SAFETY DATA SHEET

Updated on 26/09/2024

1. Material Identification

Product Name : Chlorpyrifos-methyl
Catalog Number : io-1999
CAS Number : 5598-13-0
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

>> H302 (59.2%): Harmful if swallowed [Warning Acute toxicity, oral]

>> H317 (100%): May cause an allergic skin reaction [Warning Sensitization, Skin]

>> H331 (19.7%): Toxic if inhaled [Danger Acute toxicity, inhalation]

>> H334 (17%): May cause allergy or asthma symptoms or breathing difficulties if inhaled [Danger Sensitization, respiratory]

>> 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

>> P233, P260, P261, P264, P270, P271, P272, P273, P280, P284, P301+P317, P302+P352, P304+P340, P316, P321, P330, P333+P317, P342+P316, P362+P364, P391, P403, P403+P233, P405, and P501

Health Hazards:

>> Excerpt from ERG Guide 171 [Substances (Low to Moderate Hazard)]:

>> Inhalation of material may be harmful. Contact may cause burns to skin and eyes. Inhalation of Asbestos dust may have a damaging effect on the lungs. Fire may produce irritating, corrosive and/or toxic gases. Some liquids produce vapors that may cause dizziness or asphyxiation. Runoff from fire control or dilution water may cause environmental contamination. (ERG, 2024)

>> Excerpt from ERG Guide 171 [Substances (Low to Moderate Hazard)]:

>> Some may burn but none ignite readily. Containers may explode when heated. Some may be transported hot. For UN3508, Capacitor, asymmetric, be aware of possible short circuiting as this product is transported in a charged state. Polymeric beads, expandable (UN2211) may evolve flammable vapours. (ERG, 2024)

3. Composition/Information On Ingredients

Chemical name : Chlorpyrifos-methyl
CAS Number : 5598-13-0
Molecular Formula : C7H7Cl3NO3PS
Molecular Weight : 322.5000 g/mol

4. First Aid Measures

First Aid:

>> Excerpt from ERG Guide 171 [Substances (Low to Moderate Hazard)]:

>> Refer to the "General First Aid" section. (ERG, 2024)

5. Fire Fighting Measures

>> Excerpt from ERG Guide 171 [Substances (Low to Moderate Hazard)]:

>> CAUTION: Fire involving Safety devices (UN3268) and Fire suppressant dispersing devices (UN3559) may have a delayed activation and a risk of hazardous projectiles. Extinguish the fire at a safe distance.

>> SMALL FIRE: Dry chemical, CO2, water spray or regular foam.

>> LARGE FIRE: Water spray, fog or regular foam. Do not scatter spilled material with high-pressure water streams. 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: 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)

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 171 [Substances (Low to Moderate Hazard)]:

>> 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)

7. Handling And Storage

Storage Conditions:

>> Do not contaminate water, food or feed by storage ... Store in a cool, dry location. Do not store in direct sunlight. Do not use or store near heat or open flame. /Storcide II Grain, Bin and Warehouse Insecticide/

8. Exposure Control/ Personal Protection

Exposure Control and Personal Protection

Exposure Summary

>> Biological Exposure Indices (BEI) [ACGIH] - Acetylcholinesterase activity in red blood cells = 70% of individual's baseline; Butylcholinesterase activity in serum or plasma = 60% of individual's baseline; Sample at end of shift; [TLVs and BEIs]

9. Physical And Chemical Properties

Molecular Weight:

>> 322.5

Exact Mass:

>> 320.894984

Physical Description:

>> Chlorpyrifos methyl appears as colorless crystals. Corrosive to copper, brass, iron, and tin plate. Used as an insecticide.

Color/Form:

>> White crystals

Odor:

>> Slight mercaptan

Melting Point:

>> 45.5-46.5 °C

Flash Point:

>> 182 °C (Cleveland open cup)

Solubility:

>> In water, 4.0 mg/L at 25 °C

Density:

>> 1.64 at 23 °C

Vapor Pressure:

>> 0.0000422 [mmHg]

LogP:

>> log Kow = 4.31

Stability/Shelf Life:

>> Relatively stable under neutral conditions, but hydrolysed by acids (pH 4-6) &, more readily, by alkalis (pH 8-10).

Decomposition:

>> When heated to decomposition it emits very toxic fumes of /hydrogen chloride, nitrogen oxides, phosphorus oxides, & sodium oxides/.

