SAFETY DATA SHEET

Updated on 26/09/2024

1. Material Identification

Product Name : Ammonium fluoride
Catalog Number : io-1715
CAS Number : 12125-01-8
Identified uses : Laboratory chemicals, manufacture of chemical compounds
Company : Ionz

>> R&D Use only

2. Hazards Identification

GHS Classification:

Flammable liquid (category 2)
Acute toxicity, oral (Category 3)
Acute toxicity, dermal (Category 3)
Acute toxicity, inhalation (Category 3)
Specific target organ toxicity, single exposure (Category 1)

Pictogram(s)

GHS Hazard Statements

>> H301 (100%): Toxic if swallowed [Danger Acute toxicity, oral]

>> H311 (98.8%): Toxic in contact with skin [Danger Acute toxicity, dermal]

>> H314 (14.6%): Causes severe skin burns and eye damage [Danger Skin corrosion/irritation]

>> H318 (16.6%): Causes serious eye damage [Danger Serious eye damage/eye irritation]

>> H331 (99.9%): Toxic if inhaled [Danger Acute toxicity, inhalation]

Precautionary Statement Codes

>> P260, P261, P262, P264, P264+P265, P270, P271, P280, P301+P316, P301+P330+P331, P302+P352, P302+P361+P354, P304+P340, P305+P354+P338, P316, P317, P321, P330, P361+P364, P363, P403+P233, P405, and P501

NFPA 704 Diamond

NFPA Health Rating

>> 3 - Materials that, under emergency conditions, can cause serious or permanent injury.

NFPA Fire Rating

>> 0 - Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand.

NFPA Instability Rating

>> 0 - Materials that in themselves are normally stable, even under fire conditions.

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 concs. of fluorine in the urine have been reported following skin contact. (USCG, 1999)

ERG 2024, Guide 154 (Ammonium fluoride)

>> TOXIC and/or CORROSIVE; 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.

>> 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.

>> Special Hazards of Combustion Products: Toxic ammonia and hydrogen fluoride gases are formed in fires.

>> Behavior in Fire: May sublime when hot and condense on cool surfaces (USCG, 1999)

ERG 2024, Guide 154 (Ammonium fluoride)

>> Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes.

>> Some are oxidizers and may ignite combustibles (wood, paper, oil, clothing, etc.).

>> Corrosives in contact with metals may evolve flammable hydrogen gas.

>> Containers may explode when heated.

>> For electric vehicles or equipment, GUIDE 147 (lithium ion or sodium ion batteries) or GUIDE 138 (sodium batteries) should also be consulted.

>> Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.

3. Composition/Information On Ingredients

Chemical name : Ammonium fluoride
CAS Number : 12125-01-8
Molecular Formula : FH4N
Molecular Weight : 37.0370 g/mol

4. First Aid Measures

First Aid:

>> 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. (USCG, 1999)

ERG 2024, Guide 154 (Ammonium fluoride)

>> General First Aid:

>> Call 911 or emergency medical service.

>> Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and avoid contamination.

>> Move victim to fresh air if it can be done safely.

>> Administer oxygen if breathing is difficult.

>> If victim is not breathing:

>> DO NOT perform mouth-to-mouth resuscitation; the victim may have ingestedor inhaled the substance.

>> If equipped and pulse detected, wash face and mouth, then give artificial respiration using a proper respiratory medical device (bag-valve mask, pocket mask equipped with a one-way valve or other device).

>> If no pulse detected or no respiratory medical device available, provide continuouscompressions. Conduct a pulse check every two minutes or monitor for any signs of spontaneous respirations.

>> Remove and isolate contaminated clothing and shoes.

>> For minor skin contact, avoid spreading material on unaffected skin.

>> In case of contact with substance, remove immediately by flushing skin or eyes with running water for at least 20 minutes.

>> For severe burns, immediate medical attention is required.

>> Effects of exposure (inhalation, ingestion, or skin contact) to substance may be delayed.

>> Keep victim calm and warm.

>> Keep victim under observation.

>> For further assistance, contact your local Poison Control Center.

