

Material Safety Data Sheet

Version 1.2
Revision Date 08/05/2005MSDS Number 30000012882
Print Date 11/30/2005

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Mixed Acid Etchant 5:1:0

Company : Air Products and Chemicals, Inc
7201 Hamilton Blvd.
Allentown, PA 18195-1501

Telephone : 1-800-345-3148 Chemicals
1-800-752-1597 Gases and Electronic Chemicals

Emergency telephone number : 800-523-9374 USA
01-610-481-7711 International

2. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS Number	Concentration (Weight)
Nitric acid	7697-37-2	50% - 70 %
Hydrofluoric acid	7664-39-3	5% - 10 %

3. HAZARDS IDENTIFICATION

Emergency Overview

Corrosive.
Oxidant. Strongly supports combustion. May react violently with combustible materials.
Oxidizer, will increase risk of fire or the intensity of a fire. Emergency responders must practice extreme caution when approaching, because of the reactivity potential; may cause violent and sometimes explosive reactions.
Harmful by inhalation.
Symptoms may be delayed.
Can cause severe burns if inhaled or upon skin contact.
Requires specialized medical treatment procedures.

Potential Health Effects

Inhalation : Inhalation of aerosol may cause irritation to the upper respiratory tract. Risk of serious damage to the lungs (by inhalation). May cause nose, throat, and lung irritation. Can cause severe eye, skin and respiratory tract burns. Harmful if inhaled.

Eye contact : Causes eye burns. May cause blindness.

Skin contact : Causes skin burns. Causes severe burns which may not be immediately painful or visible.

Ingestion : If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the oesophagus and the stomach. Skin contact, characterized by a yellowing of the tissue, will produce chemical burns. Ingestion of nitric acid will produce chemical burns of the mucous membranes of the mouth, larynx, and esophagus with immediate pain, necrosis of tissues, edema, and possible

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obstruction of the airway. Irritation and corrosion of the stomach may be associated with nausea and vomiting of blood or coffee ground-like material. Profound shock is common. Rupture of the esophagus or stomach may occur. Esophageal structure, other permanent injury, or death may occur. The toxic oxides of nitrogen are very insidious and exposure to low concentrations may not be recognized initially. The oxides are readily recognized at higher concentrations as light to deep reddish-brown fumes. The vapors of nitric acid are characterized by their acrid odor.

Chronic Health Hazard : This product contains no listed carcinogens according to IARC, ACGIH, NTP and/or OSHA in concentrations of 0.1 percent or greater. Chronic fluoride exposure may cause bone or joint changes in humans (fluorosis).

Exposure Guidelines

Target Organs : Respiratory system.
Skin.
Eyes.
Lungs.
Kidney.
Liver.
Heart.
Teeth and bone.

Aggravated Medical Condition

Asthma. Eye disease Skin disorders and Allergies. Liver disorders Kidney disorders Acute or chronic respiratory conditions.

4. FIRST AID MEASURES

- General advice : If additional information is needed call the Air Products Emergency Number or consult the Air Products Safetygram 29:Treatment Protocol for Hydrofluoric Acid Burns, available on our web site at <http://www.airproducts.com/productstewardship/>. Prompt medical attention is required in all cases of overexposure. Seek medical advice. If breathing has stopped or is labored, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately.
- Eye contact : Hold eyelids apart, initiate and maintain gentle and continuous irrigation until the patient receives medical care. If medical care is not promptly available, continue to irrigate for one hour. Seek medical treatment immediately. Irrigate eye intermittently for 20 minutes with an aqueous calcium gluconate 1% solution, if available.
- Skin contact : Immediately remove contaminated clothing, and any extraneous chemical, if possible to do so without delay. Initiate and maintain gentle and continuous irrigation until the patient receives medical care. If medical care is not promptly available, continue to irrigate for one hour. Cover wound with sterile dressing. A physician should be consulted for all exposures. Burns covering an area greater than fifty-two square centimeters (8 square inches) require immediate treatment by a medical doctor. Remove contaminated clothing. With gloved

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hand apply 2.5% calcium gluconate gel to the burn area. Alternative treatment is to soak the affected areas in an iced 0.13% water solution (1:750) of Zephiran® chloride (benzalkonium chloride solution, NF). Use ice cubes, not shaved ice, to prevent frostbite. If soaking is impractical, soaks or compresses may be used. (Do not use Zephiran® for burns of the eye.) If immersion is impractical, soaked compresses of the same solution should be applied to the area. Immersion or compresses must be used continuously for two hours.

Ingestion

: If a person vomits when lying on his back, place him in the recovery position. Never give anything by mouth to an unconscious person. Drink 1 or 2 glasses of water. Do not induce vomiting. Call a physician immediately. Gastric lavage with calcium chloride or calcium gluconate may be performed by a physician. Administer several vials of 10% aqueous calcium gluconate orally. (Calcium carbonate or an antacid containing calcium carbonate or magnesium carbonate or hydroxide may also be used.) Prevent aspiration of vomit. Turn victim's head to the side.

