SAFETY DATA SHEET

Updated on 26/09/2024

1. Material Identification

Product Name : Paraquat dichloride
Catalog Number : io-2798
CAS Number : 1910-42-5
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)

Pictogram(s)

GHS Hazard Statements

>> H290 (14.2%): May be corrosive to metals [Warning Corrosive to Metals]

>> H301+H311 (70.2%): Toxic if swallowed or in contact with skin [Danger Acute toxicity, oral; acute toxicity, dermal]

>> H301 (100%): Toxic if swallowed [Danger Acute toxicity, oral]

>> H310 (17.9%): Fatal in contact with skin [Danger Acute toxicity, dermal]

>> H311 (82.1%): Toxic in contact with skin [Danger Acute toxicity, dermal]

>> H315 (100%): Causes skin irritation [Warning Skin corrosion/irritation]

>> H319 (100%): Causes serious eye irritation [Warning Serious eye damage/eye irritation]

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

>> H335 (99.5%): May cause respiratory irritation [Warning Specific target organ toxicity, single exposure; Respiratory tract irritation]

>> H372 (99.5%): Causes damage to organs through prolonged or repeated exposure [Danger Specific target organ toxicity, repeated exposure]

>> H400 (100%): Very toxic to aquatic life [Warning Hazardous to the aquatic environment, acute hazard]

>> H410 (100%): Very toxic to aquatic life with long lasting effects [Warning Hazardous to the aquatic environment, long-term hazard]

Precautionary Statement Codes

>> P234, P260, P261, P262, P264, P264+P265, P270, P271, P273, P280, P284, P301+P316, P302+P352, P304+P340, P305+P351+P338, P316, P319, P320, P321, P330, P332+P317, P337+P317, P361+P364, P362+P364, P390, P391, P403+P233, P405, P406, and P501

Health Hazards:

>> Can cause death due to severe injury to the lungs. The lowest lethal oral dose reported in humans is 43 mg/kg. (EPA, 1998)

>> Avoid strong oxidizers. (EPA, 1998)

>> Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.

3. Composition/Information On Ingredients

Chemical name : Paraquat dichloride
CAS Number : 1910-42-5
Molecular Formula : C12H14Cl2N2
Molecular Weight : 257.1600 g/mol

4. First Aid Measures

First Aid:

>> Warning: Effects occur in two stages, immediate and delayed. Caution is advised. Exposure to paraquat may be fatal; there is no effective antidote.

>> Signs and Symptoms of Acute Paraquat Exposure: Signs and symptoms of acute exposure to paraquat may be severe and include nausea, vomiting, diarrhea, and abdominal pain. A burning sensation of the mouth and esophagus with possible ulceration may occur following ingestion. Eye exposure may result in corneal opacification (cloudiness). Dermatitis and nail atrophy may occur following dermal contact. Delayed effects include transient reversible liver injury, acute renal failure, and progressive pulmonary fibrosis with associated dyspnea (shortness of breath) and pulmonary edema.

>> Emergency Life-Support Procedures: Acute exposure to paraquat 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 paraquat.

>> 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 performance of other invasive procedures.

>> 4. RUSH to a health care facility.

>> Dermal/Eye Exposure:

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

>> 3. Remove 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 three times with soap and water.

>> 6. Obtain authorization and/or further instructions from the local hospital for performance of other invasive procedures.

>> 7. RUSH 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 performance of other invasive procedures.

>> 3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of paraquat 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: 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. 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.

>> 5. 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.

>> 6. RUSH to a health care facility. (EPA, 1998)

First Aid Measures

Inhalation First Aid

>> Fresh air, rest. Refer immediately for medical attention.

Skin First Aid

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

Eye First Aid

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

Ingestion First Aid

>> Rinse mouth. Give one or two glasses of water to drink. Give a slurry of activated charcoal in water to drink. Refer immediately for medical attention.

5. Fire Fighting Measures

>> This material is a bipyridilium compound. Procedures for bipyridilium pesticides are as follows. 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. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. (EPA, 1998)

>> In case of fire in the surroundings, use appropriate extinguishing media.

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 151 [Substances - Toxic (Non-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)

Spillage Disposal:

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

>> Consult an expert! Personal protection: chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations. Sweep spilled substance into covered sealable containers. If appropriate, moisten first to prevent dusting. Carefully collect remainder. Then store and dispose of according to local regulations.

7. Handling And Storage

Safe Storage:

>> Keep in a well-ventilated room. Well closed. Separated from food and feedstuffs. Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.

8. Exposure Control/ Personal Protection

>> TWA 0.1 mg/m3 (resp) [skin]

>> 0.5 [mg/m3], respirable dust

>> 0.05 [mg/m3], inhalable particulate matter, as the cation

>> (as the cation): 0.05 mg/m

Inhalation Risk:

>> Evaporation at 20 °C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying or when dispersed, especially if powdered.

Effects of Short Term Exposure:

>> The substance is severely irritating to the eyes. The substance is irritating to the respiratory tract. The substance is mildly irritating to the skin. Inhalation at high concentrations and ingestion of large amounts may cause effects on the lungs, kidneys, liver and cardiovascular system. This may result in impaired functions and tissue lesions including haemorrhage and lung fibrosis. Exposure to high concentrations could cause death. Medical observation is indicated. The effects may be delayed.

Effects of Long Term Exposure:

>> Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the nails. This may result in nail damage.

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 face shield or eye protection in combination with breathing protection if powder.