Collision Cross Section:

Collision cross section (CCS) represents the effective area for the interaction between an individual ion and the neutral gas through which it is traveling (e.g., in ion mobility spectrometry (IMS) experiments). It quantifies the probability of a collision taking place between two or more particles.

>> 161.39 Å² [M+Na]+

>> 153.14 Å² [M+H]+

10. Stability And Reactivity

>> Hydrolyzed by strong acid and base.

11. Toxicological Information

Toxicity Summary:

>> IDENTIFICATION: Chlorpyrifos-methyl is an organophosphate pesticide used to control insects on fruits, vegetables and cereal plants. It is used to control insects in grain storage areas. This pesticide is a granular crystalline solid with a mercaptan odor. It is soluble in acetone, acetonitrile, benzene, carbon disulfide, carbon tetrachloride, chloroform, diethyl ether, ethanol, methanol, n-octanol and hexane. It is insoluble in water. HUMAN EXPOSURE: Fourteen male volunteers were divided into two treatment groups of 5 men each and a control group of four men. Chlorpyrifos-methyl was administered by gelatin capsule in a single daily dose for four weeks. Plasma and erythrocyte cholinesterase activities were not depressed at the levels tested. Hematology, blood chemistry, urinalysis, blood pressure, pulse and ophthalmology were not affected by the treatment. ANIMAL STUDIES/BIRDS: This pesticide was administered to groups of Sprague-Dawley CD strain rats in the diet for 104 weeks. There was no compound related effect on the incidence of spontaneous tumors. Chlorpyrifos-methyl administered orally to mice from day 7 through day 13 of gestation. Animals were sacrificed on day 18 and pups were removed by caesarean section. No significant difference was observed between control and treated groups concerning the number of implants and number of deaths. Body weights were lower in both males at the highest dose level. An increased incidence of cleft palate and a delay of ossification of the cervicovertebral body were observed at the high dose. When pregnant mice were dosed with a single oral dose on the seventh or eleventh day of pregnancy, there was no effect on mortality or body weights of the fetuses. A skeletal abnormality was observed (exencephalia, cleft palate, liberation of bone fragments of the cervicovertebral arch). Undiluted chlorpyrifos-methyl applied directly to the conjunctival sac of rabbits caused signs of irritation, which subsided after 24-48 hr. No corneal injury was noted. No significant skin reaction occurred when undiluted pesticide was applied to shaved and abraded skin of rabbits for prolonged periods. Chlorpyrifos-methyl was administered to rats in a three generation (two litters per generation) reproduction study. The pesticide was dosed orally. No treatment related effects were noted on behavior, survival and body weight gain or food consumption oberved in parental animals. Pup weights of the second litter, third generation were significantly less than control. There was no effect on sex ratio. In adults of the third generation, plasma cholinesterase activity decreased in both sexes at different dose levels. Mallard ducks, Bobwhite quail, Japanese quail were fed various doses of this pesticide for five days and observed for a further three days showed body weight and food consumption reduced for the Bobwhite and Japanese quail and at higher dose for the Mallard duck. Whole blood cholinesterase was inhibited. When 2,6-(14)C ring labeled chlorpyrifos-methyl was administered as a single dose to rats, radioactivity was readily absorbed and excreted. After 72 hr, 90-93% of the radioactivity was eliminated from the body. Urinary metabolites included 3,5,6-trichloro-2-pyridinol and unidentified activity at the origin by thin layer chromatography.

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

>> Chlorpyrifos-methyl

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

>> 0.00033

Acute or One Day HHBPs [ppb]

>> 2.2

Acute HHBP Sensitive Lifestage/Population

>> Children

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

>> 0.00033

Chronic or One Day HHBPs [ppb]

>> 1.9

Chronic HHBP Sensitive Lifestage/Population

>> Females 13-49 yrs

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:

