ionz

SAFETY DATA SHEET

Updated on 20/07/2024

1. Material Identification

Product Name : Fluoroacetic acid
Catalog Number : io-2407
CAS Number : 144-49-0
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

>> H300 (100%): Fatal if swallowed [Danger Acute toxicity, oral]

>> H314 (100%): Causes severe skin burns and eye damage [Danger Skin corrosion/irritation]

>> H400 (100%): Very toxic to aquatic life [Warning Hazardous to the aquatic environment, acute hazard]

Precautionary Statement Codes

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

Health Hazards:

>> This material is very toxic; ingestion of small quantities may cause death. (EPA, 1998)

ERG 2024, Guide 154 (Fluoroacetic acid)

>> 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.

>> When heated to decomposition, it emits highly toxic fumes of fluorine containing compounds. Some of these materials may burn but none ignite readily. These materials may ignite combustibles (wood, paper, oil, etc.). (EPA, 1998)

ERG 2024, Guide 154 (Fluoroacetic acid)

>> 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 : Fluoroacetic acid
CAS Number : 144-49-0
Molecular Formula : C2H3FO2
Molecular Weight : 78.0400 g/mol

4. First Aid Measures

First Aid:

>> Warning: Effects usually appear within 30 minutes of exposure but may be delayed as long as 20 hours. Caution is advised. Vital signs should be monitored closely.

>> Signs and Symptoms of Fluoroacetic Acid Exposure: Signs and symptoms may be extremely severe and range from nausea, excessive salivation, vomiting, diarrhea, blurred vision, tingling sensations, and muscular twitching to convulsions alternating with coma and depression, and heart failure. Other symptoms include numbness, low blood pressure, hyperactivity, respiratory depression or arrest, cyanosis (blue tint to the skin and mucous membranes), and ventricular fibrillation.

>> Emergency Life-Support Procedures: Acute exposure to fluoroacetic acid exposure 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 fluoroacetic acid.

>> 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 oxygen or other respiratory support.

>> 3. RUSH to a health care facility.

>> 4. Obtain authorization and/or further instructions from the local hospital for performance of other invasive procedures.

>> Dermal/Eye Exposure:

>> 1. Remove victims from exposure. Emergency personnel should avoid self-exposure to fluoroacetic acid.

>> 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 three times with soap and water.

>> 6. RUSH to a health care facility.

>> 7. Obtain authorization and/or further instructions from the local hospital for performance of other invasive procedures.

>> 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 oxygen or other respiratory support.

>> 2. RUSH to a health care facility.

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

>> 4. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of fluoroacetic acid is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step

>> 5. Ipecac should not be administered to children under 6 months of age.Warning: Ingestion of fluoroacetic acid may result in sudden onset of seizures or loss of consciousness. Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step

>> 5.The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

>> 5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

>> 6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3- 1/2 oz) is recommended for adults. (EPA, 1998)

ERG 2024, Guide 154 (Fluoroacetic acid)

>> 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. Half-upright position. Artificial respiration may be needed. Refer immediately for medical attention.

Skin First Aid

>> Wear protective gloves when administering first aid. Remove contaminated clothes. Rinse skin with plenty of water or shower for at least 15 minutes. Refer immediately for medical attention.

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

>> Stay upwind; keep out of low areas. Wear self-contained, positive pressure breathing apparatus and full protective clothing. Move container from fire area. Cool containers that are exposed to flames with water from the side until well after fire is out.

>> Small fires: use dry chemical, carbon dioxide, water spray, or foam. For large fires, use water spray, fog, or foam. (EPA, 1998)

>> In case of fire in the surroundings, use appropriate extinguishing media.

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 (Fluoroacetic acid)

>> 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.

>> Evacuate danger area! Consult an expert! Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT wash away into sewer. Sweep spilled substance into covered sealable containers. Carefully collect remainder. Then store and dispose of according to local regulations.

Accidental Release Measures

Public Safety: ERG 2024, Guide 154 (Fluoroacetic acid)

>> 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 (Fluoroacetic acid)

>> 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 food and feedstuffs. See Chemical Dangers. Keep in a well-ventilated room.

Storage Conditions:

>> Keep container tightly closed in a dry and well-ventilated place. Storage class (TRGS 510): Non-combustible, acute toxic Cat. 1 and 2 / very toxic hazardous materials.

8. Exposure Control/ Personal Protection

>> 8 hr Time Weighted Avg (TWA): 2.5 mg/cu m. /Fluorides, as F/

Emergency Response: ERG 2024, Guide 154 (Fluoroacetic acid)

>> 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:

>> Evaporation at 20 °C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying or when dispersed, especially if powdered.

Effects of Short Term Exposure:

>> The substance is corrosive to the eyes, skin and respiratory tract. Corrosive on ingestion. The substance may cause effects on the cardiovascular system, central nervous system and kidneys. This may result in impaired functions including cardiac and renal failure. The effects may be delayed. Medical observation is indicated. Exposure could cause death.

Effects of Long Term Exposure:

>> The substance may have effects on the testes and heart.

