



Intel Chemical of the Month October 2023

Ammonium Fluoride

Note: Most of the following material is extracted from Environmental Protection Agency (EPA) websites. Other material was added to complete sentences and to facilitate transitions between different sections of this document, and that wording appears in italics.

Uses

Ammonium fluoride is used in a variety of ways including etching and frosting glass; as an antiseptic in brewing beer; for preserving wood; in printing and dyeing textiles; as a mothproofing agent; and as a wet etchant in semiconductor manufacturing at a standard concentration of 40%.

Health Hazards

Inhalation of dust may cause irritation of respiratory system. Ingestion is harmful; readily soluble fluorides may be fatal if relatively small quantities are swallowed. Contact with eyes causes local irritation of the mucous membrane. Contact with skin may cause burns. High concentrations of fluorine in the urine have been reported following skin contact.

Human Toxicity

SIGNS AND SYMPTOMS / Ingestion of soluble fluoride salts. Salty or soapy taste, salivation, nausea. Repeated small doses (as in drinking water) may produce no other symptoms, but polyuria and polydipsia have also been reported. Large doses lead promptly to burning or crampy abdominal pain, intense vomiting and diarrhea, often with hematemesis and melena. Dehydration and thirst. Muscle weakness, tremors, and rarely transient epileptiform convulsions, preceded or followed by progressive central nervous depression (lethargy, coma and respiratory arrest, even in the absence of circulatory failure). Shock characterized by pallor, weak and thready pulse (sometimes irregular), shallow unlabored respiration, weak heart sounds, wet cold skin, cyanosis, anuria, dilated pupils, followed almost invariably by death in 2 to 4 hours. Even in the absence of shock, arrhythmias may occur, especially multiple episodes of ventricular fibrillation leading eventually to cardiac arrest. If the victim survives a few hours, paralysis of the muscles of deglutition, carpopedal spasm, and painful spasms of the extremities. Occasionally localized or generalized urticaria. The above signs and symptoms are related to a variety of metabolic disorders that may occur in acute fluoride poisoning, including hypocalcemia, hypomagnesemia, metabolic and/or respiratory acidosis and sometimes hyperkalemia.

Inhalation, ingestion or skin contact with material may cause severe injury or death. Contact with molten substance may cause severe burns to skin and eyes. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause environmental contamination. Toxic ammonia and hydrogen fluoride gases are formed in fires. A skin, eye, and respiratory tract irritant; May cause fluorosis; A corrosive substance that can cause injury to the skin, eyes, and respiratory tract; Can be absorbed through skin; Targets bones.

Emergency Response

Begin first aid as quickly as possible.

INHALATION: remove to fresh air.

INGESTION: perform gastric lavage with limewater or 1% calcium chloride solution; support respiration; call a physician.

EYES: flush with water for 15 min.; consult physician.

SKIN: shower immediately with large quantities of water; remove all contaminated clothing in the shower at once; consult physician.

Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. Move victim to fresh air if it can be done safely. Give artificial respiration if victim is not breathing. Do not perform mouth-to-mouth resuscitation if victim ingested or inhaled the substance; wash face and mouth before giving artificial respiration. Use a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer [oxygen](#) if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running [water](#) for at least 20 minutes. For minor skin contact, avoid spreading material on unaffected skin. Keep victim calm and warm

Accidental Release Measures

- CALL 911. Then call emergency response.
- Keep unauthorized personnel away.
- Stay upwind, uphill and/or upstream.
- Ventilate closed spaces before entering, but only if properly trained and equipped.

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- ELIMINATE all ignition sources (no smoking, flares, sparks or flames) from immediate area.
 - Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
 - Stop leak if you can do it without risk.
 - Prevent entry into waterways, sewers, basements or confined areas.
 - Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
 - DO NOT GET WATER INSIDE CONTAINERS.

Isolation and Evacuation

IMMEDIATE PRECAUTIONARY MEASURE: Isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.

SPILL: Increase the immediate precautionary measure distance, in the downwind direction, as necessary.

FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. (ERG, 2020)
