

1. Material Identification

Product Name : Metiram

Catalog Number : io-2687

CAS Number : 9006-42-2

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)



>> Warning

GHS Hazard Statements

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

>> H335 (100%): May cause respiratory irritation [Warning Specific target organ toxicity, single exposure; Respiratory tract irritation]

Precautionary Statement Codes

>> P261, P271, P272, P280, P302+P352, P304+P340, P319, P321, P333+P317, P362+P364, P403+P233, P405, and P501

Health Hazards:

>> SYMPTOMS: Symptoms associated with exposure to this compound include irritation of the skin, eyes and mucous membranes as well as anemia.

>> ACUTE/CHRONIC HAZARDS: This compound is toxic by ingestion and inhalation. It may also cause irritation of the skin, eyes and mucous membranes. Highly toxic fumes are emitted when this material is heated to decomposition. (NTP, 1992)

>> Flash point data for this chemical are not available, but it is probably combustible. (NTP, 1992)

>> Combustible. Gives off irritating or toxic fumes (or gases) in a fire. Finely dispersed particles form explosive mixtures in air.

3. Composition/Information On Ingredients

Chemical name : Metiram
CAS Number : 9006-42-2
Molecular Formula : C₄H₆N₂S₄Zn
Molecular Weight : 275.8000 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. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment.
- >> INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. 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: Some heavy metals are VERY TOXIC POISONS, especially if their salts are very soluble in water (e.g., lead, chromium, mercury, bismuth, osmium, and arsenic). 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. Also locate Ipecac syrup or a glass of salt water in case the medical advisor recommends inducing vomiting. Usually, this is NOT RECOMMENDED outside of a physician's care. 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)

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.

Eye First Aid

- >> First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.

Ingestion First Aid

- >> Rinse mouth. Do NOT induce vomiting. Give one or two glasses of water to drink. Refer for medical attention .

5. Fire Fighting Measures

- >> Fires involving this compound should be controlled with a dry chemical, carbon dioxide or Halon extinguisher. (NTP, 1992)
- >> 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 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.

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

7. Handling And Storage

Safe Storage:

- >> Separated from food and feedstuffs, strong bases, amines, amides, acids and strong oxidizers. Store only in original container. Provision to contain effluent from fire extinguishing. Cool. Dry. Keep in the dark. Keep in a well-ventilated room.

Storage Conditions:

- >> Store in well-aired, fresh (less than 30 °C), dry area away from dwellings, animal shelters and stored food.

8. Exposure Control/ Personal Protection

Inhalation Risk:

- >> A harmful concentration of airborne particles can be reached quickly when dispersed, especially if powdered.

Effects of Short Term Exposure:

- >> The substance is irritating to the eyes, skin and respiratory tract.

Effects of Long Term Exposure:

- >> Repeated or prolonged contact with skin may cause dermatitis. Repeated or prolonged contact may cause skin sensitization. The substance may have effects on the blood, nervous system, liver and thyroid. May cause an increase in cholinesterase activity. Animal tests show that this substance possibly causes toxic effects upon human reproduction.

Acceptable Daily Intakes:

An estimate of the amount of a chemical in food or drinking water that can be consumed daily over a lifetime without presenting an appreciable risk to health. It is usually expressed as milligrams of the substance per kilogram of body weight per day and applies to chemicals such as food additives, pesticide residues and veterinary drugs.

- >> EPA RfD= 0.05 mg/kg; WHO RfD= 0.05 mg/kg

Fire Prevention

- >> NO open flames. Closed system, dust explosion-proof electrical equipment and lighting. Prevent deposition of dust.

Exposure Prevention

- >> PREVENT DISPERSION OF DUST!

Inhalation Prevention

- >> Use local exhaust or breathing protection.

Skin Prevention

- >> Protective gloves.

Eye Prevention

- >> Wear safety goggles.

Ingestion Prevention

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

9. Physical And Chemical Properties

Molecular Weight:

- >> 275.8

Exact Mass:

- >> 273.870525

Physical Description:

- >> Zineb appears as an off-white powder. Used as a fungicide.
- >> YELLOW POWDER.

