SAFETY DATA SHEET

Updated on 26/09/2024

1. Material Identification

Product Name : Antimony pentafluoride
Catalog Number : io-1742
CAS Number : 7783-70-2
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

>> H302 (43.9%): Harmful if swallowed [Warning Acute toxicity, oral]

>> H314 (15.9%): Causes severe skin burns and eye damage [Danger Skin corrosion/irritation]

>> H332 (36.4%): Harmful if inhaled [Warning Acute toxicity, inhalation]

>> H411 (51.4%): Toxic to aquatic life with long lasting effects [Hazardous to the aquatic environment, long-term hazard]

>> H412 (48.6%): Harmful to aquatic life with long lasting effects [Hazardous to the aquatic environment, long-term hazard]

Precautionary Statement Codes

>> P260, P261, P264, P270, P271, P273, P280, P301+P317, P301+P330+P331, P302+P361+P354, P304+P340, P305+P354+P338, P316, P317, P321, P330, P363, P391, P405, and P501

Health Hazards:

>> The compound is irritating to eyes, skin, and lungs. Contact with eyes or skin causes severe burns. The compound is extremely toxic with a probable oral lethal dose of 5-50 mg/kg or between 7 drops and one teaspoonful for a 150 pound person (antimony salts). (EPA, 1998)

ERG 2024, Guide 157 (Antimony pentafluoride)

>> TOXIC and/or CORROSIVE; inhalation, ingestion or contact (skin, eyes) with vapors, dusts or substance may cause severe injury, burns or death.

>> Reaction with water or moist air may release toxic, corrosive or flammable gases.

>> Reaction with water may generate much heat that will increase the concentration of fumes in the air.

>> Fire will produce irritating, corrosive and/or toxic gases.

>> Runoff from fire control or dilution water may be corrosive and/or toxic and cause environmental contamination.

>> Reacts violently with water, to form poisonous hydrogen fluoride fumes. If confined and wet can cause explosion. May cause fire in contact with combustible material. Hazardous polymerization may not occur. (EPA, 1998)

ERG 2024, Guide 157 (Antimony pentafluoride)

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

>> UN1802, UN2032, UN3084, UN3093, UN1796 (above 50%), UN1826 (above 50%), and UN2031 (above 65%) may act as oxidizers. Also consult GUIDE 140.

>> Vapors may accumulate in confined areas (basement, tanks, hopper/tank cars, etc.).

>> Substance may react with water (some violently), releasing corrosive and/or toxic gases and runoff.

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

>> Containers may explode when heated or if contaminated with water.

>> Not combustible but enhances combustion of other substances. Gives off irritating or toxic fumes (or gases) in a fire.

Hazards Identification

ERG Hazard Classes

>> Water-reactive material (WR)

3. Composition/Information On Ingredients

Chemical name : Antimony pentafluoride
CAS Number : 7783-70-2
Molecular Formula : F5Sb
Molecular Weight : 216.7520 g/mol

4. First Aid Measures

First Aid:

>> Warning: Antimony Pentafluoride is highly corrosive to the eyes, skin, and lungs, and is extremely toxic if swallowed. The estimated lethal dose after ingestion is between 7 drops and one teaspoonful for a 150 pound person.

>> Signs and Symptoms of Antimony Pentafluoride Exposure: Acute exposure to antimony pentafluoride may result in severe eye damage, vomiting, and severe burns of mouth and throat. Over- exposure by any route can cause bloody stools, slow pulse rate, low blood pressure, coma, convulsions, and cardiac arrest.

>> Emergency Life-Support Procedures: Acute exposure to antimony pentafluoride may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

>> Inhalation Exposure:

>> 1. Move victims to fresh air. Emergency personnel should avoid self-exposure to antimony pentafluoride.

>> 2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer 100% humidified oxygen or other respiratory support.

>> 3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

>> 4. Rush to a health care facility.

>> Dermal/Eye Exposure:

>> 1. Remove victims from exposure. Emergency personnel should avoid self-exposure to antimony pentafluoride.

>> 3. Remove contaminated clothing as soon as possible.

>> 4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

>> 5. Wash exposed skin areas thoroughly with soap and water.

>> 6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

>> 7. Rush to a health care facility.

>> Ingestion Exposure:

>> 1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer 100% humidified oxygen or other respiratory support.

