SAFETY DATA SHEET

Updated on 25/09/2024

1. Material Identification

Product Name : Nitrosodimethylamine
Catalog Number : io-2753
CAS Number : 62-75-9
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

>> H300 (19.6%): Fatal if swallowed [Danger Acute toxicity, oral]

>> H301 (80.4%): Toxic if swallowed [Danger Acute toxicity, oral]

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

>> H350 (100%): May cause cancer [Danger Carcinogenicity]

>> H372 (98.9%): Causes damage to organs through prolonged or repeated exposure [Danger Specific target organ toxicity, repeated exposure]

>> H411 (100%): Toxic to aquatic life with long lasting effects [Hazardous to the aquatic environment, long-term hazard]

Precautionary Statement Codes

>> P203, P260, P264, P270, P271, P273, P280, P284, P301+P316, P304+P340, P316, P318, P319, P320, P321, P330, P391, P403+P233, P405, and P501

Health Hazards:

>> Excerpt from NIOSH Pocket Guide for N-Nitrosodimethylamine:

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

>> Symptoms: Nausea, vomiting, diarrhea, abdominal cramps; headache; fever; enlarged liver, jaundice; decreased liver, kidney, pulmonary function; [potential occupational carcinogen]

>> Target Organs: Liver, kidneys,lungs

>> Cancer Site: In animals; lung, kidney, liver & nasal cavity tumors (NIOSH, 2024)

>> When heated to decomposition, it emits toxic fumes of nitrogen oxides. Avoid exposure to ultraviolet light. (EPA, 1998)

>> Combustible.

3. Composition/Information On Ingredients

Chemical name : Nitrosodimethylamine
CAS Number : 62-75-9
Molecular Formula : C2H6N2O
Molecular Weight : 74.0800 g/mol

4. First Aid Measures

First Aid:

>> Warning: Nitrosodimethylamine is a suspected human carcinogen, hepatotoxin, and hemorrhagic agent. Caution is advised. Effects may be delayed.

>> Signs and Symptoms of Nitrosodimethylamine Exposure: Signs and symptoms of acute exposure to nitrosodimethylamine may include myocardial and endocardial hemorrhage after oral exposure. Pulmonary edema and congestion have been noted, as have hepatomegaly (liver enlargement), hepatitis, icterus (jaundice), and ascites (accumulation of serous fluid in the abdomen). Other signs and symptoms may include malaise (body discomfort), vomiting, GI hemorrhage, seizures, and cerebral edema.

>> Emergency Life-Support Procedures: Acute exposure to nitrosodimethylamine 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. Remove victims to fresh air. Emergency personnel should avoid self-exposure to nitrosodimethylamine.

>> 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 100% humidified oxygen or other respiratory support.

>> 3. Rush to a health care facility.

>> 4. Obtain authorization and/or further instructions from the local hospital for performance of other invasive procedures.

>> Dermal/Eye Exposure:

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

>> 3. Remove and isolate 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 thoroughly 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 100% humidified oxygen or other respiratory support.

>> 2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

>> 3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of nitrosodimethylamine 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: Ingestion of nitrosodimethylamine may result in sudden onset of seizures or loss of consciousness. 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 I 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 for medical attention.

Skin First Aid

>> Remove contaminated clothes. Rinse skin with plenty of water or shower.

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

>> Give a slurry of activated charcoal in water to drink. Refer for medical attention .

5. Fire Fighting Measures

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

>> Use powder, carbon dioxide.

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 153 [Substances - Toxic and/or Corrosive (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.

>> Evacuate danger area! Personal protection: chemical protection suit including self-contained breathing apparatus. 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.

7. Handling And Storage

Safe Storage:

>> Separated from strong oxidants and food and feedstuffs. Cool. Keep in the dark. Well closed.

Storage Conditions:

>> ALL BOTTLES OF N-NITROSODIETHYLAMINE SHOULD BE STORED & TRANSPORTED WITHIN UNBREAKABLE OUTER CONTAINER; STORAGE SHOULD BE IN VENTILATED STORAGE CABINET (OR IN HOOD). /N-NITROSODIETHYLAMINE, ALSO APPLICABLE TO OTHER DIALKYLNITROSAMINES/

8. Exposure Control/ Personal Protection

>> Ca See Appendix A

>> [1910.1016] See Appendix B

>> Exposure by all routes should be carefully controlled to levels as low as possible. Skin notation.