>> Acute exposure to cholinesterase inhibitors can cause a cholinergic crisis characterized by severe nausea/vomiting, salivation, sweating, bradycardia, hypotension, collapse, and convulsions. Increasing muscle weakness is a possibility and may result in death if respiratory muscles are involved. Accumulation of ACh at motor nerves causes overstimulation of nicotinic expression at the neuromuscular junction. When this occurs symptoms such as muscle weakness, fatigue, muscle cramps, fasciculation, and paralysis can be seen. When there is an accumulation of ACh at autonomic ganglia this causes overstimulation of nicotinic expression in the sympathetic system. Symptoms associated with this are hypertension, and hypoglycemia. Overstimulation of nicotinic acetylcholine receptors in the central nervous system, due to accumulation of ACh, results in anxiety, headache, convulsions, ataxia, depression of respiration and circulation, tremor, general weakness, and potentially coma. When there is expression of muscarinic overstimulation due to excess acetylcholine at muscarinic acetylcholine receptors symptoms of visual disturbances, tightness in chest, wheezing due to bronchoconstriction, increased bronchial secretions, increased salivation, lacrimation, sweating, peristalsis, and urination can occur. Certain reproductive effects in fertility, growth, and development for males and females have been linked specifically to organophosphate pesticide exposure. Most of the research on reproductive effects has been conducted on farmers working with pesticides and insecticdes in rural areas. In females menstrual cycle disturbances, longer pregnancies, spontaneous abortions, stillbirths, and some developmental effects in offspring have been linked to organophosphate pesticide exposure. Prenatal exposure has been linked to impaired fetal growth and development. Neurotoxic effects have also been linked to poisoning with OP pesticides causing four neurotoxic effects in humans: cholinergic syndrome, intermediate syndrome, organophosphate-induced delayed polyneuropathy (OPIDP), and chronic organophosphate-induced neuropsychiatric disorder (COPIND). These syndromes result after acute and chronic exposure to OP pesticides.

>> Symptoms of low dose exposure include excessive salivation and eye-watering. Acute dose symptoms include severe nausea/vomiting, salivation, sweating, bradycardia, hypotension, collapse, and convulsions. Increasing muscle weakness is a possibility and may result in death if respiratory muscles are involved. Hypertension, hypoglycemia, anxiety, headache, tremor and ataxia may also result.

Adverse Effects:

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

>> Other Poison - Organophosphate

Toxicity Data:

>> LC50 (rat) > 670 mg/m3/4h

Treatment:

Treatment when exposed to toxin

>> If the compound has been ingested, rapid gastric lavage should be performed using 5% sodium bicarbonate. For skin contact, the skin should be washed with soap and water. If the compound has entered the eyes, they should be washed with large quantities of isotonic saline or water. In serious cases, atropine and/or pralidoxime should be administered. Anti-cholinergic drugs work to counteract the effects of excess acetylcholine and reactivate AChE. Atropine can be used as an antidote in conjunction with pralidoxime or other pyridinium oximes (such as trimedoxime or obidoxime), though the use of '-oximes' has been found to be of no benefit, or possibly harmful, in at least two meta-analyses. Atropine is a muscarinic antagonist, and thus blocks the action of acetylcholine peripherally.

Interactions:

>> Symptoms, lesions and changes in clinical chemistry and hematology were examined in goats orally dosed with dursban (150 mg/kg), reldan (150 mg/kg) and their mixture (300 mg/kg) in certain proportions. More rapid death and severe changes occurred in goats receiving reldan and dursban at 50% of the combined dose than either of the individual compounds.

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. /Organophosphates and related compounds/

Human Toxicity Excerpts:

>> /HUMAN EXPOSURE STUDIES/ ... Three male and three female volunteers were administered capsules of chlorpyrifos-methyl (purity 99.2%) in corn oil at 0.1 mg/kg bw per day for 21 days and at 0.3 mg/kg bw per day for the following 14 days. Following a 28-day recovery period, the same volunteers were dosed at 0.2 mg/kg bw per day for 21 days. Four control subjects (two of each sex) were administered placebo capsules. Erythrocyte and plasma cholinesterase activities were determined pretest and at intervals throughout the study period ... . Selected hematological, urinalysis and clinical chemistry parameters were also assessed. No reference to informed consent was made in the study report. No adverse effects on blood pressure, pulse rate, pupil size, light reflex, eye accommodation, chest sound, muscle tone, knee jerk or tongue tremor were reported. No treatment-related effects on hematological, clinical chemistry or urinalysis parameters were noted. Significant interindividual and intraindividual variations in plasma and erythrocyte cholinesterase activities were noted. Treatment-related decreases in plasma cholinesterase activity were reported in volunteers following administration of chlorpyrifos-methyl at 0.2 and 0.3 mg/kg bw per day; no effects were seen at 0.1 mg/kg bw per day. No consistent effects were seen on erythrocyte cholinesterase activity at any dose level in this study. Increased cholinesterase activity in volunteer CS was attributed to "withdrawal from birth-control medication". A NOAEL of 0.3 mg/kg bw per day can be determined for this study in the absence of any biologically significant effects on erythrocyte cholinesterase inhibition.

