ionz

SAFETY DATA SHEET

Updated on 26/09/2024

1. Material Identification

Product Name : 4-Aminobiphenyl
Catalog Number : io-1690
CAS Number : 92-67-1
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 (100%): Harmful if swallowed [Warning Acute toxicity, oral]

>> H340 (35.3%): May cause genetic defects [Danger Germ cell mutagenicity]

>> H341 (27.8%): Suspected of causing genetic defects [Warning Germ cell mutagenicity]

>> H350 (99.2%): May cause cancer [Danger Carcinogenicity]

Precautionary Statement Codes

>> P203, P264, P270, P280, P301+P317, P318, P330, P405, and P501

Health Hazards:

>> Excerpt from NIOSH Pocket Guide for 4-Aminodiphenyl:

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

>> Symptoms: Headache, dizziness; drowsiness, dyspnea (breathing difficulty); ataxia, lassitude (weakness, exhaustion); methemoglobinemia; urinary burning; acute hemorrhagic cystitis; [potential occupational carcinogen]

>> Target Organs: Bladder, skin

>> Cancer Site: Bladder cancer (NIOSH, 2024)

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

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

3. Composition/Information On Ingredients

Chemical name : 4-Aminobiphenyl
CAS Number : 92-67-1
Molecular Formula : C12H11N
Molecular Weight : 169.2200 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. IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas.

>> INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop. 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.

>> OTHER: Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure. (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. Refer for medical attention .

5. Fire Fighting Measures

>> Fires involving this material can be controlled with a dry chemical, carbon dioxide or Halon extinguisher. A water spray may also be used. (NTP, 1992)

>> Use water spray, dry 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.

>> Personal protection: complete protective clothing including self-contained breathing apparatus. Sweep spilled substance into sealable 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:

>> Separated from strong oxidants and acids. Well closed.

Storage Conditions:

>> Keep container tightly closed in a dry and well-ventilated place.

8. Exposure Control/ Personal Protection

>> Ca See Appendix A

PEL-TWA (8-Hour Time Weighted Average)

>> Ca

>> [1910.1011] See Appendix B

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

>> (skin); A1 (confirmed human carcinogen).

TLV-TWA (Time Weighted Average)

>> Exposure by all routes should be carefully controlled to levels as low as possible. [1968]

MAK (Maximale Arbeitsplatz Konzentration)

>> skin absorption (H); carcinogen category: 1; germ cell mutagen group: 3A

Inhalation Risk:

>> Evaporation at 20 °C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

Effects of Long Term Exposure:

>> The substance may have effects on the bladder. This may result in inflammation and tissue lesions. This substance is carcinogenic to humans.

Fire Prevention

>> NO open flames.

Exposure Prevention

>> See EFFECTS OF LONG-TERM OR REPEATED EXPOSURE. AVOID ALL CONTACT!

Inhalation Prevention

>> Use closed system or ventilation.

Skin Prevention

>> Protective gloves. Protective clothing.

Eye Prevention

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

Ingestion Prevention

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

9. Physical And Chemical Properties

Molecular Weight:

>> 169.22

Exact Mass:

>> 169.089149355

Physical Description:

>> 4-aminobiphenyl appears as colorless to yellowish-brown crystals or light brown solid. (NTP, 1992)

>> COLOURLESS SOLID IN VARIOUS FORMS WITH CHARACTERISTIC ODOUR. TURNS PURPLE ON EXPOSURE TO AIR.

Color/Form:

>> Colorless crystals

Odor:

>> Floral odor

Boiling Point:

>> 576 °F at 760 mmHg (NTP, 1992)

>> 302 °C

Melting Point:

>> 127 °F (NTP, 1992)

>> 53 °C

Flash Point:

>> greater than 235 °F (NTP, 1992)

>> 113 °C c.c.

Solubility:

>> less than 0.1 mg/mL at 66 °F (NTP, 1992)

>> Solubility in water, g/100ml at 25 °C: 0.2 (poor)

Density:

>> 1.16 at 68 °F (NTP, 1992) - Denser than water; will sink

>> 1.2 g/cm³

Vapor Density:

>> 5.8 (Air = 1) at boiling point of 4-aminodiphenyl

>> Relative vapor density (air = 1): 5.8

Vapor Pressure:

>> 1 mmHg at 227 °F (NIOSH, 2024)

>> Vapor pressure, Pa at 25 °C: 0.077

LogP:

>> log Kow = 2.86 at pH 7.5

>> 2.9

Stability/Shelf Life:

>> Stable under recommended storage conditions.

Autoignition Temperature:

>> 842 °F (NTP, 1992)

>> 450 °C

Decomposition:

>> Hazardous decomposition products formed under fire conditions - Carbon oxides, nitrogen oxides (NOx).