Fire Prevention

>> See Chemical Dangers.

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. Wash hands before eating.

Exposure Control and Personal Protection

Protective Clothing: ERG 2024, Guide 154 (Fluoroacetic acid)

>> 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.

9. Physical And Chemical Properties

Molecular Weight:

>> 78.04

Exact Mass:

>> 78.01170750

Physical Description:

>> Fluoroacetic acid appears as a colorless crystalline solid. May be toxic by ingestion. Used to make other chemicals.

>> ODOURLESS COLOURLESS CRYSTALS.

Color/Form:

>> Needles

Boiling Point:

>> 329 °F at 760 mmHg (EPA, 1998)

>> 165 °C

Melting Point:

>> 95.4 °F (EPA, 1998)

>> 35.2 °C

Solubility:

>> Miscible with water (1.0X10+6 mg/L) at 25 °C

>> Solubility in water: freely soluble

Density:

>> 1.3693 at 97 °F (EPA, 1998) - Denser than water; will sink

>> Relative density (water = 1): 1.37

Vapor Pressure:

>> 12.8 [mmHg]

>> Vapor pressure, Pa at 20 °C: 534

LogP:

>> -0.061 (estimated)

Stability/Shelf Life:

>> Stable under recommended storage conditions.

Decomposition:

>> When heated to decomposition, it emits highly toxic fumes of /hydrogen fluoride and sodium oxides/.

Refractive Index:

>> Mobile liquid, fp: -32 °C. Practically odorless or faint, fruit-like odor. Specific gravity: 1.1744 at 20 dg C/4 °C; 1.1613 at 15 °C/4 °C. Index of refraction: 1.3678 at 20 °C/D. Soluble in water; slightly soluble in petroleum ether /Fluoroacetic acid, methyl ester/

Dissociation Constants:

>> pKa = 2.59

10. Stability And Reactivity

>> Water soluble.

11. Toxicological Information

Toxicity Summary:

>> IDENTIFICATION AND USE: Fluoroacetic acid is a solid. It was used formerly in the production of the highly toxic rodenticide and general mammalian pest control agent sodium fluoroacetic acid. HUMAN STUDIES: Estimates of the lethal dose of fluoroacetate in humans lie in the range of 2 to 10 mg/kg. In the case of chronic human poisoning, a rabbit exterminator in New Zealand was exposed repeatedly during preparation of fluoroacetate bait over a period of 10 years. He presented with severe and progressive lesions of the renal tubular epithelium and with milder hepatic, neurologic and thyroid dysfunctions. In another case, symptoms of poisoning in a chemist began after latent period of 0.5 to several hr followed rapidly by death. Convulsions and arrhythmia were common terminal signs. No specific changes were noted at post mortem. Fluoroacetic ion alone is non-toxic but in vivo forms fluorotricarboxylic acid, which blocks cellular metabolism at the citrate stage. Symptoms occur with a delay but lethal synthesis of fluorotricarboxylic acid leads to the irreversible cellular dysfunction, especially in CNS and circulatory system. Poisoning may be treated with monoacetin and acetamide. ANIMAL STUDIES: Administration of 1.0-1.5 mg/kg of fluoroacetate decreased dentin formation and enamel calcification in rats. Hypothermic activity of fluoroacetic acid 1.5-60 mg/kg, ip in rats was closely related to its lethal effect. Rats were more sensitive than mice. Administration of 6 mg/kg ip to rats progressively depleted ATP content, AMP and ADP levels increased during initial 2 hr and later declined. 4.5-15 ug/kg/min fluoroacetate administration into dogs left renal artery for 90-240 min sharply increased unilateral diuresis, with increased excretion of sodium, potassium, calcium, chlorides and inorganic phosphates due to decreased reabsorption. Similar changes observed after 37-936 ug/kg iv administration. Fluoroacetic acid toxicity is often characterized by seizures. In cats intravenously injected with fluoroacetate at 0.03 mmol/kg the ionized calcium level in blood fell by an average of 27.2%, 40 minutes after injection. There was a corresponding prolongation of the QT interval of the electrocardiogram. Many plants worldwide contain monofluoroacetate and cause sudden death in livestock. These plants are primarily found in the southern continents of Africa, Australia, and South America, where they negatively affect livestock production. In goats, the main clinical signs were motor incoordination, generalized muscle tremors, broad-based posture, tachypnea, tachycardia, vocalization and respiratory distress. Two goats died 5 and 20 min after the observation of the first clinical signs. ECOTOXICITY STUDIES: In the nematode Caenorhabditis elegans, fluoroacetic acid added to the growth medium reduced reproduction in the second generation by 50% at concentrations 3,000 times lower than the concentrations that reduced 24-hour survival by 50%.

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/

Carcinogen Classification:

This section provides the International Agency for Research on Cancer (IARC) Carcinogenic Classification and related monograph links. In the IARC Carcinogenic classification, chemicals are categorized into four groups: Group 1 (carcinogenic to humans), Group 2A (probably carcinogenic to humans), Group 2B (possibly carcinogenic to humans), and Group 3 (not classifiable as to its carcinogenicity to humans).

