negative

logIE

>> 0.84

pH

>> 10.5

Instrument

>> Agilent XCT

Ion source

>> Electrospray ionization

Additive

>> ammonia (10nM)

Organic modifier

>> MeCN (80%)

Reference

>> DOI:10.1021/acs.analchem.7b00595

Dissociation Constants:

pKa

>> 4.09 (at 25 °C)

>> pKa = 4.09

10. Stability And Reactivity

>> Highly flammable. Slightly soluble in water.

>> Highly Flammable

>> Explosive

>> Strong Oxidizing Agent

11. Toxicological Information

Toxicity Summary:

>> Acute 2,4-dinitrophenol poisoning (from ingestion) involves uncoupling of oxidative phosphorylation, which presumably reduces body's reservoirs of high-energy phosphate. This stimulates oxidative metabolism and, in turn, the heat production of the body. Oxygen consumption, body temperature, respiration and heart rate are all increased. 2,4-Dinitrophenol has been suggested to bind serum proteins such as transthyretin. In fact it was proposed as a therapeutic agent for the prevention/inhibition of amyloid diseases through stabilization of the native fold of transthyretin. (T21, A126, A127)

EPA Provisional Peer-Reviewed Toxicity Values:

This section provides the EPA Provisional Peer-Reviewed Toxicity Values (PPRTVs) and links of related assessment documents.

Chemical Substance

>> 2,4-Dinitrophenol

Reference Dose (RfD), Subchronic

>> 2 x 10^-2 mg/kg-day

PPRTV Assessment

>> PDF Document

Weight-Of-Evidence (WOE)

>> Inadequate information to assess carcinogenic potential

Last Revision

>> 2007

USGS Health-Based Screening Levels for Evaluating Water-Quality:

This section provides the USGS Health-Based Screening Levels for Evaluating Water-Quality data.

Chemical

>> 2,4-Dinitrophenol

Noncancer HBSL (Health-Based Screening Level)[µg/L]

>> 10

Reference

>> Smith, C.D. and Nowell, L.H., 2024. Health-Based Screening Levels for evaluating water-quality data (3rd ed.). DOI:10.5066/F71C1TWP

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:

>> 2,4-DNP can cause cataracts following ingestion of a small dose for short or long periods. This condition could lead to blindness in both eyes. Breathing in, swallowing, or having skin contact with large amounts of DNP can lead to death. (L168)

Exposure Routes:

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

>> Oral (L170); inhalation (L170) ; dermal (L170)

Inhalation Exposure

>> See Ingestion.

Skin Exposure

>> MAY BE ABSORBED! Redness. Roughness. Yellow staining of the skin. Further see Inhalation.

Eye Exposure

>> Yellow vision. Redness. Conjunctivitis.

Ingestion Exposure

>> Nausea. Sweating. Severe thirst. Fever. Increased heart rate. Vomiting. Shock or collapse.

>> Dermal contact may results in redness, roughness, yellow staining of the skin. Nausea, vomiting, palpitations, collapse, sweating occur after inhalation or ingestion. (L170)

Target Organs:

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

>> Body Weight, Dermal (Skin), Developmental (effects while organs are developing), Hematological (Blood Forming), Hepatic (Liver), Ocular (Eyes)

>> Ocular

Adverse Effects:

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

>> Occupational hepatotoxin - Secondary hepatotoxins: the potential for toxic effect in the occupational setting is based on cases of poisoning by human ingestion or animal experimentation.

>> Nephrotoxin - The chemical is potentially toxic to the kidneys in the occupational setting.

>> Methemoglobinemia - The presence of increased methemoglobin in the blood; the compound is classified as secondary toxic effect

>> Other Poison - Uncoupler

>> Dermatotoxin - Skin burns.

Toxicity Data:

>> LCLo (dog) = 300 mg/m3/30 min

Minimum Risk Level:

The minimal risk level (MRL) is an estimate of the amount of a chemical a person can eat, drink, or breathe each day without a detectable risk to health

>> Acute Oral: 0.01 mg/kg/day (L168)

Treatment:

Treatment when exposed to toxin

>> There is no specific antidote for 2,4-DNP poisoning. Symptomatic treatment includes replacing oxygen and fluids, controlling temperature by administering sponge baths and ice packs, and using a fan to promote air flow and evaporation. In fully conscious patients, administer cold, sugar-containing liquids by mouth as tolerated. In cases of skin contact, bathe and shampoo contaminated skin and hair promptly. (L179)

Interactions:

>> 2,4-DNP appears to markedly increase the rate of ethanol metabolism in rat liver slices by 100-160% and in rats in vivo by 20-30%. Because 2,4-DNP uncouples mitochondrial electron transport from oxidative phosphorylation, the oxidation of NADH to NAD+ is accelerated in the mitochondria. Reoxidation of NADH rather than the activity of alcohol dehydrogenase is the rate-limiting step in the metabolism of ethanol, and, therefore, the metabolic effect of 2,4-DNP

enhances the clearance of ethanol. Because 2,4-DNP is known to augment the rate of respiration and perspiration, .2.7-8.2% of the initial dose of ethanol was also eliminated by expiration and cutaneous evaporation in the rat.

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 as necessary. Immediately flush contaminated eyes with gently flowing water. Do not induce vomiting. If vomiting occurs, lean patient forward or place on 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. /Dinitrophenol and Related Compounds/

Human Toxicity Excerpts:

>> /HUMAN EXPOSURE STUDIES/ In an experimental study in which four volunteers were placed on various diets (balanced, high carbohydrate, high fat, or high protein) and given an average dose of 3.53 mg/kg/day 2,4-DNP for 7-16 days, the average weight loss during 2,4-DNP treatment was approx 2 pounds (0.92 kg). The type of diet did not appear to influence the degree of weight loss.

