

# Material Safety Data Sheet

HAZARD WARNINGS	RISK PHRASES	PROTECTIVE CLOTHING
  	<b>Environmental hazard.</b> This material is toxic to aquatic organisms and may cause long term adverse effects to the aquatic environment. Harmful compound, minimize exposure. <b>CARCINOGEN. MINIMIZE EXPOSURE.</b> Store under inert gas.	   

## Section I. Chemical Product and Company Identification

Chemical Name	<b>Azobenzene</b>		
Catalog Number	A0565	Supplier	TCI America 9211 N. Harborsgate St. Portland OR 1-800-423-8616
Synonym	Diazene, 1,2-diphenyl- (CA INDEX NAME)		
Chemical Formula	C <sub>12</sub> H <sub>10</sub> N <sub>2</sub>		
CAS Number	103-33-3	In case of Emergency Call	<b>Chemtrec®</b> <b>(800) 424-9300 (U.S.)</b> <b>(703) 527-3887 (International)</b>

## Section II. Composition and Information on Ingredients

Chemical Name	CAS Number	Percent (%)	TLV/PEL	Toxicology Data
Azobenzene	103-33-3	Min. 98.0 (GC)	This chemical is classified as a carcinogen. There is no acceptable exposure limit for a carcinogen.	Rat LD <sub>50</sub> (oral) 1000 mg/kg Mouse LD <sub>50</sub> (intraperitoneal) 500 mg/kg

## Section III. Hazards Identification

Acute Health Effects	Harmful if ingested or inhaled. Minimize exposure to this material. Severe overexposure can result in injury or death. Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.
Chronic Health Effects	<b>CARCINOGENIC EFFECTS</b> : Carcinogenic by RTECS criteria. <b>MUTAGENIC EFFECTS</b> : Not available. <b>TERATOGENIC EFFECTS</b> : Tumorigenic effects. Rat TDLo Oral 7350 mg/kg for 2 years continuous <b>TOXIC EFFECTS:</b> Tumorigenic - Carcinogenic by RTECS criteria Blood - Tumors Rat TDLo Subcutaneous 17 gm/kg for 2 years intermittent <b>TOXIC EFFECTS:</b> Tumorigenic - Equivocal tumorigenic agent by RTECS criteria Sense Organs and Special Senses (Nose, Eye, Ear and Taste) - Tumors Mouse TDLo Oral 300 mg/kg for 8 weeks intermittent <b>TOXIC EFFECTS:</b> Tumorigenic - Neoplastic by RTECS criteria Lung, Thorax, or Respiration - Tumors <b>DEVELOPMENTAL TOXICITY:</b> Not available. Repeated or prolonged exposure to this compound is not known to aggravate existing medical conditions.

## Section IV. First Aid Measures

Eye Contact	Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.
Skin Contact	In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.
Inhalation	If the victim is not breathing, perform mouth-to-mouth resuscitation. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, oxygen can be administered. Seek medical attention if respiration problems do not improve.
Ingestion	INDUCE VOMITING by sticking finger in throat. Lower the head so that the vomit will not reenter the mouth and throat. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive.

**Section V. Fire and Explosion Data**

Flammability	May be combustible at high temperature.	Auto-Ignition	477 °C (890.6 °F)
Flash Points	100 °C (212 °F).	Flammable Limits	Not available.
Combustion Products	These products are toxic carbon oxides (CO, CO <sub>2</sub> ), nitrogen oxides (NO, NO <sub>2</sub> ).		
Fire Hazards	Not available.		
Explosion Hazards	Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.		
Fire Fighting Media and Instructions	SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. DO NOT use water jet. Consult with local fire authorities before attempting large scale fire-fighting operations.		

