

Safety Data Sheet

2-Aminofluorene

Division of Safety
National Institutes
of Health



WARNING!

THIS COMPOUND IS CARCINOGENIC, MUTAGENIC, AND SLIGHTLY TOXIC. 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, INDUCE VOMITING. 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 ALCOHOL TO DISSOLVE COMPOUND. WASH DOWN AREA WITH SOAP AND WATER. DISPOSE OF WASTE SOLUTIONS AND MATERIALS APPROPRIATELY.

A. Background

2-Aminofluorene (AF) has no known use other than for basic research in carcinogenesis and DNA repair. It has weak acute toxicity for rodents, but it is a potent carcinogen and is mutagenic to bacteria in the presence of a metabolizing system.

B. Chemical and Physical Data

1. Chemical Abstract No.: 153-78-6

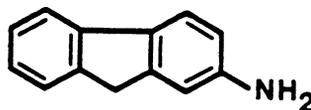
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2. Synonyms :

AF	2-Fluorenylamine
2-Fluorenamine	9H-Fluoren-2-amine (9CI)
2-Fluoreneamine	

3. Molecular
formula:
 $C_{13}H_{11}N$

structure:



weight:
181.24

- Density: No data.
- Absorption spectroscopy: UV (al): λ ($\log \epsilon$) = 287.5 (4.32) and 315 shoulder (3.94).
- Volatility: Essentially nonvolatile.
- Solubility: Nearly insoluble in neutral aqueous solutions; readily soluble in dilute acid, alcohol, and ether.
- Description, appearance: White crystals, long plates, or needles.
- Melting point: 131-132°C.
- Stability: May oxidize slowly in solution or as a solid; more stable in acidic solution and when stored at 0°C or below.
- Chemical reactivity: Usual reactivity of aromatic amines.
- Flash point: No data.
- Autoignition temperature: No data.
- Flammable limits: No data.

Fire, Explosion, and Reactivity Hazard Data

- AF does not require special fire-fighting procedures or equipment and does not present unusual fire and explosion hazards. Because of the electrostatic nature of dry AF, fire fighters should wear full-face masks.
- No conditions contributing to instability are known.
- No incompatibilities have been reported.

4. No hazardous decomposition products are known.
5. AF does not require nonspark equipment. When handled in organic 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 AF.

1. Chemical inactivation: No validated method reported.
2. Decontamination: Turn off equipment that could be affected by AF 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 116) for assistance. Wipe off surfaces with acetone, then wash with copious quantities of water. Glassware should be rinsed (in a hood) with acetone, followed by soap and water. Animal cages should be washed with water.
3. Disposal: No waste streams containing AF shall be disposed of in sinks or general refuse. Surplus AF or chemical waste streams contaminated with AF 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 AF 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 AF shall be disinfected by heat using a standard autoclave treatment and packaged for incineration, as above. Burnable waste (e.g., absorbent bench top liners) minimally contaminated with AF 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 AF shall be handled in accordance with the NIH radioactive waste disposal system.
4. Storage: Store stock quantities of solid material or solution in ampoules or screw-capped bottles or vials with Teflon cap liners. Storage at 0°C or lower improves stability. Avoid dispersal of electrostatically charged solid material while sampling.

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

Since AF is strictly a laboratory chemical, methods for field sampling and measurement have not been developed.

1. Sampling: AF may be extracted from biological material by organic solvents under neutral or basic conditions.
2. Separation and analysis: When necessary, AF can be separated from other constituents by GC (Bowman and King, 1974) or by HPLC (Fullerton and Jackson, 1976) followed by UV spectrophotometry. A colorimetric method that is simpler but less specific, developed for acetylaminofluorene but presumably applicable to AF by omission of the initial hydrolysis step, is also available (Westfall and Morris, 1947).

Biological Effects (Animal and Human)

1. Absorption: On the basis of tumor formation when AF is administered to animals by various routes, it is judged that AF is absorbed through the gastrointestinal tract, through the skin, and after parenteral injection.
2. Distribution: No data.
3. Metabolism and excretion: The main site of metabolism is the liver, where AF is N-acetylated and subsequently hydroxylated at the nitrogen atom to N-hydroxy-2-acetylaminofluorene, which is regarded as the "proximate carcinogen" of AF. The "ultimate carcinogen" is believed to be its D-sulfate. Hydroxylation at various ring system positions also occurs. Urinary metabolites are mainly the sulfate and glucuronide conjugates of these hydroxylated metabolites (Weisburger and Weisburger, 1958).
4. Toxic effects: There are no data on the acute LD50 of AF in animals. No target organs for toxicity have been identified; AF appears to have very low toxicity in rodents in doses that are significantly carcinogenic.
5. Carcinogenic effects: Oral or parenteral administration of AF to rodents results in tumors of the liver, mammary gland, urinary bladder, intestinal epithelium, and sebaceous glands of the ear duct. The rat is the most susceptible species, and the guinea pig is resistant.
6. Mutagenic and teratogenic effects: AF is mutagenic in bacterial systems in the presence of an activating liver microsomal system. There are no data concerning its teratogenicity.

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.
2. Ingestion: Drink plenty of water. Induce vomiting.
3. Inhalation: Remove victim promptly to clean air. Administer rescue breathing if necessary.
4. Refer to physician.

References

- Bowman, M.C., and J.R. King. 1974. Analysis of 2-acetylaminofluorene residues in laboratory chow and microbiological media. *Biochem Med* 9:390-401.
- Fullerton, F.R., and C.D. Jackson. 1976. Determination of 2-acetylaminofluorene and its metabolites in urine by high pressure liquid chromatography. *Biochem Med* 16:95-103.
- Weisburger, E.K., and J.H. Weisburger. 1958. Chemistry, carcinogenicity, and metabolism of 2-fluorenamine and related compounds. *Adv Cancer Res* 5:331-431.
- Westfall, B.B., and H.P. Morris. 1947. Photometric estimation of N-acetyl-2-aminofluorene. *J Natl Cancer Inst* 8:17-21.