>> 2. DO NOT induce vomiting or attempt to neutralize.

>> 4. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup); children 1 to 12 years old, 200 mL (6 ox or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert.

>> 5. Rush to a health care facility. (EPA, 1998)

ERG 2024, Guide 157 (Antimony pentafluoride)

>> 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 case of skin contact with Hydrofluoric acid (UN1790), if calcium gluconate gel is available, rinse 5 minutes, then apply gel. Otherwise, continue rinsing until medical treatment is available.

>> 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. Half-upright position. Refer immediately for medical attention.

Skin First Aid

>> Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer immediately for medical attention. Apply calcium gluconate to the burn areas.

Eye First Aid

>> Rinse with plenty of water for several minutes (remove contact lenses if easily possible). Refer immediately for medical attention.

Ingestion First Aid

>> Rinse mouth. Do NOT induce vomiting. Refer immediately for medical attention.

5. Fire Fighting Measures

>> Closed containers may rupture violently when heated.

>> Wear full protective clothing and acid-gas-type canister mask. Move container from fire area. Spray cooling water on containers that are exposed to flames until well after fire is out. Reacts violently with water.

>> Do not use water or foam on fire or on adjacent fires; extinguish with dry chemicals or carbon dioxide. (EPA, 1998)

>> Use powder, carbon dioxide. NO water. NO hydrous agents. In case of fire: keep drums, etc., cool by spraying with water. NO direct contact with water.

6. Accidental Release Measures

Toxic-by-Inhalation (TIH) Gas:

ERG Toxic-by-Inhalation (TIH) Gas(es) Produced When Spilled in Water

>> HF - when spill Antimony pentafluoride into water.

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 157 [Substances - Toxic and/or Corrosive (Non-Combustible / Water-Sensitive)]:

>> 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: See ERG Table 1 - Initial Isolation and Protective Action Distances on the UN/NA 1732 datasheet.

>> 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 157 (Antimony pentafluoride)

>> 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.

Isolation

>> When spilled in water

>> Small spill:

>> ISOLATE in all directions: 30 m (100 ft)

>> Large spill:

>> ISOLATE in all directions: 100 m (300 ft)

Protection

>> When spilled in water

>> Small spill:

>> PROTECT people from downwind during DAY time: 0.1 km (0.1 mi)

>> PROTECT people from downwind during NIGHT time: 0.3 km (0.2 mi)

>> Large spill:

>> PROTECT people from downwind during DAY time: 0.8 km (0.5 mi)

>> PROTECT people from downwind during NIGHT time: 3.0 km (1.9 mi)

Spillage Disposal:

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

>> Evacuate danger area! Consult an expert! Personal protection: complete protective clothing including self-contained breathing apparatus. Collect leaking and spilled liquid in sealable containers as far as possible. Do NOT wash away into sewer. Do NOT absorb in saw-dust or other combustible absorbents. Do NOT let this chemical enter the environment. Then store and dispose of according to local regulations.

Accidental Release Measures

Public Safety: ERG 2024, Guide 157 (Antimony pentafluoride)

>> 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 157 (Antimony pentafluoride)

>> ELIMINATE all ignition sources (no smoking, flares, sparks or flames) from immediate area.

>> All equipment used when handling the product must be grounded.

>> Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

>> Stop leak if you can do it without risk.

>> A vapor-suppressing foam may be used to reduce vapors.

>> DO NOT GET WATER INSIDE CONTAINERS.

>> Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.

>> Prevent entry into waterways, sewers, basements or confined areas.

>> Small Spill

>> Cover with DRY earth, DRY sand or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain.

>> Use clean, non-sparking tools to collect material and place it into loosely covered plastic containers for later disposal.

7. Handling And Storage

Safe Storage:

>> Separated from combustible substances, reducing agents and food and feedstuffs. Dry. Well closed. Keep in a well-ventilated room. Do NOT store or transport in containers made from metal or glass. Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.

Storage Conditions:

>> Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Reacts violently with water. Do not store in glass. Storage class (TRGS 510): Non Combustible Liquids.