Ingestion Prevention

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

Exposure Control and Personal Protection

Maximum Allowable Concentration (MAK)

>> 0.1 [mg/m3], inhalable fraction[German Research Foundation (DFG)]

9. Physical And Chemical Properties

Molecular Weight:

>> 257.16

Exact Mass:

>> 256.0534038

Physical Description:

>> Paraquat dichloride is a colorless to yellow crystalline solid. Used as a contact herbicide and desiccant. (EPA, 1998)

>> COLOURLESS HYGROSCOPIC CRYSTALS.

Boiling Point:

>> Decomposes (NIOSH, 2024)

Melting Point:

>> Decomposes 572 °F (EPA, 1998)

Solubility:

>> greater than or equal to 100 mg/mL at 66 °F (NTP, 1992)

>> Solubility in water, g/100ml at 20 °C: 62

Density:

>> 1.24 to 1.26 at 68 °F (NTP, 1992)

>> 1.24 g/cm³

Vapor Pressure:

>> Approximately 0 (EPA, 1998)

>> Vapor pressure, Pa at 25 °C:

LogP:

>> -4.5

Decomposition:

>> 300 °C

10. Stability And Reactivity

>> Water soluble.

11. Toxicological Information

Toxicity Summary:

>> The mechanisms of the toxic effects of paraquat are largely the result of a metabolically catalyzed single electron oxidation reduction reaction, resulting in depletion of cellular NADPH and the generation of potentially toxic forms of oxygen such as the superoxide radical (A607). Recent studies have demonstrated paraquat cytotoxicity occurs in the mitochondria and particularly in mitochondrial-rich tissues. The mitochondrial NADH-dependent PQ reductase containing a voltage-dependent anion channel 1 (VDAC1) appears to be largely responsible for paraquat cytotoxicity. When mitochondria are incubated with NADH and paraquat, the superoxide anion is produced, and the mitochondria rupture. Ruptured mitochondria lead to rapid cell death (A3102).

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

>> Paraquat dichloride

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

>> 0.05

Acute or One Day HHBPs [ppb]

>> 300

Acute HHBP Sensitive Lifestage/Population

>> Children

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

>> 0.005

Chronic or One Day HHBPs [ppb]

>> 30

Chronic HHBP Sensitive Lifestage/Population

>> General Population

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:

>> It can cause temporary damage to nails and if swalloed, may cause nose bleeding. Long term exposures to paraquat would most likely cause lung and eye damage. Some suspect a possible link to a greater incidence of Parkinson's disease. Pancreatitis may develop in some cases of acute. Paraquat is caustic to the oral, esophageal, and gastric mucosa (T36, A545, L421).

Exposure Routes:

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

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

Inhalation Exposure

>> Cough. Sore throat. Headache. Nosebleeds.

Skin Exposure

>> Redness.

Eye Exposure

>> Redness. Burning sensation. Pain.

Ingestion Exposure

>> Sore throat. Abdominal pain. Nausea. Vomiting. Diarrhoea.

>> irritation eyes, skin, nose, throat, respiratory system; epistaxis (nosebleed); dermatitis; fingernail damage; irritation gastrointestinal tract; heart, liver, kidney damage

Target Organs:

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

>> Respiratory

>> Eyes, skin, respiratory system, heart, liver, kidneys, gastrointestinal tract

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.

>> Dermatotoxin - Skin burns.

>> Toxic Pneumonitis - Inflammation of the lungs induced by inhalation of metal fumes or toxic gases and vapors.

>> Fibrogenic - Inducing tissue injury and fibrosis (scarring).

>> ACGIH Carcinogen - Not Classifiable.

Toxicity Data:

>> LCLo (rat) = 1 mg/m3/6H for respirable dust;

Treatment:

Treatment when exposed to toxin

>> In case of oral exposure, administer charcoal as a slurry. Consider after ingestion of a potentially life-threatening amount of poison if it can be performed soon after ingestion. The treatment is symptomatic and supportive. In case of eye exposure, irrigate exposed eyes with copious amounts of room temperature water for at least 15 minutes. In case of dermal exposure, remove contaminated clothing and jewellery. Wash the skin, including hair and nails, vigorously; do repeated soap washings. Discard contaminated clothing. (T36)

12. Ecological Information

Resident Soil (mg/kg)

>> 2.80e+02

Industrial Soil (mg/kg)

>> 3.70e+03

Tapwater (ug/L)

>> 9.00e+01

MCL (ug/L)

>> 2.00e+02

Risk-based SSL (mg/kg)

>> 1.20e+00

Chronic Oral Reference Dose (mg/kg-day)

>> 4.50e-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. The substance may cause long-term effects in the aquatic environment. 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

>> Consult an expert! Personal protection: chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations. Sweep spilled substance into covered sealable containers. If appropriate, moisten first to prevent dusting. Carefully collect remainder. Then store and dispose of according to local regulations.

14. Transport Information

DOT

Paraquat dichloride
6.1
UN Pack Group: I

IATA

Paraquat dichloride
6.1,
UN Pack Group: I

15. Regulatory Information

Regulatory Information

REACH Registered Substance

>> Status: Active Update: 26-01-2023 https://echa.europa.eu/registration-dossier/-/registered-dossier/29834

New Zealand EPA Inventory of Chemical Status

>> Paraquat dichloride: Does not have an individual approval but may be used as a component in a product covered by a group standard. It is not approved for use as a chemical in its own right.

16. Other Information

Other Safety Information

Chemical Assessment

>> IMAP assessments - 4,4'-Bipyridinium, 1,1'-dimethyl-, dichloride: Human health tier I assessment

>> IMAP assessments - 4,4'-Bipyridinium, 1,1'-dimethyl-, dichloride: Environment tier I assessment

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