>> (skin); A3 (confirmed animal carcinogen with unknown relevance to humans).

MAK (Maximale Arbeitsplatz Konzentration)

>> skin absorption (H); carcinogen category: 2

Inhalation Risk:

>> No indication can be given about the rate at which a harmful concentration of this substance in the air is reached on evaporation at 20 °C.

Effects of Short Term Exposure:

>> The substance is irritating to the eyes, skin and respiratory tract. The substance may cause effects on the liver. This may result in jaundice. The effects may be delayed. Medical observation is indicated.

Effects of Long Term Exposure:

>> The substance may have effects on the liver. This may result in liver function impairment and cirrhosis. This substance is probably carcinogenic to humans.

Fire Prevention

>> NO open flames.

Exposure Prevention

>> AVOID ALL CONTACT! IN ALL CASES CONSULT A DOCTOR!

Inhalation Prevention

>> Use ventilation, local exhaust or breathing protection.

Skin Prevention

>> Protective gloves.

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.

9. Physical And Chemical Properties

Molecular Weight:

>> 74.08

Exact Mass:

>> 74.048012819

Physical Description:

>> N-nitrosodimethylamine is a yellow oily liquid with a faint characteristic odor. Boiling point 151-153 °C. Can reasonably be expected to be a carcinogen. Used as an antioxidant, as an additive for lubricants and as a softener of copolymers. An intermediate in 1,1-dimethylhydrazine production.

>> YELLOW OILY LIQUID.

Color/Form:

>> Yellow, oily liquid

Odor:

>> Faint, characteristic odor

Boiling Point:

>> 304 to 307 °F at 760 mmHg (EPA, 1998)

>> 151 °C

Melting Point:

>> < 25 °C

Flash Point:

>> 142 °F (NTP, 1992)

>> 61 °C

Solubility:

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

>> Solubility in water: very good

Density:

>> 1.0048 at 68 °F (EPA, 1998) - Denser than water; will sink

>> Relative density (water = 1): 1.0

Vapor Density:

>> 2.56 (NTP, 1992) - Heavier than air; will sink (Relative to Air)

>> Relative vapor density (air = 1): 2.56

Vapor Pressure:

>> 40 mmHg at 152.8 °F (NTP, 1992)

>> Vapor pressure, Pa at 20 °C: 360

LogP:

>> log Kow = -0.57

>> -0.57

Stability/Shelf Life:

>> Stable at room temperature for more than 14 days in neutral or alkaline solutions in the dark; slightly less stable in acidic solutions; sensitive to UV light.

Decomposition:

>> When heated to decomp it emits toxic fumes of /oxides of nitrogen/.

Viscosity:

>> Low

Ionization Potential:

>> 8.69 eV

Odor Threshold:

>> Odor Threshold Low: 0.0079 [mmHg]

>> Odor Threshold High: 0.01 [mmHg]

>> Odor threshold from AIHA

Refractive Index:

>> Index of refraction: 1.4368 at 20 °C/D

10. Stability And Reactivity

>> Water soluble.

11. Toxicological Information

Toxicity Summary:

>> The mechanism of NDMAinduced liver toxicity is not clearly understood but may be related to alkylation of cellular protein. (L1207)

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

>> n-Nitrosodimethylamine

Reference Dose (RfD), Chronic

>> 8 x 10^-6 mg/kg-day

Reference Dose (RfD), Subchronic

>> 8 x 10^-6 mg/kg-day

PPRTV Assessment

>> PDF Document

Weight-Of-Evidence (WOE)

>> See the IRIS entry for n-Nitrosodimethylamine

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

>> N-Nitrosodimethylamine

Cancer HBSL [µg/L]

>> 0.0006-0.06

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).