>> Note: Basic Life Support (BLS) and Advanced Life Support (ALS) should be done by trained professionals.

>> Specific First Aid:

>> For corrosives, in case of contact, immediately flush skin or eyes with running water for at least 30 minutes. Additional flushing may be required.

>> In Canada, an Emergency Response Assistance Plan (ERAP) may be required for this product. Please consult the shipping paper and/or the "ERAP" section.

First Aid Measures

Inhalation First Aid

>> Fresh air, rest. Refer for medical attention.

Skin First Aid

>> Remove contaminated clothes. Rinse skin with plenty of water or shower.

Eye First Aid

>> First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.

Ingestion First Aid

>> Rinse mouth. Do NOT induce vomiting. Give one or two glasses of water to drink. Refer for medical attention .

5. Fire Fighting Measures

>> Excerpt from ERG Guide 154 [Substances - Toxic and/or Corrosive (Non-Combustible)]:

>> SMALL FIRE: Dry chemical, CO2 or water spray.

>> LARGE FIRE: Dry chemical, CO2, alcohol-resistant foam or water spray. If it can be done safely, move undamaged containers away from the area around the fire. Dike runoff from fire control for later disposal.

>> FIRE INVOLVING TANKS, RAIL TANK CARS OR HIGHWAY TANKS: Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks in direct contact with flames. (ERG, 2024)

6. Accidental Release Measures

Isolation and Evacuation:

Isolation and evacuation measures to take when a large amount of this chemical is accidentally released in an emergency.

>> Excerpt from ERG Guide 154 [Substances - Toxic and/or Corrosive (Non-Combustible)]:

>> 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 tank car or highway tank 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, 2024)

Evacuation: ERG 2024, Guide 154 (Ammonium fluoride)

>> 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

>> For non-highlighted materials: increase the immediate precautionary measure distance, in the downwind direction, as necessary.

>> Fire

>> If tank, rail tank car or highway tank 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.

Spillage Disposal:

Methods for containment and safety measures to protect workers dealing with a spillage of this chemical.

>> Personal protection: particulate filter respirator adapted to the airborne concentration of the substance. Do NOT let this chemical enter the environment. Sweep spilled substance into covered dry, plastic containers. Carefully collect remainder. Then store and dispose of according to local regulations.

Accidental Release Measures

Public Safety: ERG 2024, Guide 154 (Ammonium fluoride)

>> CALL 911. Then call emergency response telephone number on shipping paper. If shipping paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.

>> Keep unauthorized personnel away.

>> Stay upwind, uphill and/or upstream.

>> Ventilate closed spaces before entering, but only if properly trained and equipped.

Spill or Leak: ERG 2024, Guide 154 (Ammonium fluoride)

>> 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.

7. Handling And Storage

Safe Storage:

>> Separated from incompatible materials and food and feedstuffs. See Chemical Dangers. Dry. Well closed.

Storage Conditions:

>> May be stored in iron vessels.

8. Exposure Control/ Personal Protection

>> 2.5 [mg/m3], as F

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>> (as F): 2.5 mg/m

EU-OEL

>> (as F): 2,5 mg/m

MAK (Maximale Arbeitsplatz Konzentration)

>> (as F, inhalable fraction): 1 mg/m

Emergency Response: ERG 2024, Guide 154 (Ammonium fluoride)

>> Small Fire

>> Dry chemical, CO2 or water spray.

>> Large Fire

>> Dry chemical, CO2, alcohol-resistant foam or water spray.

>> If it can be done safely, move undamaged containers away from the area around the fire.

>> Dike runoff from fire control for later disposal.

>> Fire Involving Tanks, Rail Tank Cars or Highway Tanks

>> Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles.

>> Do not get water inside containers.

>> Cool containers with flooding quantities of water until well after fire is out.

>> Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.

>> ALWAYS stay away from tanks in direct contact with flames.

Inhalation Risk:

>> No indication can be given about the rate at which a harmful concentration of this substance in the air is reached on evaporation at 20 °C.

Effects of Short Term Exposure:

>> The substance is irritating to the eyes, skin and respiratory tract. Corrosive on ingestion.