**Section VI. Accidental Release Measures**

Spill Cleanup Instructions	Environmentally hazardous material. Harmful material. Carcinogenic material. Use a shovel to put the material into a convenient waste disposal container. Consult federal, state, and/or local authorities for assistance on disposal.
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**Section VII. Handling and Storage**

Handling and Storage Information	ENVIRONMENTAL HAZARD. HARMFUL. CARCINOGEN. STORE UNDER INERT GAS. Keep away from heat. Mechanical exhaust required. When not in use, tightly seal the container and store in a dry, cool place. Avoid excessive heat and light. Do not breathe dust. Always store away from incompatible compounds such as oxidizing agents.
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**Section VIII. Exposure Controls/Personal Protection**

Engineering Controls	Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.
Personal Protection	Splash goggles. Lab coat. Dust respirator. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product. Be sure to use a MSHA/NIOSH approved respirator or equivalent.
	
Exposure Limits	This chemical is classified as a carcinogen. There is no acceptable exposure limit for a carcinogen.

**Section IX. Physical and Chemical Properties**

Physical state @ 20°C	Solid. (Red crystal.)	Solubility	Soluble in ether, alcohol, acetic acid. Insoluble in water.
Specific Gravity	1.20 (water=1)		
Molecular Weight	182.22	Partition Coefficient	Not available.
Boiling Point	293 °C (559.4 °F)	Vapor Pressure	1.3 hPa (@104.0 °C)
Melting Point	68 °C (154.4 °F)	Vapor Density	Not available.
Refractive Index	Not available.	Volatility	Not available.
Critical Temperature	Not available.	Odor	Not available.
Viscosity	Not available.	Taste	Not available.

**Section X. Stability and Reactivity Data**

Stability	This material is stable if stored under proper conditions. (See Section VII for instructions)
Conditions of Instability	Avoid excessive heat and light.
Incompatibilities	Reactive with oxidizing agents.

**Section XI. Toxicological Information**

RTECS Number	CN1400000
Routes of Exposure	Eye Contact. Ingestion. Inhalation.
Toxicity Data	Rat LD <sub>50</sub> (oral) 1000 mg/kg Mouse LD <sub>50</sub> (intraperitoneal) 500 mg/kg

Chronic Toxic Effects	<p><b>CARCINOGENIC EFFECTS</b> : Carcinogenic by RTECS criteria.  <b>MUTAGENIC EFFECTS</b> : Not available.  <b>TERATOGENIC EFFECTS</b> : Tumorigenic effects.  Rat TDLo Oral 7350 mg/kg for 2 years continuous  <b>TOXIC EFFECTS:</b>  Tumorigenic - Carcinogenic by RTECS criteria  Blood - Tumors  Rat TDLo Subcutaneous 17 gm/kg for 2 years intermittent  <b>TOXIC EFFECTS:</b>  Tumorigenic - Equivocal tumorigenic agent by RTECS criteria  Sense Organs and Special Senses (Nose, Eye, Ear and Taste) - Tumors  Mouse TDLo Oral 300 mg/kg for 8 weeks intermittent  <b>TOXIC EFFECTS:</b>  Tumorigenic - Neoplastic by RTECS criteria  Lung, Thorax, or Respiration - Tumors  <b>DEVELOPMENTAL TOXICITY:</b> Not available.  Repeated or prolonged exposure to this compound is not known to aggravate existing medical conditions.</p>
Acute Toxic Effects	Harmful if ingested or inhaled. Minimize exposure to this material. Severe overexposure can result in injury or death. Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.

