SAFETY DATA SHEET

Updated on 08/12/2024

1. Material Identification

Product Name : Temephos
Catalog Number : io-3056
CAS Number : 3383-96-8
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)

Pictogram(s)

GHS Hazard Statements

>> H302 (61%): Harmful if swallowed [Warning Acute toxicity, oral]

>> H311 (57.1%): Toxic in contact with skin [Danger Acute toxicity, dermal]

>> H312 (40.3%): Harmful in contact with skin [Warning Acute toxicity, dermal]

>> H332 (42.9%): Harmful if inhaled [Warning Acute toxicity, inhalation]

>> H372 (36.4%): Causes damage to organs through prolonged or repeated exposure [Danger Specific target organ toxicity, repeated exposure]

>> H400 (96.1%): Very toxic to aquatic life [Warning Hazardous to the aquatic environment, acute hazard]

>> H410 (46.8%): Very toxic to aquatic life with long lasting effects [Warning Hazardous to the aquatic environment, long-term hazard]

Precautionary Statement Codes

>> P260, P261, P262, P264, P270, P271, P273, P280, P301+P317, P302+P352, P304+P340, P316, P317, P319, P321, P330, P361+P364, P362+P364, P391, P405, and P501

Health Hazards:

>> Excerpt from NIOSH Pocket Guide for Temephos:

>> Exposure Routes: Inhalation, skin absorption, ingestion, skin and/or eye contact

>> Symptoms: Irritation eyes, blurred vision; dizziness; dyspnea (breathing difficulty); salivation; abdominal cramps, nausea, diarrhea, vomiting

>> Target Organs: Eyes, respiratory system, central nervous system, cardiovascular system, blood cholinesterase (NIOSH, 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)

>> Combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.

3. Composition/Information On Ingredients

Chemical name : Temephos
CAS Number : 3383-96-8
Molecular Formula : C16H20O6P2S3
Molecular Weight : 466.5000 g/mol

4. First Aid Measures

First Aid:

>> Excerpt from NIOSH Pocket Guide for Temephos:

>> Eye: IRRIGATE IMMEDIATELY - If this chemical contacts the eyes, immediately wash (irrigate) the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately.

>> Skin: SOAP WASH IMMEDIATELY - If this chemical contacts the skin, immediately wash the contaminated skin with soap and water. If this chemical penetrates the clothing, immediately remove the clothing, wash the skin with soap and water, and get medical attention promptly.

>> Breathing: RESPIRATORY SUPPORT - If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible.

>> Swallow: MEDICAL ATTENTION IMMEDIATELY - If this chemical has been swallowed, get medical attention immediately. (NIOSH, 2024)

First Aid Measures

Inhalation First Aid

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

Skin First Aid

>> Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer immediately for medical attention.

Eye First Aid

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

Ingestion First Aid

>> Rinse mouth. Refer for medical attention .

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)

>> Use water spray, foam, powder, carbon dioxide. 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 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)

Spillage Disposal:

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

>> Personal protection: filter respirator for organic gases and vapours adapted to the airborne concentration of the substance. Do NOT let this chemical enter the environment. Sweep spilled substance into covered 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:

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

Storage Conditions:

>> Store in cool, dry, well-ventilated, secure area out of reach children and animals.

8. Exposure Control/ Personal Protection

REL-TWA (Time Weighted Average)

>> 10 mg/m³ (total), 5 mg/m³ (resp)

>> TWA 10 mg/m3 (total) TWA 5 mg/m3 (resp)

>> 15.0 [mg/m3](total dust), 5 mg/m3(respirable fraction)

PEL-TWA (8-Hour Time Weighted Average)

>> 15 mg/m³ (total dust), 5 mg/m³ (respirable fraction)

>> 1.0 [mg/m3], inhalable particulate matter

>> 1 mg/m

TLV-TWA (Time Weighted Average)

>> 1 mg/m³ (inhalable particulate matter) [2002]

Inhalation Risk:

>> A harmful contamination of the air will not or will only very slowly be reached on evaporation of this substance at 20 °C.

Effects of Short Term Exposure:

>> Cholinesterase inhibition. The substance may cause effects on the nervous system. This may result in convulsions and respiratory depression. The effects may be delayed. Medical observation is indicated. Exposure far above the OEL could cause death.

Effects of Long Term Exposure:

>> Cholinesterase inhibition. Cumulative effects are possible. See Acute Hazards/Symptoms.

Fire Prevention

>> NO open flames.

Exposure Prevention

>> PREVENT DISPERSION OF DUST! PREVENT GENERATION OF MISTS!

Inhalation Prevention

>> Use ventilation (not if powder), local exhaust or breathing protection.

Skin Prevention

>> Protective gloves. Protective clothing.