8. Exposure Control/ Personal Protection

>> 0.5 [mg/m3], as Sb (2.5 mg/m3, as F)

>> 0.5 [mg/m3], as Sb (2.5 mg/m3, as F)

>> (as Sb): 0.5 mg/m

MAK (Maximale Arbeitsplatz Konzentration)

>> carcinogen category: 2; germ cell mutagen group: 3A

Emergency Response: ERG 2024, Guide 157 (Antimony pentafluoride)

>> Note: Some foams will react with the material and release corrosive/toxic gases.

>> Small Fire

>> CO2 (except for Cyanides), dry chemical, dry sand, alcohol-resistant foam.

>> Large Fire

>> Water spray, fog or alcohol-resistant foam.

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

>> Avoid aiming straight or solid streams directly onto the product.

>> 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:

>> A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20 °C.

Effects of Short Term Exposure:

>> Corrosive. Inhalation may cause severe swelling of the throat. This may result in asphyxia. Inhalation may cause lung oedema, but only after initial corrosive effects on eyes and/or airways have become manifest. Exposure at high levels could cause severe lung damage. Medical observation is indicated.

Effects of Long Term Exposure:

>> The substance may have effects on the cardiovascular system and respiratory tract. This may result in impaired functions.

Exposure Prevention

>> AVOID ALL CONTACT! IN ALL CASES CONSULT A DOCTOR!

Inhalation Prevention

>> Use ventilation, local exhaust or breathing protection.

Skin Prevention

>> Protective gloves. Protective clothing.

Eye Prevention

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

Ingestion Prevention

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

Exposure Control and Personal Protection

Protective Clothing: ERG 2024, Guide 157 (Antimony pentafluoride)

>> 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.

Exposure Summary

>> Biological Exposure Indices (BEI) [ACGIH] - Fluorides in urine = 2 mg/L prior to shift or 3 mg/L at end of shift; (Repeated measurements recommended.)

>> TIH (Toxic Inhalation Hazard) - Term used to describe gases and volatile liquids that are toxic when inhaled. Some are TIH materials themselves, e.g., chlorine, and some release TIH gases when spilled in water, e.g., chlorosilanes. [ERG 2016].

Maximum Allowable Concentration (MAK)

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

9. Physical And Chemical Properties

Molecular Weight:

>> 216.752

Exact Mass:

>> 215.89583

Physical Description:

>> Antimony pentafluoride appears as a colorless, oily liquid. Fumes irritate the eyes and mucous membranes. Toxic. Corrosive to metals and tissue. Extremely dangerous to tissue; its burns may be followed by gangrene. Only shipped in cylinders. Under prolonged exposure to heat cylinders may violently rupture and rocket. Used to make other chemicals as well as a catalyst in the manufacture of other chemicals.

>> OILY COLOURLESS HYGROSCOPIC LIQUID WITH PUNGENT ODOUR.

Color/Form:

>> Hygroscopic, moderately viscous liquid

Odor:

>> Sharp odor

Boiling Point:

>> 286 °F at 760 mmHg (EPA, 1998)

>> 141 °C

Melting Point:

>> 47 °F (EPA, 1998)

>> 8.3 °C

Solubility:

>> Reacts violently with water

>> Solubility in water: reaction

Density:

>> 3.097 at 78.44 °F (EPA, 1998) - Denser than water; will sink

>> Relative density (water = 1): 3.00

Vapor Pressure:

>> Vapor pressure, kPa at 25 °C: 1.33

Stability/Shelf Life:

>> Stable under recommended storage conditions.

Decomposition:

>> Hazardous decomposition products formed under fire conditions - Hydrogen fluoride, antimony oxide.

Corrosivity:

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

>> Slowly corrodes glass, copper, lead

Surface Tension:

>> 20 dynes/cm = 0.20 N/m at 20 °C

10. Stability And Reactivity

>> Fumes in air to form small amounts of hydrogen fluoride (reacts with moisture in air). May React with water to give hydrofluoric acid (HF) [Merck 11th ed. 1989].

>> Based on a scenario where the chemical is spilled into an excess of water (at least 5 fold excess of water), half of the maximum theoretical yield of Hydrogen Fluoride gas will be created in 1.2 minutes. Experimental details are in the following: "Development of the Table of Initial Isolation and Protective Distances for the 2008 Emergency Response Guidebook", ANL/DIS-09-2, D.F. Brown, H.M. Hartmann, W.A. Freeman, and W.D. Haney, Argonne National Laboratory, Argonne, Illinois, June 2009.