Non-Human Toxicity Excerpts:

>> /LABORATORY ANIMALS: Acute Exposure/ Giant White Pekin ducks (initial age and body weight 16-30 days and 400-800 g) were treated once by gavage with 2,4-DNP. The percentages of ducks developing cataracts (bilateral opacities in lenses) were 0, 0, 38, 75, 100, and 100% at dose levels of 12, 15, 20, 25, 28, and 30 mg/kg, respectively. The ED50 (effective dose in 50% of animals) with 0.95% confidence limits was 21.5 (17.9-25.8) mg/kg. Cataracts were generally observed for the first time between 1 and 3 hr after dosing and usually disappeared completely within 12 hr after the first observation. /It was/ suggested that the rapid development of cataracts indicated that the parent compound, not the metabolite, was causing the effect. The validity of this suggestion is supported by an experiment in which 2,4-DNP (0.10-10.0 ug) was injected directly into the posterior chamber of the eyes of ducks. Cataracts developed within 30 min of injection regardless of dose and within 10 min of injection at doses >/= 1.0 ug.

Human Toxicity Values:

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

>> Lethal doses for orally ingested 2,4-dinitrophenol in humans have been reported to be 14 to 43 mg/kg ... .

Non-Human Toxicity Values:

>> LD50 Rat oral 30 mg/kg

Populations at Special Risk:

>> Some human subpopulations that are predisposed to a syndrome known as malignant hyperthermia may be more likely to develop fatal hyperthermia following exposure to 2,4-DNP. Malignant hyperthermia is an inherited disease of skeletal muscle characterized by a drug-induced hyperpyrexia. Humans with this inherited disease are predisposed to acute hyperthermic reactions triggered by stress or drugs (such as inhalation anesthetic agents, skeletal muscle relaxants, and amide local anesthetics)

12. Ecological Information

Resident Soil (mg/kg)

>> 1.30e+02

Industrial Soil (mg/kg)

>> 1.60e+03

Tapwater (ug/L)

>> 3.90e+01

MCL (ug/L)

>> 5.00e+00

Risk-based SSL (mg/kg)

>> 4.40e-02

Chronic Oral Reference Dose (mg/kg-day)

>> 2.00e-03

Volatile

>> Volatile

Mutagen

>> Mutagen

Fraction of Contaminant Absorbed in Gastrointestinal Tract

>> 1

Fraction of Contaminant Absorbed Dermally from Soil

>> 0.1

ICSC Environmental Data:

>> The substance is very toxic to aquatic organisms. It is strongly advised not to let the chemical enter into the environment.

Sediment/Soil Concentrations:

Concentrations of this compound in sediment/soil.

>> During 1980, 2,4-dinitrophenol was detected in sediment/water/soil samples at Love Canal.

Fish/Seafood Concentrations:

Concentrations of this compound in fish or seafood.

>> 2,4-Dinitrophenol was identified, not quantified, in fish from Lake Michigan tributaries and embayments(1).

13. Disposal Considerations

Spillage Disposal

>> Evacuate danger area! Consult an expert! Personal protection: complete protective clothing including self-contained breathing apparatus. Do not allow to dry out. Do NOT let this chemical enter the environment. Sweep spilled substance into containers. Carefully collect remainder. 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 P048, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste.

>> Dinitrophenol: Incinerate (1800 °F, 2.0 sec minimum) with adequate scrubbing equipment for the removal of NOx. Dinitrophenol ... /is a/ waste chemical stream constituent which may be subjected to ultimate disposal by controlled incineration. /Dinitrophenol/

>> A potential candidate for rotary kiln incineration at a temperature range of 820 to 1,600 °C and residence times of seconds for liquids and gases, and hours for solids. A potential candidate for fluidized bed incineration at a temperature range of 450 to 980 °C and residence times of seconds for liquids and gases, and longer for solids.

>> Chemical Treatability of 2,4-Dinitrophenol; Concentration Process: Biological Treatment. Chemical Classification: Phenol; Scale of Study: Respirometer Study; Type of Wastewater Used: Synthetic Wastewater; Results of Study: Max oxygen uptake was 27.7 ppm of aeration.

>> For more Disposal Methods (Complete) data for 2,4-Dinitrophenol (8 total), please visit the HSDB record page.

14. Transport Information

DOT

2,4-Dinitrophenol
4.1
UN Pack Group: I
Reportable Quantity of 10 lb or 4

IATA

2,4-Dinitrophenol
4.1, 6.1
UN Pack Group: I

15. Regulatory Information

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.

>> Dinitrophenol 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. /Dinitrophenol; CAS No. 51-28-5/

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.

>> Pursuant to section 8(d) of TSCA, EPA promulgated a model Health and Safety Data Reporting Rule. The section 8(d) model rule requires manufacturers, importers, and processors of listed chemical substances and mixtures to submit to EPA copies and lists of unpublished health and safety studies. 2,4-Dinitrophenol is included on this list. Effective date 9/30/91; Sunset date: 12/19/95.

Regulatory Information

The Australian Inventory of Industrial Chemicals

>> Chemical: Phenol, 2,4-dinitro-

REACH Registered Substance

>> Status: Active Update: 09-03-2022 https://echa.europa.eu/registration-dossier/-/registered-dossier/10875

New Zealand EPA Inventory of Chemical Status

>> Phenol, 2,4-dinitro- (wetted with not less than 15% water by mass): HSNO Approval: HSR001273 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 during combustion of this material. /Dinitrophenol solutions; dinitrophenol, wetted with at least 15% water/