Dissociation Constants:

>> pKa = 4.35 at 18 °C (conjugate acid)

Relative Evaporation Rate:

The rate at which a material will vaporize (evaporate, change from liquid to vapor), compared to the rate of vaporization of a specific known material.

>> Evaporation at 20 °C is negligible

10. Stability And Reactivity

>> Is oxidized by air (darkens on oxidation). Insoluble in water.

11. Toxicological Information

Toxicity Summary:

>> IDENTIFICATION AND USE: 4-Biphenylamine (BPA) is a solid. It is used in detection of sulfates, and as carcinogen in cancer research. HUMAN EXPOSURE AND TOXICITY: BPA is a known human carcinogen. It is an occupational bladder carcinogen and may cause cancer of the ureters and renal pelves. Eleven percent of 171 workers in a plant manufacturing BPA developed bladder tumors. Tumors appeared 5 to 19 years after initial exposure, which ranged in duration from 1.25 to 10 years. BPA forms BPA-DNA adducts in normal human urothelial mucosa and bladder tumor tissues. Levels of BPA- hemoglobin adducts in smokers of blond (flue-cured) and black (air-cured) tobacco have been found to be proportional to bladder cancer risk. Risk of bladder cancer due to exposure to occupational carcinogens is elevated in genetically determined slow acetylators. ANIMAL STUDIES: A comparison between DNA adducts and tumorigenesis indicated a linear correlation between adduct levels and the incidence of liver tumors in female mice. In the bladders of male mice, however, the relationship was markedly nonlinear. Seven rabbits were given BPA orally, and the treatment was continued until the onset of the final illness. Bladder carcinomas were observed in three rabbits, the earliest after four years of treatment. Four young adult female mongrel dogs were given BPA orally. Bladder carcinomas were observed in all four dogs after 21- 34 months. The total dose until first appearance of tumors was 87.5-144.0 g per dog (8.2-14.1 g/kg bw). In BPA- treated mice dose-related neoplasms were angiosarcomas, bladder urothelial carcinomas and hepatocellular neoplasms. The non-neoplastic dose-related lesions were left atrial thrombosis, bladder urothelial hyperplasia, splenic hemosiderosis and splenic erythropoiesis. The incidences of bladder carcinoma and atrial thrombosis were higher in the males and the incidences of hepatocellular neoplasms and angiosarcomas were higher in the females. BPA gave positive results in the mouse bone marrow micronucleus test. BPA produced both frameshift and base pair substitution mutations In Salmonella typhimurium TA-98 and TA-100. ECOTOXICITY STUDIES: The system most sensitive to BPA was D. magna immobilization, followed by development of zebrafish embryos, and inhibition of mammalian cell proliferation.

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).

>> Sufficient evidence of carcinogenicity in humans. Sufficient evidence of carcinogenicity in animals. OVERALL EVALUATION: Group 1: The agent is 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

>> 4-Aminobiphenyl

IARC Carcinogenic Classes

>> Group 1: Carcinogenic to humans

IARC Monographs

>> Volume 1: (1972) Some Inorganic Substances, Chlorinated Hydrocarbons, Aromatic Amines, N-Nitroso Compounds, and Natural Products

>> 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)

>> Volume 99: (2010) Some Aromatic Amines, Organic Dyes, and Related Exposures

>> Volume 100F: (2012) Chemical Agents and Related Occupations

>> 1, carcinogenic to humans. (L135)

Health Effects:

>> 4-Aminobiphenyl is a known human carcinogen. It may also cause methemoglobinemia. (L135, T36)

Exposure Routes:

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

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

Inhalation Exposure

>> No acute symptoms expected.

Skin Exposure

>> MAY BE ABSORBED!

Ingestion Exposure

>> Further see Inhalation.

>> headache, dizziness; drowsiness, dyspnea (breathing difficulty); ataxia, lassitude (weakness, exhaustion); methemoglobinemia; urinary burning; acute hemorrhagic cystitis; [potential occupational carcinogen]

Target Organs:

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

>> Bladder, skin

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).

>> [bladder cancer]

Adverse Effects:

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

>> Methemoglobinemia - The presence of increased methemoglobin in the blood; the compound is classified as secondary toxic effect

>> Dermatotoxin - Skin burns.

>> IARC Carcinogen - Class 1: International Agency for Research on Cancer classifies chemicals as established human carcinogens.

>> NTP Carcinogen - Known to be a human carcinogen.

>> ACGIH Carcinogen - Confirmed Human.

