

2-Acetylaminofluorene

Safety Data Sheet

Division of Occupational Health and Safety
National Institutes of Health



WARNING!

This compound is carcinogenic, mutagenic, and slightly toxic. Avoid formation and breathing of aerosols.

Laboratory operation 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.

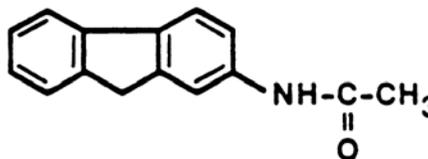
In case of laboratory spill, wear protective clothing during cleanup. Avoid skin contact or breathing of aerosols. Use acetone to dissolve compound. Wash down area with soap and water. Dispose of waste solutions and materials appropriately.

A. Background

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

B. Chemical and Physical Data

1. Chemical Abstract No.: 53-96-3
2. Synonyms: AAF, 2-Acetaminofluorene, 2-AAF, 2-Acetylaminofluorene, FAA, N-Acetyl-2-aminofluorene, 2-FAA, N-2-Fluorenylacetamide, 2-Acetamidofluorene, N-Fluoren-2-yl-acetamide, N-9H-Fluoren-2-yl-acetamide (9Cl).
3. Molecular formula, weight and structure:
 $C_{15}H_{13}NO$ 223.28
4. Density: No data.
5. Absorption spectroscopy: UV (al): λ (log e) = 287 (4.4) and 300 shoulder (4.2). Fluorescence: λ_{ex} = 296; λ_{em} = 328 (Bowman and King, 1974).



6. Volatility: 2.3×10^{-4} mm Hg at 100°C (estimated).
7. Solubility: Essentially insoluble in water; soluble in alcohol, ether, and acetone; highly soluble in dimethylsulfoxide.
8. Description, appearance: White crystals.
9. Melting point: 194°C.
10. Stability: Stable under ordinary conditions.
11. Chemical reactivity: Hydrolysis is accomplished with hot acid.
12. Flash point: No data.
13. Auto ignition temperature: No data.
14. Flammable limits: No data.

C. Fire, Explosion, and Reactivity Hazard Data

1. AAF 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 AAF, fire fighters should wear full-face masks.
2. No conditions contributing to instability are known.
3. No incompatibilities have been reported.
4. No hazardous decomposition products are known.
5. AAF does not require any spark equipment. When handled in organic solvents, the precautions required for such solvents will apply.

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 AAF.

1. Chemical inactivation: No validated method reported.
2. Decontamination: Turn off equipment that could be affected by AAF 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 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 AAF shall be disposed of in sinks or general refuse. Surplus AAF or chemical waste streams contaminated with AAF 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 AAF 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 AAF 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 AAF 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 AAF shall be handled in accordance with the NIH radioactive waste disposal system.

4. Storage: Store stock quantities of solid material or solutions 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.

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

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

1. Sampling: AAF may be extracted from biological material by organic solvents.
2. Separation and analysis: When necessary, AAF can be separated from other constituents by GC (Bowman and King, 1974) or by HPLC (Fullerton and Jackson, 1976; Stanley *et al.*, 1978) or TLC (Gutmann and Erickson, 1969, 1972) followed by UV spectrophotometry. A colorimetric method that is simpler but less specific is also available (Westfall and Morris, 1947).

F. Biological Effects (Animal and Human)

1. Absorption: AAF is absorbed from the gastrointestinal tract, after parenteral injection, and through the skin. It may also be absorbed from the respiratory tract since intratracheal administration has produced bladder tumors in hamsters.
2. Distribution: Few data. In the rat, AAF (after metabolic transformation) is bound to guanyl residues of liver RNA and DNA and to glycogen in nodules of neoplastic liver cells.
3. Metabolism and excretion: The main site of metabolism is the liver, where AAF is hydroxylated at the nitrogen atom to N-hydroxy-2-acetylaminofluorene, which is regarded as the “proximate carcinogen” of AAF. The “ultimate carcinogen” is believed to be its D-sulfate ester. Hydroxylation at various positions of the ring system also occurs, but these metabolites are not carcinogenic. Excretion products are mainly the sulfate and glucuronide conjugates of these hydroxylated metabolites. On the basis of results with radio labeled AAF, 60-70% of these metabolites is excreted in the urine and most of the remainder is excreted in the feces (Weisburger and Weisburger, 1958).
4. Toxic effects: The acute LD50 of AAF is 1,020 mg/kg (oral, mouse). No toxic effects have been reported in animals receiving doses that are significantly carcinogenic.
5. Carcinogenic effects: Oral or parenteral administration of AAF to rodents results in tumors primarily in the liver but also in mammary gland, urinary bladder, intestinal epithelium, and sebaceous glands of the ear duct. Lung metastases have been reported. The rat is the most susceptible species and the guinea pig are resistant.
6. Mutagenic and teratogenic effects: AAF is mutagenic in bacterial systems in the presence of an activating liver microsomal system. 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.
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.

H. 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.
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- Gutmann, H.R., and R.R. Erickson. 1969. The conversion of the carcinogen N-hydroxy-2-fluorenylacetamide to o-amidophenols by rat liver in vitro. *J Biol chem.* 244:1729-1740.
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- Weisburger, E.K., and J.H. Weisburger. 1958. Chemistry, carcinogenicity, and metabolism of 2-fluorenamine and related compounds. *Adv Cancer Res* 5:331-431., G.D. Newport, C.C.
- Westfall, B.B., and H.P. Morris. 1947. Photometric estimation of N-acetyl-2-aminofluorene. *J Nat'l Cancer Inst* 8:17-21.