

# Safety Data Sheet

# 4-Aminobiphenyl

Division of Safety  
National Institutes  
of Health



## WARNING!

THIS COMPOUND IS ABSORBED THROUGH THE SKIN AND THE RESPIRATORY AND INTESTINAL TRACTS. IT IS TOXIC, CARCINOGENIC, AND MUTAGENIC. AVOID FORMATION AND BREATHING OF AEROSOLS.

LABORATORY OPERATIONS SHOULD BE CONDUCTED IN A FUME HOOD, GLOVE BOX, OR VENTILATED CABINET.

AVOID SKIN CONTACT: IF EXPOSED, WASH WITH SOAP AND WATER.

FOR EYE EXPOSURE, IRRIGATE IMMEDIATELY WITH LARGE AMOUNTS OF WATER. FOR INGESTION, DRINK WATER, INDUCE VOMITING, OR REFER FOR GASTRIC LAVAGE. FOR INHALATION, REMOVE VICTIM PROMPTLY TO CLEAN AIR. ADMINISTER RESCUE BREATHING IF NECESSARY. REFER TO PHYSICIAN.

IN CASE OF LABORATORY SPILL, WEAR PROTECTIVE CLOTHING DURING CLEANUP. AVOID SKIN CONTACT OR BREATHING OF AEROSOLS. USE ETHANOL TO DISSOLVE COMPOUND. WASH DOWN AREA WITH SOAP AND WATER. DISPOSE OF WASTE SOLUTIONS AND MATERIALS APPROPRIATELY.

### A. Background

4-Aminobiphenyl (ABP) is toxic to rodents and dogs and carcinogenic in animals and man, with the chief target organs being kidney, liver, and bladder. It is mutagenic in the Ames test. ABP is used primarily in the analytical laboratory (detection of sulfate ion) and as a model in cancer research.

### B. Chemical and Physical Data

1. Chemical Abstract No.: 92-67-1

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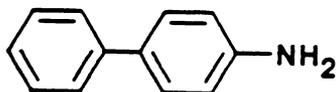
Synonyms:

ABP	p-Aminobiphenyl	Biphenylamine
4-ABP	4-Aminobiphenyl	4-Biphenylamine
Xenylamine	4-Aminodiphenyl	p-Biphenylamine
p-Xenylamine	p-Aminodiphenyl	p-Phenylaniline

(1,1'-Biphenyl)-4-amine (9CI)

Molecular  
formula:  
 $C_{12}H_{11}N$

structure:



weight:  
169.22

Density: 1.160 g/cm<sup>3</sup>.

Absorption spectroscopy: Absorption spectra have been reported (Bridges et al., 1965).

Volatility: ABP has a relatively low volatility. Data have been compiled (Weast, 1979, p. D-214). Volatile in steam.

Solubility: 0.18 mg/ml in water at 25°C, soluble in alcohol, chloroform, polar solvents, lipids.

Description, appearance: Colorless crystals.

Boiling point: 302°C at 760 mm Hg; 191°C at 15 mm Hg.

Melting point: 53°C.

Stability: Stable in aqueous solution at low concentrations.

Chemical reactivity: ABP exhibits the usual reactivity of primary aromatic amines (salt formation, acylation, alkylation, isocyanide formation, diazotization, oxidation by neutral and basic permanganate) and of aromatic compounds in general (ring substitution).

Flash point: No data.

Autoignition temperature: No data.

Explosive limits in air: No data.

, Explosion, and Reactivity Hazard Data

ABP does not require special fire-fighting procedures or equipment and does not present unusual fire and explosion hazards.

2. No conditions contributing to instability have been reported for ABP. However, aromatic amines in general are slightly flammable.
3. No incompatibilities are known.
4. Aromatic amines may form toxic fumes when heated to decomposition.
5. ABP has a low vapor pressure and does not require nonspark equipment. When handled in flammable solvents, the precautions required for such solvents will apply.

### Operational Procedures

The NIH Guidelines for the Laboratory Use of Chemical Carcinogens describe operational practices to be followed when potentially carcinogenic chemicals are used in NIH laboratories. The Guidelines should be consulted to identify the proper use conditions required and specific controls to be implemented during normal and complex operations or manipulations involving ABP.