Toxicity Data:

>> LD50: 205 mg/kg (Oral, Mouse) (T14)

Interactions:

>> ... In the present study, we analyzed possible interactions between the aromatic amines 4-aminobiphenyl (4-ABP) as well as 2-naphthylamine (2-NA) and the polycyclic aromatic hydrocarbon benzo[a]pyrene (B[a]P). For this purpose we incubated primary porcine urinary bladder epithelial cells (PUBEC) with concentrations of 1 to 50 uM 4-ABP with and without co-exposure to B[a]P. As expected B[a]P increased mRNA expression of cytochrome P450 1A1 (CYP1A1), whereas 4-ABP had no effect. However, when co-exposed 4-ABP enhanced the induction of CYP1A1 by B[a]P. This result was confirmed by Western blot analysis of CYP1A1 protein expression. A similar effect as for CYP1A1 was also observed for cyclooxygenase-2 (COX-2) and UDP-glucuronosyltransferase 1 (UGT1). Next, we studied co-exposures of 2-NA and B[a]P. Similar as for 4-ABP also 2-NA enhanced B[a]P-mediated induction of CYP1A1. Our results demonstrate that some aromatic amines may enhance the influence of B[a]P on Ah receptor-dependent genes.

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. /Nitrates, Nitrites, and Related Compounds/

Human Toxicity Excerpts:

>> /SIGNS AND SYMPTOMS/ ... 4 Aminobiphenyl (xenylamine), a byproduct of aniline dye manufacturing used as a rubber antioxidant, is another occupational bladder carcinogen and may cause cancer of the ureters and renal pelves as well.

Non-Human Toxicity Excerpts:

>> /LABORATORY ANIMALS: Subchronic or Prechronic Exposure/ ... The potential of 4-ABP or its metabolites to exert a genotoxic effect on newborn pups via maternal transfer was ... examined. Dams were treated on day 1 post partum and then daily with 4-ABP (10 mg/kg) in corn oil or corn oil alone for 2 weeks. Each experimental group had four liters of pups each containing 5 pups. Pups were sacrificed at 15 days of age, separated by sex and the levels of 4-ABP:DNA adducts in liver determined using 32P-postlabeling. DNA adduct profiles were similar between male and female pups with total adduct levels of 332 and 338 fmol of adducts/mg of DNA, respectively. These results indicate that the genotoxic effects of 4-ABP can be transmitted from exposed dams to the nursing offspring.

Non-Human Toxicity Values:

>> LD50 Rat oral 500 mg/kg

Populations at Special Risk:

>> ... Lower expression of NAT1 and NAT2 occurring in neonates limits acetylation, a key reaction in the activation of 4ABP, and contributes to decreased susceptibility to 4ABP genotoxicity compared to adults. Based on the similarities in expression of NATs in mice and humans, children would be predicted to have a higher risk of toxicity for chemicals that are inactivated by NATs compared to adults but lower risk for xenobiotics activated by these enzymes.

12. Ecological Information

Resident Soil (mg/kg)

>> 2.60e-02

Industrial Soil (mg/kg)

>> 1.10e-01

Resident Air (ug/m3)

>> 4.70e-04

Industrial Air (ug/m3)

>> 2.00e-03

Tapwater (ug/L)

>> 3.00e-03

MCL (ug/L)

>> 4.00e+00

Risk-based SSL (mg/kg)

>> 1.5e-05

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

>> 2.10e+01

Inhalation Unit Risk (ug/m3)-1

>> 6.00e-03

Volatile

>> Volatile

Mutagen

>> Mutagen

Fraction of Contaminant Absorbed in Gastrointestinal Tract

>> 1

Fraction of Contaminant Absorbed Dermally from Soil

>> 0.1

ICSC Environmental Data:

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

13. Disposal Considerations

Spillage Disposal

>> Personal protection: complete protective clothing including self-contained breathing apparatus. Sweep spilled substance into sealable containers. If appropriate, moisten first to prevent dusting. Carefully collect remainder. 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.

>> 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.

>> Product: Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber; Contaminated packaging: Dispose of as unused product.

>> Consult with environmental regulatory agencies for guidance on acceptable disposal practices. Generators of waste containing this contaminant (>/= 100 kg/mo) must conform with EPA regulations governing storage, transportation, treatment, and waste disposal. Controlled incineration whereby oxides of nitrogen are removed from the effluent gas by scrubber, catalytic or thermal devices.

14. Transport Information

DOT

4-Aminobiphenyl

Reportable Quantity of 1 lb or 0

IATA

4-Aminobiphenyl

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15. Regulatory Information

Regulatory Information

REACH Restricted Substance

>> Restricted substance: 4-Aminobiphenyl xenylamine

>> EC: 202-177-1

REACH Substances of Very High Concern (SVHC)

>> Substance: Biphenyl-4-ylamine

>> EC: 202-177-1

>> Date of inclusion: >19-Dec-2012

>> Reason for inclusion: Carcinogenic (Article 57a)

New Zealand EPA Inventory of Chemical Status

>> 4-Aminodiphenyl: 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 are produced in fire, including nitrogen 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. Ionz is not responsible for any damages resulting from handling or contact with the product incorrectly."