>> No data are available in humans. Sufficient evidence of carcinogenicity in animals. OVERALL EVALUATION: Group 2A: The agent is probably carcinogenic 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

>> N-Nitrosodimethylamine

IARC Carcinogenic Classes

>> Group 2A: Probably carcinogenic to humans

IARC Monographs

>> Volume 17: (1978) Some N-Nitroso Compounds

>> 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)

Additional information

>> NB Overall evaluation upgraded to Group 2A with supporting evidence from other relevant data

>> 2A, probably carcinogenic to humans. (L135)

Health Effects:

>> NDMA is very harmful to the liver of animals and humans. Moreover, although there are no reports of NDMA causing cancer in humans, it is reasonable to expect that exposure to NDMA by eating, drinking, or breathing could also cause cancer in humans. (L1207)

Exposure Routes:

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

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

Inhalation Exposure

>> Sore throat. Cough. Nausea. Diarrhoea. Vomiting. Headache. Weakness.

Skin Exposure

>> Redness. Pain.

Eye Exposure

>> Pain. Redness.

Ingestion Exposure

>> Abdominal cramps. Further see Inhalation.

>> nausea, vomiting, diarrhea, abdominal cramps; headache; fever; enlarged liver, jaundice; decreased liver, kidney, pulmonary function; [potential occupational carcinogen]

Target Organs:

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

>> Cancer, Developmental (effects while organs are developing), Hematological (Blood Forming), Hepatic (Liver)

Cancer Sites:

The site in which cancer develops due to exposure to this compound. Cancers are casually referred to based on their primary sites (e.g., skin, lung, breasts, prostate, colon and rectum).

>> Hepatic

>> [in animals; lung, kidney, liver & nasal cavity tumors]

Adverse Effects:

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

>> Occupational hepatotoxin - Primary hepatotoxins: the toxic effect to the liver is the principal adverse effect of the chemical.

>> IARC Carcinogen - Class 2: International Agency for Research on Cancer classifies chemicals as probable (2a), or possible (2b) human carcinogens.

>> NTP Carcinogen - Reasonably anticipated to be a human carcinogen.

>> ACGIH Carcinogen - Confirmed Animal.

Toxicity Data:

>> LC50 (rat) = 78 ppm/4h

Interactions:

>> Resveratrol, a phytoalexin found in grapes and red wines, has been reported to exhibit a wide range of pharmacological properties. In this study, we investigated the protective effect of resveratrol on hepatic injury induced by dimethylnitrosamine (DMN) in rats. Oral administration of resveratrol (20 mg/kg daily for 4 weeks) remarkably prevented the DMN-induced loss in body and liver weight, and inhibited the elevation of serum alanine transaminase, aspartate transaminase, alkaline phosphatase and bilirubin levels. Resveratrol also increased serum albumin and hepatic glutathione levels and reduced the hepatic level of malondialdehyde due to its antioxidant effect. Furthermore, DMN-induced elevation of hydroxyproline content was reduced in the resveratrol treated rats, the result of which was consistent with the reduction in type I collagen mRNA expression and the histological analysis of liver tissue stained with Sirius red. The reduction in hepatic stellate cell activation, as assessed by alpha-smooth muscle actin staining, and the reduction in transforming growth factor-beta1 mRNA expression were associated with resveratrol treatment. In conclusion, resveratrol exhibited in vivo hepatoprotective and antifibrogenic effects against DMN-induced liver injury, suggesting that resveratrol may be useful in the prevention of the development of hepatic fibrosis.

Antidote and Emergency Treatment:

>> Irrigate eyes with water. Wash contaminated areas of body with soap and water.

Human Toxicity Excerpts:

>> /SIGNS AND SYMPTOMS/ Potential symptoms of overexposure are nausea, vomiting, diarrhea and abdominal cramps; headache; fever; enlarged liver, jaundice; reduced function of liver, kidneys and lungs.

Non-Human Toxicity Excerpts:

>> /LABORATORY ANIMALS: Acute Exposure/ Acute doses of 20 to 40 mg/kg bw NDMA administered orally in rats, rabbits, mice, guinea pigs and dogs caused severe liver necrosis that culminated in death.

Non-Human Toxicity Values:

>> LC50 Rat inhalation 78 ppm/4 hr

Populations at Special Risk:

>> Protect from exposure those individuals with diseases of liver.