Eye Prevention

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

Ingestion Prevention

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

Exposure Control and Personal Protection

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:

>> 466.5

Exact Mass:

>> 465.98972587

Physical Description:

>> Temephos appears as white crystalline solid or liquid (above 87 °F). Used as an insecticide. Technical grade is a viscous brown liquid. (NIOSH, 2024)

>> COLOURLESS OR WHITE CRYSTALS OR LIQUID.

Color/Form:

>> Colorless crystals

Boiling Point:

>> 248 to 257 °F at 760 mmHg (Decomposes) (NIOSH, 2024)

Melting Point:

>> 87 °F (NIOSH, 2024)

>> 30 °C

Flash Point:

>> ABATE 4-E 167 °F (Closed Cup); ABATE 6-E 109 °F (Closed Cup); ABATE 200-E 113 °F (Closed Cup); ABATE 500-E 142 °F (Closed Cup)

Solubility:

>> Insoluble (NIOSH, 2024)

>> Solubility in water: none

Density:

>> 1.32 (NIOSH, 2024) - Denser than water; will sink

>> 1.3 g/cm³

Vapor Pressure:

>> 7e-08 mmHg at 77 °F (NIOSH, 2024)

>> Vapor pressure at 25 °C: negligible

LogP:

>> log Kow = 5.96

>> 5.96

Stability/Shelf Life:

>> Stable indefinitely at room temperature; no observed hydrolysis at pH 8 at room temp for several wk or at pH 11 at 40 °C for several hr.

Decomposition:

>> When heated to decomposition it emits toxic /phosphorus oxide and sulfur oxide/ fumes.

>> 120-125 °C

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.

>> 191.86 Å² [M+Na]+ [CCS Type: TW; Method: calibrated with polyalanine and drug standards]

>> 176.67 Å² [M+H-H2O]+ [CCS Type: TW; Method: calibrated with polyalanine and drug standards]

10. Stability And Reactivity

>> No rapid reaction with air. No rapid reaction with water.

11. Toxicological Information

RAIS Toxicity Values:

This section provides the Chemical toxicity information from the Risk Assessment Information System.

Oral Chronic Reference Dose (RfDoc) (mg/kg-day)

>> 0.02

Oral Chronic Reference Dose Reference

>> HEAST Current

Oral Subchronic Chronic Reference Dose (RfDos) (mg/kg-day)

>> 0.2

Oral Subchronic Chronic Reference Dose Reference

>> HEAST Current

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

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

Chemical

>> Temephos

Reference

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

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).

>> Cancer Classification: Not Yet Determined

Exposure Routes:

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

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

Inhalation Exposure

>> Dizziness. Nausea. Muscle twitching. Sweating. Pupillary constriction, muscle cramp, excessive salivation. Vomiting. Diarrhoea. Laboured breathing. Convulsions. Unconsciousness.

Skin Exposure

>> MAY BE ABSORBED! Further see Inhalation.

Eye Exposure

>> Blurred vision.

Ingestion Exposure

>> Abdominal cramps. See Inhalation.

>> irritation eyes, blurred vision; dizziness; dyspnea (breathing difficulty); salivation; abdominal cramps, nausea, diarrhea, vomiting

Target Organs:

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

>> Eyes, respiratory system, central nervous system, cardiovascular system, blood cholinesterase

Adverse Effects:

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

>> Other Poison - Organophosphate

>> ACGIH Carcinogen - Not Classifiable.

Interactions:

>> Mixture of abate and malathion are appreciably more toxic in rats than either compound alone.

Antidote and Emergency Treatment:

>> Do not administer atropine or pralidoxime prophylactically to workers exposed to organophosphate pesticides. Prophylactic dosage with either atropine or pralidoxime may mask early signs and symptoms of organophosphate poisoning and thus allow the worker to continue exposure and possibly progress to more severe poisoning. Atropine itself may enhance the health hazards of the agricultural work setting: impaired heat loss due to reduced sweating and impaired ability to operate mechanical equipment due to blurred vision. This can be caused by mydriasis, one of the effects of atropine. /Organophosphate pesticides/

Human Toxicity Excerpts:

>> /HUMAN EXPOSURE STUDIES/ Human volunteers each ingested 256 mg/day for 5 days or 64 mg/day for 4 weeks without symptoms or detectable effects on plasma or red cell cholinesterase activity.

Non-Human Toxicity Excerpts:

>> /LABORATORY ANIMALS: Acute Exposure/ The effect of short term exposure to monocrotophos (20 mg/kg) and abate (8600 mg/kg) on brain acetylcholinesterase activity was examined using male Wistar rats. Rats were administered 20 mg/kg monocrotophos or 8600 mg/kg abate orally. Rats were killed at 1 to 7 days after dosing. An in vitro study was conducted on the inhibition of brain acetylcholinesterase by monocrotophos. A maximum inhibition in the enzyme activity in the monocrotophos treated animals occurred on day one with a significant recovery being attained by day three. A second inhibition was noted on day five with a second recovery by day seven. Monocrotophos had no significant effect on the enzyme constant values but the maximum velocity varied, demonstrating a noncompetitive nature. Abate caused changes in both the maximum velocity and the enzyme constant at different time intervals. The in vitro studies with monocrotophos demonstrated an increase in the the enzyme constant with no changes in the the maximum velocity. The in vivo studies showed the the enzyme constant decreased and the maximum velocity varied when compared to control. ...