## Section XII. Ecological Information

Ecotoxicity	Not available.
Environmental Fate	<p>Azobenzene's former production and use as an intermediate in the production of dyes and rubber accelerators, benzidine and its salts, insecticides and pyrazolone derivatives may have resulted in its release to the environment through various waste streams. Its former use as a greenhouse fumigant and arcaricide resulted in its direct release to the environment. If released to air, a vapor pressure of 3.61X10<sup>-4</sup> mm Hg at 25 deg C indicates azobenzene will exist solely as a vapor. Vapor-phase azobenzene will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 10 days. In methanol, azobenzene will absorb UV light strongly above 290 nm, and therefore will be susceptible to direct photolysis by sunlight. If released to soil, azobenzene is expected to have low to slight mobility based upon experimental Koc values ranging from 1,350-4,510. Volatilization from moist soil surfaces is expected to be an important fate process based upon an estimated Henry's Law constant of 1.4X10<sup>-5</sup> atm-cu m/mole. Azobenzene was found to be resistant to biodegradation when tested using a Warburg respirometer, suggesting that biodegradation is not an important environmental fate process. If released into water, azobenzene is expected to adsorb to suspended solids and sediment based upon the Koc range. Volatilization from water surfaces is expected to be an important fate process based upon this compound's estimated Henry's Law constant. Estimated volatilization half-lives for a model river and model lake are 2.5 days and 32 days, respectively. However, volatilization from water surfaces is expected to be attenuated by adsorption to suspended solids and sediment in the water column. An estimated BCF of 10 suggests the potential for bioconcentration in aquatic organisms is low. Hydrolysis is not expected to be an important environmental fate process since this compound lacks functional groups that hydrolyze under environmental conditions. Occupational exposure to azobenzene may have occurred through dermal contact with this compound at workplaces where azobenzene was produced or used. Monitoring and use data indicate that the general population may have been exposed to azobenzene via dermal contact with consumer products containing this compound. Occupational exposure and general population exposure due to its use as an arcaricide and fumigant should be low or non-existent since azobenzene is no longer produced or used in the US. In the past, azobenzene was used as a fumigant in greenhouses against insects and mites and their eggs.</p>

## Section XIII. Disposal Considerations

Waste Disposal	Recycle to process, if possible. Consult your local regional authorities. You may be able to dissolve or mix material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber system. Observe all federal, state and local regulations when disposing of the substance.
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## Section XIV. Transport Information

DOT Classification	DOT CLASS 9: Miscellaneous
PIN Number	UN3077
Proper Shipping Name	Environmentally hazardous substance, solid, n.o.s.
Packing Group (PG)	III
DOT Pictograms	

## Section XV. Other Regulatory Information and Pictograms

TSCA Chemical Inventory (EPA)	This compound is <b>ON</b> the EPA Toxic Substances Control Act (TSCA) inventory list.
WHMIS Classification (Canada)	CLASS D-2B: Material causing other toxic effects (TOXIC). On DSL.
EINECS Number (EEC)	203-102-5
EEC Risk Statements	R20/21/22- Harmful by inhalation, in contact with skin and if swallowed. R45- May cause cancer. R51- Toxic to aquatic organisms. R53- May cause long-term adverse effects in the aquatic environment.
Japanese Regulatory Data	ENCS No. 3-361

**Section XVI. Other Information****Version 1.0****Validated on 4/29/2009.****Printed 4/29/2009.****Notice to Reader**

TCI laboratory chemicals are for research purposes only and are NOT intended for use as drugs, food additives, household, or pesticides. The information herein is believed to be correct, but does not claim to be all inclusive and should be used only as a guide. Neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All chemical reagents must be handled with the recognition that their chemical, physiological, toxicological, and hazardous properties have not been fully investigated or determined. All chemical reagents should be handled only by individuals who are familiar with their potential hazards and who have been fully trained in proper safety, laboratory, and chemical handling procedures. Although certain hazards are described herein, we can not guarantee that these are the only hazards which exist. Our MSDS sheets are based only on data available at the time of shipping and are subject to change without notice as new information is obtained. Avoid long storage periods since the product is subject to degradation with age and may become more dangerous or hazardous. It is the responsibility of the user to request updated MSDS sheets for products that are stored for extended periods. Disposal of unused product must be undertaken by qualified personnel who are knowledgeable in all applicable regulations and follow all pertinent safety precautions including the use of appropriate protective equipment (e.g. protective goggles, protective clothing, breathing equipment, facial mask, fume hood). For proper handling and disposal, always comply with federal, state, and local regulations.

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