Non-Human Toxicity Excerpts:

>> /LABORATORY ANIMALS: Acute Exposure/ Eight Nubian goats were given single oral doses of 1200, 600, 300 or 150 mg/kg of Reldan. The 2 goats receiving the highest dose died after 1 and 16 hr whereas other animals survived the 7-day observation period. Twelve Nubian goats were given Reldan orally at daily dosages of 600, 300, 150 or 75 mg/kg. The goats died or were killed in extremis between 2 and 25 days. Pathology, clinical chemistry and hematology findings are reported.

Non-Human Toxicity Values:

>> LD50 Rat oral 1500 mg/kg

12. Ecological Information

Resident Soil (mg/kg)

>> 6.30e+02

Industrial Soil (mg/kg)

>> 8.20e+03

Tapwater (ug/L)

>> 1.20e+02

MCL (ug/L)

>> 8.0E+01(G)

Risk-based SSL (mg/kg)

>> 5.40e-01

Chronic Oral Reference Dose (mg/kg-day)

>> 1.00e-02

Volatile

>> Volatile

Mutagen

>> Mutagen

Fraction of Contaminant Absorbed in Gastrointestinal Tract

>> 1

Fraction of Contaminant Absorbed Dermally from Soil

>> 0.1

Average Daily Intake:

The average amount of the compound taken into the body through eating, drinking, or breathing.

>> Between the years 1984-1986, the mean daily intake per unit body weight (ug/kg body wt/day) of chlorpyrifos-methyl was measured for the following age groups: 6-11 mo (0.0135), 2 yr (0.0323), 14-16 yr female (0.0118), 14-16 yr male (0.0158), 25-30 yr female (0.0101), 25-30 yr male (0.0116), 60-65 yr female (0.0092), and 60-65 yr male (0.0107)(1).

13. Disposal Considerations

Disposal Methods

>> SRP: The most favorable course of action is to use an alternative chemical product with less inherent propensity for occupational harm/injury/toxicity or environmental contamination. Recycle any unused portion of the material for its approved use or return it to the manufacturer or supplier. Ultimate disposal of the chemical must consider: the material's impact on air quality; potential migration in soil or water; effects on animal and plant life; and conformance with environmental and public health regulations.

>> Improper disposal of excess pesticide is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the hazardous waste representative at the EPA Regional Office for guidance. /Storcide II Grain, Bin and Warehouse Insecticide/

>> Rigid, non-refillable containers small enough to shake (i.e., with capacities equal to or less than 5 gallons). ... Do not reuse or refill this container. Offer for recycling, if available. Triple rinse or pressure rinse container (or equivalent) promptly after emptying ... Once container is rinsed, offer for recycling if available, or puncture and dispose of in a sanitary landfill or incineration, or if allowed by state and local authorities, by burning. If burned stay out of smoke. /Storcide II Grain, Bin and Warehouse Insecticide/

>> Rigid non-refillable containers that are too large to shake (i.e., with capacities greater than 5 gallons). ... Do not reuse or refill this container... Cleaning the container before final disposal is the responsibility of the person disposing of the container. Once container is rinsed, offer for recycling if available or puncture and dispose of in a sanitary landfill, or incineration, or if allowed by state and local authorities, by burning. If burned stay out of smoke. /Storcide II Grain, Bin and Warehouse Insecticide/

>> For more Disposal Methods (Complete) data for CHLORPYRIFOS-METHYL (7 total), please visit the HSDB record page.

14. Transport Information

DOT

Chlorpyrifos-methyl

IATA

Chlorpyrifos-methyl

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15. Regulatory Information

Regulatory Information

New Zealand EPA Inventory of Chemical Status

>> Chlorpyrifos methyl: Does not have an individual approval but may be used under an appropriate group standard

16. Other Information

Other Safety Information

Chemical Assessment

- IMAP assessments - Phosphorothioic acid, O,O-dimethyl O-(3,5,6-trichloro-2-pyridinyl) ester: Environment tier I assessment
- IMAP assessments - Phosphorothioic acid, O,O-dimethyl O-(3,5,6-trichloro-2-pyridinyl) ester: Human health tier I assessment

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