SAFETY DATA SHEET

Updated on 26/09/2024

1. Material Identification

Product Name : Diphenyl ether
Catalog Number : io-5839
CAS Number : 101-84-8
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)

Note

>> Pictograms displayed are for 99.5% (2201 of 2213) of reports that indicate hazard statements. This chemical does not meet GHS hazard criteria for 0.5% (12 of 2213) of reports.

Pictogram(s)

>> Warning

GHS Hazard Statements

>> H319 (84.9%): Causes serious eye irritation [Warning Serious eye damage/eye irritation]

>> H400 (15%): Very toxic to aquatic life [Warning Hazardous to the aquatic environment, acute hazard]

>> H410 (10.2%): Very toxic to aquatic life with long lasting effects [Warning Hazardous to the aquatic environment, long-term hazard]

>> H411 (79.8%): Toxic to aquatic life with long lasting effects [Hazardous to the aquatic environment, long-term hazard]

Precautionary Statement Codes

>> P264+P265, P273, P280, P305+P351+P338, P337+P317, P391, and P501

NFPA 704 Diamond

NFPA Health Rating

>> 1 - Materials that, under emergency conditions, can cause significant irritation.

NFPA Fire Rating

>> 1 - Materials that must be preheated before ignition can occur. Materials require considerable preheating, under all ambient temperature conditions, before ignition and combustion can occur.

NFPA Instability Rating

>> 0 - Materials that in themselves are normally stable, even under fire conditions.

EPA Safer Chemical:

EPA labels products so that consumers can easily choose ones that are safer for people and the environment. When consumers see the Safer Choice label on a product, they can be confident that the ingredients have been through a rigorous EPA review. The label means that EPA scientists have evaluated every ingredient in the product to ensure it meets Safer Choice's stringent criteria. When people use Safer Choice products, they are protecting their families and the environment by making safer chemical choices.

EPA Safer Chemical

>> Chemical: Diphenyl oxide

>> Yellow triangle - The chemical has met Safer Choice Criteria for its functional ingredient-class, but has some hazard profile issues. Specifically, a chemical with this code is not associated with a low level of hazard concern for all human health and environmental endpoints. (See Safer Choice Criteria). While it is a best-in-class chemical and among the safest available for a particular function, the function fulfilled by the chemical should be considered an area for safer chemistry innovation.

Health Hazards:

>> Inhalation may cause nausea because of disagreeable odor. Contact of liquid with eyes causes mild irritation. Prolonged exposure of skin to liquid causes reddening and irritation. Ingestion produces nausea. (USCG, 1999)

>> This chemical is combustible. (NTP, 1992)

>> Combustible.

3. Composition/Information On Ingredients

Chemical name : Diphenyl ether
CAS Number : 101-84-8
Molecular Formula : C12H10O
Molecular Weight : 170.2100 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: DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician. If the victim is convulsing or unconscious, do not give anything by mouth, ensure 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.

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).

Ingestion First Aid

>> Rinse mouth.

5. Fire Fighting Measures

>> Fire Extinguishing Agents Not to Be Used: Water or foam may cause frothing.

>> Fire Extinguishing Agents: Dry chemical, carbon dioxide (USCG, 1999)

>> Use water spray, powder, foam, 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 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.

>> 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. If solid: sweep spilled substance into 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 strong oxidants. Store in an area without drain or sewer access. Provision to contain effluent from fire extinguishing.

Storage Conditions:

>> Conditions for safe storage, including any incompatibilities. Keep container tightly closed in a dry and well-ventilated place. Storage class (TRGS 510): Non Combustible Solids.

8. Exposure Control/ Personal Protection

REL-TWA (Time Weighted Average)

>> 1 ppm (7 mg/m³)

>> TWA 1 ppm (7 mg/m3)

>> 1.0 [ppm]

PEL-TWA (8-Hour Time Weighted Average)

>> 1 ppm (7 mg/m³)

>> 1.0 [ppm], vapor fraction

TLV-STEL

>> 2.0 [ppm], vapor fraction

>> 1 ppm as TWA; 2 ppm as STEL.

TLV-TWA (Time Weighted Average)

>> 1 ppm [1979]

TLV-STEL (Short Term Exposure Limit)

>> 2 ppm [1979]

EU-OEL

>> 7 mg/m

MAK (Maximale Arbeitsplatz Konzentration)

>> 7.1 mg/m

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:

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

Effects of Long Term Exposure:

>> Repeated or prolonged contact with skin may cause dermatitis.

Fire Prevention

>> NO open flames.

Inhalation Prevention

>> Use ventilation. Use local exhaust.

Skin Prevention

>> Protective gloves.

Eye Prevention

>> Wear safety spectacles.

Ingestion Prevention

>> Do not eat, drink, or smoke during work.

Exposure Control and Personal Protection

Maximum Allowable Concentration (MAK)

>> 1.0 [ppm]

9. Physical And Chemical Properties

Molecular Weight:

>> 170.21

Exact Mass:

>> 170.073164938

Physical Description:

>> Diphenyl oxide appears as colorless liquid with a mild pleasant odor. May float or sink in water. Freezing point is 81 °F. (USCG, 1999)

>> COLOURLESS LIQUID OR CRYSTALS WITH CHARACTERISTIC ODOUR.