12. Ecological Information

Resident Soil (mg/kg)

>> 2.00e-03

Industrial Soil (mg/kg)

>> 3.40e-02

Resident Air (ug/m3)

>> 7.2e-05

Industrial Air (ug/m3)

>> 8.80e-04

Tapwater (ug/L)

>> 1.10e-04

MCL (ug/L)

>> 1.00e+03

Risk-based SSL (mg/kg)

>> 2.7e-08

Oral Slope Factor (mg/kg-day)-1

>> 5.10e+01

Inhalation Unit Risk (ug/m3)-1

>> 1.40e-02

Chronic Oral Reference Dose (mg/kg-day)

>> 8e-06

Chronic Inhalation Reference Concentration (mg/m3)

>> 4e-05

Volatile

>> Volatile

Mutagen

>> Mutagen

Fraction of Contaminant Absorbed in Gastrointestinal Tract

>> 1

Soil Saturation Concentration (mg/kg)

>> 2.37e+05

ICSC Environmental Data:

>> Environmental effects from the substance have not been investigated adequately.

Sediment/Soil Concentrations:

Concentrations of this compound in sediment/soil.

>> N-Nitrosodimethylamine has been found in a number of soil samples at the 1 to 8 ug/kg (dry basis) level.

Fish/Seafood Concentrations:

Concentrations of this compound in fish or seafood.

>> N-Nitrosodimethylamine concentrations in fish and seafood were: 200 to 1400 ng/kg in fried salted yellow croaker(1), 0.2 ppb (average) in frozen cod and sole fillet(2), 0.6 ppb (average) in miscellaneous smoked fish(2), 0.26 ng/g in a crab from the Raritan River, NJ(3) and a trace in uncooked, fresh cod(4). N-Nitrosodimethylamine is often present in fish meal(5).

Average Daily Intake:

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

>> WATER: (assume 3 to 6 ng N-nitrosodimethylamine/l)(1) 6 to 12 ng; direct intake from drinking water is probably much less than 1 ug/day(2). AIR: (estimates of 400,000 people in the USA are exposed to 0.1 ng N-nitrosodimethylamine/cu m)(3) 2 ng. FOOD: (assume <0.1 to 84 ug/kg)(4) <0.16 to 134 ug.

13. Disposal Considerations

Spillage Disposal

>> Evacuate danger area! Personal protection: chemical protection suit including self-contained breathing apparatus. 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.

Disposal Methods

>> Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste number P082, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste.

>> SRP: Wastewater from contaminant suppression, cleaning of protective clothing/equipment, or contaminated sites should be contained and evaluated for subject chemical or decomposition product concentrations. Concentrations shall be lower than applicable environmental discharge or disposal criteria. Alternatively, pretreatment and/or discharge to a permitted wastewater treatment facility is acceptable only after review by the governing authority and assurance that "pass through" violations will not occur. Due consideration shall be given to remediation worker exposure (inhalation, dermal and ingestion) as well as fate during treatment, transfer and disposal. If it is not practicable to manage the chemical in this fashion, it must be evaluated in accordance with EPA 40 CFR Part 261, specifically Subpart B, in order to determine the appropriate local, state and federal requirements for disposal.

>> 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.

>> The following wastewater treatment technology has been investigated for dimethylnitrosamine: Concentration process: Activated carbon.

>> For more Disposal Methods (Complete) data for N-NITROSODIMETHYLAMINE (13 total), please visit the HSDB record page.

14. Transport Information

DOT

Nitrosodimethylamine
6.1
UN Pack Group: I
Reportable Quantity of 10 lb or 4

IATA

Nitrosodimethylamine
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.

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

Regulatory Information

The Australian Inventory of Industrial Chemicals

>> Chemical: Methanamine, N-methyl-N-nitroso-

New Zealand EPA Inventory of Chemical Status

>> N-Nitrosodimethylamine: 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

Toxic Combustion Products:

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

>> Poisonous gases, including nitrogen oxides, are produced in fire.

Other Safety Information

Chemical Assessment

>> IMAP assessments - Methanamine, N-methyl-N-nitroso-: Human health tier I assessment

>> IMAP assessments - Methanamine, N-methyl-N-nitroso-: Environment 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."