Non-Human Toxicity Values:

>> LD50 Rabbit female dermal 970 mg/kg

12. Ecological Information

Resident Soil (mg/kg)

>> 1.30e+03

Industrial Soil (mg/kg)

>> 1.60e+04

Tapwater (ug/L)

>> 4.00e+02

MCL (ug/L)

>> 1.00e+02

Risk-based SSL (mg/kg)

>> 7.60e+01

Chronic Oral Reference Dose (mg/kg-day)

>> 2.00e-02

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. This substance may be hazardous to the environment. Special attention should be given to bees. Bioaccumulation of this chemical may occur along the food chain. 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.

Sediment/Soil Concentrations:

Concentrations of this compound in sediment/soil.

>> SEDIMENT: The concentration of temephos in sediment samples taken from several locations in NJ and CA, date not provided, were less then 0.1 ppm(1).

Fish/Seafood Concentrations:

Concentrations of this compound in fish or seafood.

>> The concentration of temephos in Florida oysters, date not provided, ranged from 0.05-0.14 ppm(1).

13. Disposal Considerations

Spillage Disposal

>> Personal protection: filter respirator for organic gases and vapours adapted to the airborne concentration of the substance. Do NOT let this chemical enter the environment. Sweep spilled substance into covered containers. If

appropriate, moisten first to prevent dusting. Carefully collect remainder. Then store and dispose of according to local regulations.

Disposal Methods

>> SRP: The most favorable course of action is to use an alternative chemical product with less inherent propensity for occupational exposure 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, aquatic, and plant life; and conformance with environmental and public health regulations.

>> Hydrolysis: No hydrolysis was observed several hr at 40 °C and pH 11 or at pH 8 and room temp for several weeks. Essentially complete hydrolysis may be obtained upon heating in concentrated KOH /potassium hydroxide/ for 20 min. Recommendable method: Incineration. Peer-review: For large amt incineration in a unit with effluent gas scrubbing is recommendable. (Peer-review conclusions of an IRPTC expert consultation (May 1985))

>> The following wastewater treatment technologies have been investigated for Malathion: Biological treatment and reverse osmosis. /Malathion/

>> Molten salt combustion: The melts contained either sodium carbonate or potassiumcarbonate. The use of potassium carbonate is of interest because the combustion product, potassium chloride can be used as a fertilizer. Destruction of the pesticide was greater than 99.9%. No pesticides were detected in the melt; however, traces of pesticides were detected in the off- gas. The conc of pesticides in the off-gas were generally well below the TLV. /Malathion/

>> Hydrolysis: The overalls polluted with malathion should be shaken and soaked in a soap-and-soda soln for 6-8 hr. Then the overalls must be washed 2-3 times in a hot soap-and-soda soln and rinsed carefully. Containers are decontaminated with 5% caustic or washing soda (300-500 g per 10 l of water). The containers are filled with this soln, kept for 5-12 hr, then washed with ample water. If soda is not at hand, wood ash may be used instead. /Malathion/

14. Transport Information

DOT

Temephos
6.1
UN Pack Group: III

IATA

Temephos
6.1,
UN Pack Group: III

15. Regulatory Information

Regulatory Information

California Safe Cosmetics Program (CSCP) Reportable Ingredient

>> Hazard Traits - Developmental Toxicity; Neurotoxicity

>> Authoritative List - CECBP - Priority Chemicals

>> Report - if used as a fragrance or flavor ingredient

Status Regulation (EC)

>> 2002/2076

New Zealand EPA Inventory of Chemical Status

>> Temephos: HSNO Approval: HSR002880 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 including sulfur and phosphorus oxides.

Other Safety Information

Chemical Assessment

>> IMAP assessments - Phosphorothioic acid, O,O'-(thiodi-4,1-phenylene) O,O,O',O'-tetramethyl ester: Environment tier I assessment

>> IMAP assessments - Phosphorothioic acid, O,O'-(thiodi-4,1-phenylene) O,O,O',O'-tetramethyl ester: Human health tier I assessment

"The information provided is believed to be accurate but is not comprehensive and should be used as a reference. It reflects our current knowledge and is intended for safety guidance related to the product. This document does not constitute a warranty of the product's properties. Ionz is not responsible for any damages resulting from handling or contact with the product incorrectly."