Effects of Long Term Exposure:

>> The substance may have effects on the bones and teeth. This may result in fluorosis.

Exposure Prevention

>> PREVENT DISPERSION OF DUST!

Inhalation Prevention

>> Use local exhaust or breathing protection.

Skin Prevention

>> Protective gloves.

Eye Prevention

>> Wear face shield or eye protection in combination with breathing protection if powder.

Ingestion Prevention

>> Do not eat, drink, or smoke during work.

Exposure Control and Personal Protection

Protective Clothing: ERG 2024, Guide 154 (Ammonium fluoride)

>> Wear positive pressure self-contained breathing apparatus (SCBA).

>> Wear chemical protective clothing that is specifically recommended by the manufacturer when there is NO RISK OF FIRE.

>> Structural firefighters' protective clothing provides thermal protection but only limited chemical protection.

Maximum Allowable Concentration (MAK)

>> 1.0 [mg/m3], inhalable fraction, as F[German Research Foundation (DFG)]

9. Physical And Chemical Properties

Molecular Weight:

>> 37.037

Exact Mass:

>> 37.032777294

Physical Description:

>> Ammonium fluoride is a white crystalline solid. It is soluble in water. It is noncombustible. It is corrosive to aluminum. It is used in chemical analysis, in brewing, and as a preservative for wood.

>> COLOURLESS CRYSTALS OR WHITE POWDER.

Color/Form:

>> Deliquescent leaflets or needles; hexagonal prisms by sublimation; occurs commercially as a granular powder

Odor:

>> Odorless

Boiling Point:

>> 212 °F at 760 mmHg (USCG, 1999)

Melting Point:

>> 238 °C

>> sublimes

Solubility:

>> 83.5 g/100 g water at 25 °C

>> Solubility in water, g/100ml at 25 °C: 45.3

Density:

>> 1.32 at 77 °F (USCG, 1999) - Denser than water; will sink

>> 1.01 g/cm³

Stability/Shelf Life:

>> Decomposed by heat.

Decomposition:

>> Decomposes with heat.

Corrosivity:

The ability of a chemical to damage or destroy other substances when it comes into contact.

>> Corrodes glass

pH:

pH is an expression of hydrogen ion concentration in water. Specifically, pH is the negative logarithm of hydrogen ion (H+) concentration (mol/L) in an aqueous solution. The term is used to indicate basicity or acidity of a solution on a scale of 0 to 14, with pH 7 being neutral.

>> The aqueous solution is acidic.

10. Stability And Reactivity

>> Dissolves in water and forms dilute solution of hydrofluoric acid. May corrode glass, cement, and most metals (USCG, 1999). Water soluble.

11. Toxicological Information

Evidence for Carcinogenicity:

Evidence that this chemical does or may cause cancer. The information here is collected from various sources by the Hazardous Substances Data Bank (HSDB).

>> A4; Not classifiable as a human carcinogen. /Fluorides, as F/

Exposure Routes:

>> The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.

Inhalation Exposure

>> Cough. Sore throat.

Skin Exposure

>> Redness.

Eye Exposure

>> Redness. Pain.

Ingestion Exposure

>> Diarrhoea. Nausea. Vomiting. Abdominal pain. Burning sensation. Shock or collapse.

Adverse Effects:

An adverse effect is an undesired harmful effect resulting from a medical treatment or other intervention.

>> Dermatotoxin - Skin burns.

Antidote and Emergency Treatment:

>> Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand-valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR as necessary. Immediately flush contaminated eyes with gently flowing water. Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Obtain medical attention. /Fluorine and related compounds/

Human Toxicity Excerpts:

>> /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. /Fluoride/

Non-Human Toxicity Excerpts:

>> /LABORATORY ANIMALS: Chronic Exposure or Carcinogenicity/ Male Wistar rats were exposed to /ammonium fluoride/ (NH4F) in concentration corresponding to mean annual limit of fluoride compounds in the atmospheric air. After 3, 6 and 9 months a microsomal fraction was isolated from the liver, and the composition as well as the metabolic activity of this fraction was determined. The content of microsomal protein increased after 3-month-long period of experiment, and subsequently it dropped after the period of 9 months. The content of phospholipids decreased after 3 months. The content of microsomal cholesterol was particularly high after a 6-month-long experiment. There were also changes in the contents of individual phospholipid fractions, and fatty acids of phospholipids. The content of cytochrome P-450, cytochrome b5 and activity of NADH-cytochrome b5 reductase did not change. Activity of NADPH-dependent reductase of cytochrome c decreased after the period of 9 months. Moreover, as consequence of changes in the activity of cytochrome P-450 system and the endoplasmic reticulum composition, alterations were observed in the metabolism of the tested substrates i.e. aniline and aminopyrine. The aniline turnover was inhibited after 6 and that of aminopyrine after 9 months experiment. The observed changes may prove that the detoxication capacity of the liver was impaired due to being exposed to ammonium fluoride.

12. Ecological Information

ICSC Environmental Data:

>> The substance is harmful to aquatic organisms.

13. Disposal Considerations

Spillage Disposal

>> Personal protection: particulate filter respirator adapted to the airborne concentration of the substance. Do NOT let this chemical enter the environment. Sweep spilled substance into covered dry, plastic containers. Carefully collect remainder. Then store and dispose of according to local regulations.

Disposal Methods

>> SRP: The most favorable course of action is to use an alternative chemical product with less inherent propensity for occupational harm/injury/toxicity or environmental contamination. Recycle any unused portion of the material for its approved use or return it to the manufacturer or supplier. Ultimate disposal of the chemical must consider: the material's impact on air quality; potential migration in soil or water; effects on animal and plant life; and conformance with environmental and public health regulations.

14. Transport Information

DOT

Ammonium fluoride
6.1
UN Pack Group: III
Reportable Quantity of 100 lb or 45

IATA

Ammonium fluoride
6.1,
UN Pack Group: III

15. Regulatory Information

Clean Water Act Requirements:

The Clean Water Act (CWA) of 1972 establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Under CWA, the U.S. Environmental Protection Agency (EPA) developed the Toxic Pollutant List (40 CFR Part 401.15) and the Priority Pollutant List (40 CFR Part 423, Appendix A). These lists are to be used by EPA and States to develop the Effluent Guidelines regulations and ensure water quality criteria and standards.

>> Ammonium fluoride is designated as a hazardous substance under section 311(b)(2)(A) of the Federal Water Pollution Control Act and further regulated by the Clean Water Act Amendments of 1977 and 1978. These regulations apply to discharges of this substance. This designation includes any isomers and hydrates, as well as any solutions and mixtures containing this substance.

Regulatory Information

The Australian Inventory of Industrial Chemicals

>> Chemical: Ammonium fluoride ((NH4)F)

REACH Registered Substance

>> Status: Active Update: 15-11-2022 https://echa.europa.eu/registration-dossier/-/registered-dossier/5498

>> Status: Cease Manufacture Update: 28-03-2018 https://echa.europa.eu/registration-dossier/-/registered-dossier/23338

New Zealand EPA Inventory of Chemical Status

>> Ammonium fluoride: Does not have an individual approval but may be used under an appropriate group standard

New Zealand EPA Inventory of Chemical Status

>> Ammonium fluoride: Does not have an individual approval but may be used under an appropriate group standard

16. Other Information

Toxic Combustion Products:

Toxic products (e.g., gases and vapors) produced from the combustion of this chemical.

>> Combustion by-products may include hydrogen fluoride, ammonia, and oxides of nitrogen.

Other Safety Information

Chemical Assessment

>> IMAP assessments - Ammonium fluoride ((NH4)F): Human health tier II assessment

>> IMAP assessments - Ammonium fluoride ((NH4)F): Environment tier I assessment

"The information provided is believed to be accurate but is not comprehensive and should be used as a reference. It reflects our current knowledge and is intended for safety guidance related to the product. This document does not constitute a warranty of the product's properties. Ionz is not responsible for any damages resulting from handling or contact with the product incorrectly."