

1-Naphthylamine

Safety Data Sheet

Division of Occupational Health and Safety
National Institutes of Health



WARNING!

This compound is absorbed through the skin and the respiratory and intestinal tracts. It is toxic and carcinogenic. 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 prefer 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

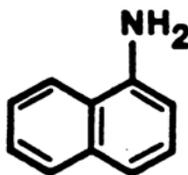
1-Naphthylamine (1-NA) is moderately toxic to rats and produces tumors in mice and rats. While 1-NA itself is not a mutagen, a metabolite of this compound is in vitro tests. It is used commercially as a chemical intermediate in the production of dyestuffs, herbicides, pesticides, and antioxidants.

B. Chemical and Physical Data

1. Chemical Abstract No.: 134-32-7
2. Synonyms: 1-Na; Fast garnet base B; C.I. 37265; 1-Aminonaphthalene; Naphthalidam; Alpha-naphthylamine; Naphthalidine; 1-Naphthalenamine (9CI); Antioxidant – MB; C.I. Azoic diazo component 114.
3. Molecular formula, weight and structure:

$C_{10}H_9N$

143.2



- Density: 1.123 g/cm³.
- Absorption spectroscopy: IR and UV spectra are described by Grasselli and Ritchey (1975).
- Volatility: Vapor pressure is 1 mm Hg at 104.3°C (for volatilities at higher temperatures, see Weast, 1979, p. D-212). Steam volatile.
- Solubility: 0.17% at 25°C in water; soluble in alcohol, ether, and many other organic solvents.
- Description, appearance: White needles that darken to purple-grey or red on exposure to air. Unpleasant odor.
- Boiling point: 301°C (160°C at 12 mm Hg); sublimes.
Melting point: 50°C.
- Stability: Oxidizes on exposure to air.
- Chemical reactivity: 1-NA 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: 157°C.
- Autoignition temperature: No data.
- Explosive limits in air: No data.

C. Fire, Explosion, and Reactivity Hazard Data

- Fire-fighting personnel should wear air-supplied respirators with full-face masks.
- No conditions contributing to instability, other than oxidation in presence of air, light, and oxidizing materials, are known to exist. Aromatic amines are slightly flammable.
- No incompatibilities are known.
- Aromatic amines may form toxic fumes when heated to decomposition.
- 1-NA does not require nonspark equipment. When handled in flammable solvents, the precautions required for such solvents apply. Open flames may cause flashing.

D. 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 1-NA.

- Chemical inactivation: No validated method reported.
- Decontamination: Turn off equipment that could be affected by 1-NA or the materials used for cleanup. If more than 1 g has been spilled or if there is any uncertainty regarding the procedures to be followed for decontamination, call the NIH Fire Department (dial 911) for assistance. Wipe surfaces with ethanol, then wash 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.
- Disposal: No waste streams containing 1-NA shall be disposed of in sinks or general refuse. Surplus 1-NA or chemical waste streams contaminated with 1-NA 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 1-NA 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 1-NA shall be packaged for incineration, as above. Burnable waste (*e.g.*, absorbent bench top liners) minimally contaminated with 1-NA 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 1-NA shall be handled in accordance with the NIH radioactive waste disposal system.

4. Storage: Store in glass ampoules or in amber screw-capped bottles with Teflon cap liners, preferably under refrigeration. Avoid unnecessary exposure to light.

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

1. Sampling: For airborne particles smaller than 0.3 μm , impingers and bubblers filled with dilute hydrochloric acid are used for Benzedrine and its congeners, and this procedure is probably satisfactory for 1-NA also. For larger particles, a high-volume air sampler with a fiberglass filter trap can be used. For surface sampling, a cotton applicator moistened with an aqueous buffer is employed, and identification is made by spectrophoto-fluorimetry. Techniques for sampling metal, painted, and concrete surfaces have been reported (Weeks *et al.*, 1976).
2. Separation and analysis: A sensitive GC procedure is based on the formation of the pentafluoropropionamide of 1-NA (Masuda and Hoffman, 1969a, 1969b). A variety of colorimetric procedures have been reported but are subject to various interferences. The most reliable ones combine paper chromatographic separation with spectrophotometric measurement (Sawicki *et al.*, 1959).

F. Biological Effects (Animal and Human)

1. Absorption: While there are no specific data concerning 1-NA, on the basis of similarity with other aromatic amines, one may assume that it is absorbed by animals and humans by inhalation, by ingestion, and through the intact skin.
2. Distribution: No data.
3. Metabolism and excretion: Very few data; as with most aromatic amines, the major route of metabolism seems to be oxidation of the ring and the amino group. This is shown in the urinary excretion products, which are N-hydroxy-1-naphthylacetamide in humans and N-hydroxy, N-nitroso, and 2- and 4-hydroxy derivatives (usually as conjugates) in dogs and other species (Radomski and Brill, 1971; IARC, 1974).
4. Toxic effects: The reported oral LD50 of 1-NA in rats is 779 mg/kg. No specific target organs, or signs and symptoms or toxicity, have been reported.
5. Carcinogenic effects: Many studies are inconclusive since 1-NA is often contaminated with 2-NA. Purified 1-NA in drinking water has produced increased frequency of hepatomas in female mice. It is of interest that two metabolites of 1-NA, the N-hydroxy and N-nitroso derivatives, produce granulomas, fibromas, and fibrosarcomas in rats.
6. Mutagenic and teratogenic effects: 1-NA is not a mutagen against *Neurospora* spores or yeast, but the N-hydroxy metabolite is. There is 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

- Grasselli, J.G., and W. M. Ritchey, eds. 1975. Atlas of Spectral Data and Physical Constants for Organic compounds. CRC Press, Cleveland, OH.
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- Masuda, Y., and D. Hoffman. 1969a. A method for the determination of primary amines of polynuclear aromatic hydrocarbons. *J Chromatogr Sci* 7:694-697.
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- Radomski, J.L., and E. Brill. 1971. The role of N-oxidation products of aromatic amines in the induction bladder cancer in the dog. *Arch Toxicol* 28:159-175.
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- Weast, R.C., ed. 1979. Handbook of Chemistry and Physics, 60th ed. CRC Press, Cleveland, OH.
- Weeks, R.W., B.J. Dean, and S.K. Yasuda. 1976. Detection limits of chemical spot tests toward certain carcinogens on metal, painted and concrete surfaces. *Anal Chem* 48:2227-2233.