>> No indication of carcinogenicity to humans (not listed by IARC).

Health Effects:

>> Fluoroacetic acid is corrosive to the eyes, the skin and the respiratory tract. It may cause effects on the cardiovascular system, central nervous system, kidneys, resulting in impaired functions including cardiac and renal failure. Exposure may result in death. (L1685) (L138)

Exposure Routes:

>> The substance can be absorbed into the body by inhalation, through the skin and by ingestion.

>> Inhalation (L1685)

Inhalation Exposure

>> Cough. Sore throat. Shortness of breath. Laboured breathing. Muscle cramps. Confusion. Irregular heartbeat. Symptoms may be delayed.

Skin Exposure

>> MAY BE ABSORBED! Redness. Serious skin burns. Pain.

Eye Exposure

>> Blurred vision. Severe deep burns.

Ingestion Exposure

>> Burns in mouth and throat. Abdominal pain. Convulsions. Shock or collapse. Further see Inhalation.

>> Cough, laboured breathing, nausea, sore throat, vomiting, excessive salivation, numbness and tingling sensation, arrhythmia are observed after fluoroacetic acid inhalation; redness, serious skin burns, pain occur after skin contact; abdominal pain and convulsions in case of ingestion; blurred vision and severe deep burns if eye contact. These symptoms may be delayed. (L1685)

Adverse Effects:

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

>> Neurotoxin - Other CNS neurotoxin

>> Occupational hepatotoxin - Secondary hepatotoxins: the potential for toxic effect in the occupational setting is based on cases of poisoning by human ingestion or animal experimentation.

>> Nephrotoxin - The chemical is potentially toxic to the kidneys in the occupational setting.

>> Dermatotoxin - Skin burns.

Interactions:

>> ... In cats intravenously injected with fluoroacetate at 0.03 mmol/kg the ionized calcium level in blood fell by an average of 27.2%, 40 minutes after injection. There was a corresponding prolongation of the QT interval of the electrocardiogram, and treatment with CaCl2 significantly prolonged the life of the treated animals as compared with unmedicated positive controls.

Antidote and Emergency Treatment:

>> Emergency and supportive measures. 1. Maintain an open airway and assist ventilation if necessary. Administer supplemental oxygen. 2. Replace fluid losses from gastroenteritis with intravenous saline or other crystalloids. 3. Treat shock, seizures, and coma if they occur. Because of the reported potential delay in the onset of serious symptoms, it is prudent to monitor the patient for at least 36-48 hours. /Fluoroacetate/

Human Toxicity Excerpts:

>> /HUMAN EXPOSURE STUDIES/ Estimates of the lethal dose of fluoroacetate in humans lie in the range of 2 to 10 mg/kg. /Fluoroacetate/

Non-Human Toxicity Excerpts:

>> /LABORATORY ANIMALS: Acute Exposure/ Administration of 1.0-1.5 mg/kg of fluoroacetate decreased dentin formation and enamel calcification in rats. Blood citrate level increased more than 2.4 time control level after 6 hr. Successive administration increased citrate content (61.5%) and phosphorus (26.6%) in dentin. /fluoroacetate/

Human Toxicity Values:

Quantitative human toxicity values (e.g., lethal dose) for this compound.

>> Estimates of the lethal dose of fluoroacetate in humans lie in the range of 2 to 10 mg/kg. /Fluoroacetate/

Non-Human Toxicity Values:

>> LD50 Mouse ip 6.60 mg/kg

12. Ecological Information

ICSC Environmental Data:

>> This substance may be hazardous to the environment. Special attention should be given to mammals.

13. Disposal Considerations

Spillage Disposal

>> Evacuate danger area! Consult an expert! Personal protection: complete protective clothing including self-contained breathing apparatus. Do NOT wash away into sewer. Sweep spilled substance into covered sealable containers. Carefully collect remainder. 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.

>> Product: Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Contaminated packaging: Dispose of as unused product.

>> Pour on sufficient sodium bicarbonate. After mixing, transfer into a drum and fill with water for drainage after 24 hours.

14. Transport Information

DOT

Fluoroacetic acid
6.1
UN Pack Group: I

IATA

Fluoroacetic acid
6.1,
UN Pack Group: I

15. Regulatory Information

Regulatory Information

The Australian Inventory of Industrial Chemicals

>> Chemical: Acetic acid, fluoro-

New Zealand EPA Inventory of Chemical Status

>> Acetic acid, fluoro-: Does not have an individual approval but may be used as a component in a product covered by a group standard. It is not approved for use as a chemical in its own right.

16. Other Information

Toxic Combustion Products:

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

>> Poisonous gases are produced in fire or when heated to decomposition.

Other Safety Information

Chemical Assessment

>> IMAP assessments - Acetic acid, fluoro-: Environment tier I assessment

>> IMAP assessments - Acetic acid, fluoro-: Human health 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."