1. Chemical inactivation: No validated method reported.
2. Decontamination: Turn off equipment that could be affected by ABP or the materials used for cleanup. Call the NIH Fire Department (dial 116) for assistance. Wash surfaces with copious quantities of water. Glassware should be rinsed (in a hood) with ethanol, followed by soap and water. Animal cages should be washed with water.
3. Disposal: No waste streams containing ABP shall be disposed of in sinks or general refuse. Surplus ABP or chemical waste streams contaminated with ABP shall be handled as hazardous chemical waste and disposed of in accordance with the NIH chemical waste disposal system. Nonchemical waste (e.g., animal carcasses and bedding) containing ABP shall be handled and packaged for incineration in accordance with the NIH medical-pathological waste disposal system. Potentially infectious waste (e.g., tissue cultures) containing ABP shall be packaged for incineration, as above. Burnable waste (e.g., absorbent bench top liners) minimally contaminated with ABP shall be handled as potentially infectious waste and packaged for incineration, as above. Absorbent materials (e.g., associated with spill cleanup) grossly contaminated shall be handled in accordance with the chemical waste disposal system. Radioactive waste containing ABP shall be handled in accordance with the NIH radioactive waste disposal system.
4. Storage: Store in amber screw-capped bottles with Teflon cap liners, preferably under refrigeration.

## Monitoring and Measurement Procedures Including Direct Field Measurements and Sampling for Subsequent Laboratory Analysis

1. Sampling: For airborne particles smaller than  $0.3 \mu\text{m}$ , impingers or bubblers filled with dilute hydrochloric acid are used; for large particles, a high-volume air sampler with a fiberglass filter trap may be used. For surface sampling, a cotton applicator moistened with an aqueous buffer is used. Techniques for sampling metal, painted, and concrete surfaces have been reported (Weeks et al., 1976).
2. Separation and analysis: The most sensitive procedure is spectrophotofluorimetry in methanol, preceded by solvent extraction and cleanup on an alumina column (Holder et al., 1976). This procedure has been applied to waste water and biological materials. GC (Kazinik et al., 1971) and colorimetry (diazotization and coupling with various reagents) are also in use.

## Biological Effects (Animal and Human)

1. Absorption: ABP may be absorbed into the animal and human body by inhalation, by ingestion, and through the skin.
2. Distribution: Only a few data are available and these indicate variability depending on species and route of administration. Ingested ABP is distributed to the liver and kidney of rodents; subcutaneously injected ABP is distributed to the mammary gland and intestine of rats and to the liver of mice.
3. Metabolism and excretion: In animals, ABP is oxidized to the N-hydroxy derivative (this compound, or its further derivative N-hydroxy-4-acetamidobiphenyl, may be the "activated" form of ABP, which is responsible for toxic and carcinogenic effectiveness) and also to the 3- and 4'-hydroxy ABP. In monkeys and dogs, these are excreted usually as conjugates with acetic, glucuronic, or sulfuric acids (IARC, 1972; Radomski et al., 1973).
4. Toxic effects: ABP is an established human carcinogen (Althaus et al., 1980). No data on acute LD50 are available. An intraperitoneal dose of 250 mg/kg is lethal in mice, and an oral dose of 25 mg/kg is lethal in dogs. The target organs in two dogs, after oral administration of ABP for 33 months, were chiefly the kidney, liver, and bladder; one or both of these dogs exhibited hemorrhages in the stomach and intestine, fatty and congested liver, congested kidney, and epithelial changes in the bladder. Both dogs died of terminal uremia.
5. Carcinogenic effects: ABP has produced cancer of the bladder in dogs, mice, and rabbits; has produced hepatomas in mice; and has increased significantly the normal incidence of mammary gland

intestinal tumors in rats. In man, 52 out of 315 workers occupationally exposed to ABP developed bladder tumors and six deaths were attributed to such tumors. Exposure over several years apparently is required.

6. Mutagenic and teratogenic effects: ABP is a mutagen in the Ames test. There are no data concerning its teratogenicity.

## G. Emergency Treatment

1. Skin and eye exposure: For skin exposure, remove contaminated clothing and wash skin with soap and water. For eye exposure, irrigate immediately with copious quantities of running water for at least 15 minutes. Consider ophthalmological consultation.
2. Ingestion: Drink plenty of water. Induce vomiting or refer for gastric lavage.
3. Inhalation: Remove victim promptly to clean air. Administer rescue breathing if necessary.
4. Refer to physician. Oxygen may be necessary during transport. Observe for methemoglobinemia.

## H. References

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