Color/Form:

- >> Powder or crystals from chloroform + alcohol

Odor:

- >> Practically odorless

Boiling Point:

- >> decomposes

Melting Point:

- >> 157 °C (decomposes)

Flash Point:

- >> 90 °C
- >> 194 °F

Solubility:

- >> less than 1 mg/mL at 77 °F (NTP, 1992)
- >> Solubility in water: none

Density:

- >> Approx 1.74 at 20 °C

Vapor Pressure:

- >> 0.00000008 [mmHg]

LogP:

- >> log Kow = 1.30

Stability/Shelf Life:

- >> Unstable to light, moisture and heat on prolonged storage ...

Autoignition Temperature:

- >> 149 °C
- >> 149 °C

Decomposition:

- >> Decomposes at 157 °C without melting.

>> 157 °C

Polymerization:

Polymerization is a process of reacting monomer molecules together in a chemical reaction to form polymer chains or three-dimensional networks.

>> The heavy metal salts of ethylene bisdithiocarbamic acid, i.e., maneb and zineb, may polymerize, the extent of polymerization depending on the method of preparation.

10. Stability And Reactivity

>> Decomposes gradually, accelerated by exposure to air, moisture, and heat. Insoluble in water. Thio and dithiocarbamates slowly decompose in aqueous solution to form carbon disulfide and methylamine or other amines. Such decompositions are accelerated by acids.

11. Toxicological Information

Toxicity Summary:

>> Anaemia results from the excessive absorption of zinc suppressing copper and iron absorption, most likely through competitive binding of intestinal mucosal cells. Unbalanced levels of copper and zinc binding to Cu,Zn-superoxide dismutase has been linked to amyotrophic lateral sclerosis (ALS). Stomach acid dissolves metallic zinc to give corrosive zinc chloride, which can cause damage to the stomach lining. Metal fume fever is thought to be an immune response to inhaled zinc. (L48, L49, A49)

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).

>> No data are available in humans. Inadequate evidence of carcinogenicity in animals. OVERALL EVALUATION: Group 3: The agent is not classifiable as to its carcinogenicity to humans.

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).

IARC Carcinogenic Agent

>> Zineb

IARC Carcinogenic Classes

>> Group 3: Not classifiable as to its carcinogenicity to humans

IARC Monographs

>> Volume 12: (1976) Some Carbamates, Thiocarbamates and Carbazides

>> Volume Sup 7: Overall Evaluations of Carcinogenicity: An Updating of IARC Monographs Volumes 1 to 42, 1987; 440 pages; ISBN 92-832-1411-0 (out of print)

>> 3, not classifiable as to its carcinogenicity to humans. (L135)

Health Effects:

>> Chronic exposure to zinc causes anemia, ataxia, lethargy, and decreases the level of good cholesterol in the body. It is also believed to cause pancreatic and reproductive damage. (L49)

Exposure Routes:

>> The substance can be absorbed into the body by inhalation.

>> Oral (L49) ; inhalation (L49) ; dermal (L49)

Inhalation Exposure

>> Cough. Sore throat. Nausea.

Skin Exposure

- >> Redness.

Eye Exposure

- >> Redness. Pain.

Ingestion Exposure

- >> Abdominal cramps. Vomiting. Diarrhoea.
- >> Ingestion of large doses of zinc causes stomach cramps, nausea, and vomiting. Acute inhalation of large amounts of zinc causes metal fume fever, which is characterized by chills, fever, headache, weakness, dryness of the nose and throat, chest pain, and coughing. Dermal contact with zinc results in skin irritation. (L49)

Target Organs:

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

- >> Endocrine

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.
- >> Reproductive Toxin – A chemical that is toxic to the reproductive system, including defects in the progeny and injury to male or female reproductive function. Reproductive toxicity includes developmental effects. See Guidelines for Reproductive Toxicity Risk Assessment.
- >> Skin Sensitizer – An agent that can induce an allergic reaction in the skin.