Color/Form:

>> Colorless crystals or liquid

Odor:

>> Geranium-like odor

Boiling Point:

>> 496.27 °F at 760 mmHg (NTP, 1992)

>> 257 °C

Melting Point:

>> 80.3 °F (NTP, 1992)

>> 28 °C

Flash Point:

>> 239 °F (NTP, 1992)

>> 115 °C c.c.

Solubility:

>> Insoluble (NTP, 1992)

>> Solubility in water, g/100ml: 0.002 (very poor)

Density:

>> 1.07 at 80.6 °F (USCG, 1999) - Denser than water; will sink

>> Relative density (water = 1): 1.08

Vapor Density:

>> 5.86 (Air = 1)

>> Relative vapor density (air = 1): 5.9

Vapor Pressure:

>> 0.02 mmHg at 77 °F (NIOSH, 2024)

>> Vapor pressure, Pa at 25 °C: 2.7

LogP:

>> log Kow = 4.21

>> 4.21

Stability/Shelf Life:

>> Stable under recommended storage conditions.

Autoignition Temperature:

>> 1148 °F (USCG, 1999)

>> 610 °C

Decomposition:

>> When heated to decomposition it emits acrid smoke and irritating fumes.

Viscosity:

>> 3.4909X10-3 Pa-sec at melting point

Heat of Combustion:

>> -1466.63 kcal/mol at 25 °C

Heat of Vaporization:

>> 15.99 kcal/mol at 25 °C

Surface Tension:

>> 38.82 dyne/cm at 30 °C

Ionization Potential:

>> 8.09 eV

Odor Threshold:

>> Odor Threshold Low: 0.0012 [mmHg]

>> Reported odor threshold

Refractive Index:

>> Index of refraction: 1.5787 at 25 °C/D

Dissociation Constants:

>> pK(BH+) = 5.79 at 25 °C /negative logarithm of ionization constant of protonated base/

10. Stability And Reactivity

>> Insoluble in water.

11. Toxicological Information

Toxicity Summary:

>> IDENTIFICATION AND USE: Diphenyl ether exists as a colorless crystalline solid or liquid with a unpleasant odor. It is insoluble in water and soluble in ether, benzene and acetic acid. The odor is extremely unpleasant. It is used in large quantities in soap perfumes and its main application is as a heat transfer medium (eutectic mixture with diphenyl) and as a chemical intermediate for reactions such as halogenation, acylation, alkylation; it is also used as a dye carrier. Employed as a processing aid in the production of polyesters. HUMAN EXPOSURE AND TOXICITY: Contact with a commercial product containing diphenyl ether has caused burning of the eyes, irritation of the respiratory tract, and severe nausea along with skin irritation. Oral exposure to a commercial product containing this chemical has caused severe degenerative changes in the liver and kidney. Prolonged exposure of skin to liquid causes reddening and irritation. Occupational exposure to diphenyl ether occurs through dermal contact and inhalation of vapor. Its use in various soap, detergent, creams, lotion, and perfume formulations results in general population exposure through inhalation and dermal contact. Diphenyl ether was detected in collected composite adipose tissue. ANIMAL STUDIES: In acute oral exposures of diphenyl ether to rats, injury to the liver, spleen, kidney, thyroid and intestinal tract was observed. Undiluted diphenyl ether is irritating to rabbit skin. Erythema and exfoliation of skin was noted.

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

>> Diphenyl Ether

PPRTV Assessment

>> PDF Document

Weight-Of-Evidence (WOE)

>> Inadequate information to assess carcinogenic potential

Last Revision

>> 2017

Exposure Routes:

>> inhalation, skin and/or eye contact

Inhalation Exposure

>> Sore throat. Cough.

Skin Exposure

>> Redness.

Eye Exposure

>> Redness. Pain.

>> irritation eyes, nose, skin; nausea

Target Organs:

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

>> Eyes, skin, respiratory system

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.

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. /Ethers and related compounds/

Human Toxicity Excerpts:

>> /HUMAN EXPOSURE STUDIES/ Diphenyl oxide was evaluated for sensitization in humans following the Maximization Test. The test material was mixed into petrolatum N.F. at 4% concentration. The test material was applied to the same forearm sites under occlusion for five alternate-day 48-hour periods. Each application of the test material was preceded by treatment of the patch site with 5% aqueous sodium lauryl sulfate under occlusion. Following a ten day rest period challenge patches of the test material were applied to fresh sites on the scapular backs under occlusion for 48 hours. The challenge sites were pretreated for one hour with 10% aqueous sodium lauryl sulfate. Clinical evaluations were made at 48 and 72 hours. Diphenyl oxide did not produce any cases of contact allergy.