>> Water-Reactive

>> Air-Reactive

11. Toxicological Information

Toxicity Summary:

>> IDENTIFICATION AND USE: Antimony pentafluoride is a hygroscopic, viscous liquid. It is used in the fluorination of organic compounds. HUMAN STUDIES: It is a corrosive liquid to skin, eyes, mucous membranes. ANIMAL STUDIES: Distribution in rats after chronic poisoning by inhalation of antimony pentafluoride showed high antimony concentration in blood. Levels in liver, kidneys, spleen and pancreas were similar. The antimony was retained for a long time and could be detected in organs under examination one month after experiment discontinued.

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:

>> Serious local effects and systemic effects by all routes of exposure.

Inhalation Exposure

>> Burning sensation. Cough. Laboured breathing. Nausea. Shortness of breath. Sore throat.

Skin Exposure

>> Redness. Serious skin burns. Pain.

Eye Exposure

>> Redness. Pain. Severe deep burns.

Ingestion Exposure

>> Burns in mouth and throat. Sore throat. Burning sensation. Abdominal pain. Diarrhoea. Vomiting. Shock or collapse.

Adverse Effects:

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

>> Dermatotoxin - Skin burns.

>> Toxic Pneumonitis - Inflammation of the lungs induced by inhalation of metal fumes or toxic gases and vapors.

Toxicity Data:

>> LC50 (mice) = 270 mg/m3

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 if 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/ A very reactive, corrosive liquid to skin, eyes, mucous membranes.

12. Ecological Information

ICSC Environmental Data:

>> The substance is toxic to aquatic organisms.

13. Disposal Considerations

Spillage Disposal

>> Evacuate danger area! Consult an expert! Personal protection: complete protective clothing including self-contained breathing apparatus. Collect leaking and spilled liquid in sealable containers as far as possible. Do NOT wash away into sewer. Do NOT absorb in saw-dust or other combustible absorbents. Do NOT let this chemical enter the environment. Then store and dispose of according to local regulations.

Disposal Methods

>> SRP: 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 air, soil or water; effects on animal, aquatic and plant life; and conformance with environmental and public health regulations. If it is possible or reasonable use an alternative chemical product with less inherent propensity for occupational harm/injury/toxicity or environmental contamination.

>> SRP: Wastewater from contaminant suppression, cleaning of protective clothing/equipment, or contaminated sites should be contained and evaluated for subject chemical or decomposition product concentrations. Concentrations shall be lower than applicable environmental discharge or disposal criteria. Alternatively, pretreatment and/or discharge to a permitted wastewater treatment facility is acceptable only after review by the governing authority and assurance that "pass through" violations will not occur. Due consideration shall be given to remediation worker exposure (inhalation, dermal and ingestion) as well as fate during treatment, transfer and disposal. If it is not practicable to manage the chemical in this fashion, it must be evaluated in accordance with EPA 40 CFR Part 261, specifically Subpart B, in order to determine the appropriate local, state and federal requirements for disposal.

>> Product: Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material; Contaminated packaging: Dispose of as unused product.

14. Transport Information

DOT

Antimony pentafluoride
8
UN Pack Group: II

IATA

Antimony pentafluoride
8, 6.1
UN Pack Group: II

15. Regulatory Information

DHS Chemicals of Interest (COI):

This section provides the Department of Homeland Security (DHS) Chemicals of Interest (COI) and related information (Ref: 6 eCFR part 27 - https://www.ecfr.gov/current/title-6/chapter-I/part-27).

Chemicals of Interest(COI)

>> Antimony pentafluoride

Sabotage: Minimum Concentration (%)

>> A Commercial Grade

Sabotage: Screening Threshold Quantities

>> A Placarded Amount

Security Issue: Sabotage/Contamination

>> Chemical or material that can be mixed with readily available materials.

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.

>> Toxic pollutant designated pursuant to section 307(a)(1) of the Federal Water Pollution Control Act and is subject to effluent limitations. /Antimony and compounds/

Regulatory Information

The Australian Inventory of Industrial Chemicals

>> Chemical: Antimony fluoride (SbF5)

New Zealand EPA Inventory of Chemical Status

>> Antimony (V) 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.

>> Not combustible, but if involved in a fire decomposes to produce fumes of antimony and hydrogen fluoride.