Toxicity Data:

- >> LCLo (rat) = 800 mg/m3/4hr

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

- >> Intermediate Oral: 0.3 mg/kg/day (L134) Chronic Oral: 0.3 mg/kg/day (L134)

Treatment:

Treatment when exposed to toxin

- >> Zinc poisoning is treated symptomatically, often by administering fluids such as water or milk, or with gastric lavage. (L49)

Antidote and Emergency Treatment:

- >> Immediate first aid: Remove patient from contact with the material. 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. /Dithiocarbamates and Related Compounds/

Human Toxicity Excerpts:

- >> /HUMAN EXPOSURE STUDIES/ The irritant and allergic potential of most dithiocarbamates is evident in occupational exposure. Skin irritation and sensitization were studied in man using a conventional patch test. A cotton square was dipped in 19% nabam solution and placed on the inner surface of the forearm, and, 14 days later, this procedure was repeated on the opposite forearm. Zineb was tested in the same manner, except that the cotton square was dipped in 65% wettable powder. The patches were left in place for 48 hr. Of the 25 subjects included in the nabam study, 2 showed irritation (mild erythema and itching). Thirteen of the 25 reacted to the retest (from mild erythema to severe erythema, edema, and vesiculation), indicating sensitization. Of the 50 subjects used in the zineb study, no reaction at all was seen in 49 of them. One reacted in such a way that it indicated primary irritation rather than sensitization ...

Non-Human Toxicity Excerpts:

- >> /LABORATORY ANIMALS: Acute Exposure/ Male Wistar rats were given tetraethylthiuramdisulfide, maneb, and zineb as a suspension in saline ip 200 mg/kg daily for 4 days. Rats received a similar dose of ethylenethiourea as a solution in saline ip, and the control rats received a corresponding volume of saline ip. After decapitation, pieces of ileum were taken, and the enzyme histochemical reactivity for the acetylcholinesterase and for the nonspecific cholinesterase in the ilea of the treated and control animals was studied. The reaction intensities in the samples were estimated by eye

using a scale from 0 (no reaction product) to 3+ (maximal reaction). Tetraethylthiuramdisulfide was used as an internal standard. Controls showed the maximal reaction for the acetylcholinesterase and for the non-specific cholinesterase. Maneb, ethylene thiourea and zineb showed consistent decrease in the reactivity for the acetylcholinesterase (+ +) and for the non-specific cholinesterase (+ +). The decrease by tetraethylthiuramdisulfide of reactions for both the acetylcholinesterase (+) as well for the non-specific cholinesterase (+) was even more pronounced indicating a possible nerve damage to the cholinergic innervation of rat intestine.

Human Toxicity Values:

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

>> Estimated lethal dose for humans 5–15 g/kg.

Non-Human Toxicity Values:

>> LD50 Rat oral >5200 mg/kg

12. Ecological Information

Resident Soil (mg/kg)

>> 3.20e+03

Industrial Soil (mg/kg)

>> 4.10e+04

Tapwater (ug/L)

>> 9.90e+02

MCL (ug/L)

>> 1.00e+04

Risk-based SSL (mg/kg)

>> 2.90e+00

Chronic Oral Reference Dose (mg/kg-day)

>> 5.00e-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. 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.

Sediment/Soil Concentrations:

Concentrations of this compound in sediment/soil.

>> SOIL: The residues of zineb in a soil planted with forage crops decreased from 11.0 ppm to 0.03 ppm within 4 months after surface spraying with 20 kg zineb/ha(1).

Average Daily Intake:

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

>> Danish farmers (251) were found to have average daily intake of zineb of 0.01 mg/kg day(1).

13. Disposal Considerations

Spillage Disposal

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

Disposal Methods

- >> Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste number U114, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste.
- >> A potential candidate for liquid injection incineration at a temperature range of 650 to 1,600 °C and a residence time of 0.1 to 2 seconds. 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. /Ethylenebisdithiocarbamate/

14. Transport Information

DOT

Metiram

6.1

UN Pack Group: III

Reportable Quantity of 5000 lb or 2270 kg

IATA

Metiram

6.1,

UN Pack Group: III

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.

- >> Toxic pollutant designated pursuant to section 307(a)(1) of the Federal Water Pollution Control Act and is subject to effluent limitations. /Zinc and compounds/

Regulatory Information

New Zealand EPA Inventory of Chemical Status

- >> Zineb: HSNO Approval: HSRO03171 Approved with controls

16. Other Information

Toxic Combustion Products:

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

- >> Gives off irritating or toxic fumes (or gases) in a fire.

Other Safety Information

Chemical Assessment

- >> IMAP assessments – Zinc, [[1,2-ethanediylbis(carbamodithioato)](2-)]-: Environment tier I assessment
- >> IMAP assessments – Zinc, [[1,2-ethanediylbis(carbamodithioato)](2-)]-: Human health tier I assessment

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