Non-Human Toxicity Excerpts:

>> /LABORATORY ANIMALS: Acute Exposure/ Diphenyl ether (DPE) was investigated to determine the dermal absorption parameters and subchronic toxicity of this fragrance ingredient. For the absorption, distribution and elimination study, Sprague-Dawley rats received a dermal application of [(14)C]DPE under a semi-occlusive dressing for 6 hr. DPE was diluted in diethyl phthalate (DEP) to administer a total application volume of 2 mL/kg and concentrations of 0.5, 5 and 50% (approximately equal to 10, 100 and 1000 mg DPE/kg body weight). Approximately 17.7% of the administered dose was eliminated in the urine, with small amounts also found in the feces (1.18-3.79%). At 72 hr post-dosing, approximately 0.2% of the applied dose was retained in the body with low levels also measured in the liver, kidney and gastrointestinal tract (approximately equal to 0.04, 0.02 and 0.3%, respectively).

Non-Human Toxicity Values:

>> LD50 Rat oral 2830 mg/kg body weight (95% confidence limits 2490-3210 mg/kg).

TSCA Test Submissions:

Under the Toxic Substances Control Act (TSCA), EPA has broad authority to issue regulations designed to require manufacturers (including importers) or processors to test chemical substances and mixtures for health and environmental effects. This section provides information on test reports submitted for this chemical under TSCA.

>> Biphenyl oxide was examined for mutagenic activity in Salmonella typhimurium tester strains TA1535, TA100, TA1538, TA98, TA1537 and TA1978 with and without addition of rat liver S9 fraction to provide metabolic activation. The method used for rat liver enzyme induction was not reported. Using the plate incorporation technique, administration of 10 uL/plate of a concentrated solution, or 5 uL/plate of a 1:9 dilution of a concentrated solution, was not mutagenic in the presence and absence of activation. The exact concentration of test article was not reported. Additionally, cytotoxicity data was not reported, although the investigators stated that no toxicity was observed in a separate spot test.

12. Ecological Information

Resident Soil (mg/kg)

>> 3.40e+01

Industrial Soil (mg/kg)

>> 1.40e+02

Resident Air (ug/m3)

>> 4.20e-01

Industrial Air (ug/m3)

>> 1.80e+00

Tapwater (ug/L)

>> 8.30e-01

MCL (ug/L)

>> 3e-05

Risk-based SSL (mg/kg)

>> 3.40e-03

Chronic Inhalation Reference Concentration (mg/m3)

>> 4.00e-04

Volatile

>> Volatile

Mutagen

>> Mutagen

Fraction of Contaminant Absorbed in Gastrointestinal Tract

>> 1

ICSC Environmental Data:

>> The substance is very toxic to aquatic organisms. Bioaccumulation of this chemical may occur in fish. It is strongly advised not to let the chemical enter into the environment.

Fish/Seafood Concentrations:

Concentrations of this compound in fish or seafood.

>> Diphenyl ether was tentatively identified at a mean concentration of 109 ng/g in the volatile component of shrimp paste (Acetes chinensis). It was not detected in salt-fermented fish (anchovy, Engraulis japonica; big-eyed herring, Harengula zunasi; hair tail, Trichiurus japonica). Samples were obtained from a fish market in Masan, Korea(1).

13. Disposal Considerations

Spillage Disposal

>> 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. If solid: sweep spilled substance into containers. If appropriate, moisten first to prevent dusting. Then store and dispose of according to local regulations.

Disposal Methods

>> SRP: 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 air, soil or water; effects on animal, aquatic and plant life; and conformance with environmental and public health regulations. If it is possible or reasonable use an alternative chemical product with less inherent propensity for occupational harm/injury/toxicity or environmental contamination.

>> Product: Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Contaminated packaging: Dispose of as unused product.

>> Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. All federal, state, and local environmental regulations must be observed.

>> 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.

14. Transport Information

DOT

Diphenyl ether
9
UN Pack Group: III

IATA

Diphenyl ether
9,
UN Pack Group: III

15. Regulatory Information

TSCA Requirements:

This section provides information on requirements concerning this chemical under the Toxic Substances Control Act (TSCA) of 1976. TSCA provides EPA with authority to require reporting, record-keeping and testing requirements, and restrictions relating to chemical substances and/or mixtures. Certain substances are generally excluded from TSCA, including, among others, food, drugs, cosmetics and pesticides.

>> Pursuant to section 8(d) of TSCA, EPA promulgated a model Health and Safety Data Reporting Rule. The section 8(d) model rule requires manufacturers, importers, and processors of listed chemical substances and mixtures to submit to EPA copies and lists of unpublished health and safety studies. Diphenyl oxide is included on this list. Effective date: 4/13/89; Sunset date: 6/30/98.

Regulatory Information

The Australian Inventory of Industrial Chemicals

>> Chemical: Benzene, 1,1'-oxybis-

REACH Registered Substance

>> Status: Active Update: 04-08-2021 https://echa.europa.eu/registration-dossier/-/registered-dossier/14971

>> Status: Active Update: 07-10-2016 https://echa.europa.eu/registration-dossier/-/registered-dossier/18130

New Zealand EPA Inventory of Chemical Status

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

16. Other Information

Toxic Combustion Products:

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

>> Special hazards arising from the substance or mixture: Carbon oxides

"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. Lonz is not responsible for any damages resulting from handling or contact with the product incorrectly."