Inhalation

: If breathing has stopped or is labored, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately. Evidence of damage to the lungs following exposure to oxides of nitrogen characteristically appears after a delay of 4-30 hours. As soon as possible give 2.5% to 3% calcium gluconate solution by nebulizer. Move to fresh air.

Notes to physician

Treatment

: This advice is provided to the attending physician because of the specific properties of hydrogen fluoride and hydrofluoric acid. All cases of ingestion and airway exposure, and skin burns with hydrofluoric acid >20% should be regarded as potentially fatal. Patients who have burns and pain within minutes of exposure can be assumed to have been exposed to concentrated acid and are at risk of rapid clinical deterioration and death. Burns can be accompanied by absorption of fluoride through the skin with sequestration of circulating calcium leading to hypocalcemia and hyperkalemia from the release of cell contents. Fatal cardiac dysrhythmias may ensue. A person who has HF burns greater than 25 square inches or who has been burned with concentrated HF should be admitted immediately to an intensive care unit and carefully monitored by EKG for 24 to 48 hours. Blood sampling should be taken to monitor circulating fluoride, potassium and calcium levels. Hemodialysis may be necessary for fluoride removal and correction of hyperkalemia. HF inhaled in high concentrations may cause acute inflammation and edema of the airway and acute pulmonary edema. Anyone who has been exposed to HF gas or mists and experiences respiratory irritation should be admitted to and monitored in an intensive care unit. In some cases, if the eyes are exposed to HF, it may penetrate to internal structures resulting in irreversible damage. HF skin burns are usually accompanied by severe, throbbing pain, which is thought to be due to irritation of nerve endings by increased levels of potassium ions entering the extracellular space to compensate for the reduced levels of calcium ions, which have been bound to the fluoride. RELIEF OF PAIN IS AN IMPORTANT GUIDE TO THE SUCCESS OF TREATMENT.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : Alcohol-resistant foam.

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The product itself does not burn.
Carbon dioxide (CO₂).
Dry chemical.
Dry sand.
Limestone powder.

- Specific hazards : Downwind personnel must be evacuated. This product is not flammable, but it is an oxidizing material and can increase risk of fire or the intensity of a fire. Danger of explosion on contact with flammable liquids and other organic materials.
- Special protective equipment for fire-fighters : Avoid contact with the skin. A face shield should be worn. Use personal protective equipment. Wear self contained breathing apparatus for fire fighting if necessary.
- Further information : The product, as distributed, is noncombustible., Do not allow run-off from fire fighting to enter drains or water courses.

6. ACCIDENTAL RELEASE MEASURES

- Personal precautions : Wear suitable protective clothing, gloves and eye/face protection. Use self-contained breathing apparatus and chemically protective clothing. Contact with combustible material may cause fire. Use chemically protective clothing. Evacuate personnel to safe areas.
- Environmental precautions : Construct a dike to prevent spreading.
- Methods for cleaning up : Approach suspected leak areas with caution. Contact Air Products' Emergency Response Center for advice. Contain and collect spillage with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations. Neutralize with a dilute solution of sodium carbonate. Place in appropriate chemical waste container.
- Additional advice : Open enclosed spaces to outside atmosphere. Never return spills in original containers for re-use. Reduce vapor with fog or fine water spray. Large releases may require considerable downwind evacuation. If possible, stop flow of product.

7. HANDLING AND STORAGE

Handling

Avoid contact with skin and eyes. Use only in well-ventilated areas. Avoid breathing vapors and/or aerosols. Emergency showers and eye wash stations should be readily accessible. Adhere to work practice rules established by government regulations. Contact with combustible material may cause fire. Prevent contamination by any source during handling or storage. This product should be kept in its original container until time of use to avoid any contamination. Never return unused product to its original storage container. All equipment that may contact this product should be cleaned thoroughly to avoid potential reactions with organic contaminants. Empty containers may contain residual liquid or vapors; therefore, empty containers should be handled with care. Dispose of in accordance with local regulations. Inexperienced or first time users of product should contact supplier for additional information on the storage, handling and use of this product. Use personal protective equipment. When using, do not eat, drink or smoke.

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Storage

Keep away from alkalis. Keep away from organic materials. Keep away from combustible material. Keep in a well-ventilated place. Keep away from: Powdered metals. Carbides. Turpentine. Hydrogen Sulfide. Store in stainless steel 55 gallon drums. DOT specification 5C. Tank motor vehicles, DOT specification MC-310, MC-311 and MC-312. Tank cars, DOT specifications 103CW, 111A60W7, 103A-AL2 and 111A60ALW2.

Storage temperature : < 100 °F (< 38 °C)

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering measures

Provide readily accessible eye wash stations and safety showers.

Provide natural or explosion-proof ventilation adequate to ensure concentrations are kept below exposure limits.

Personal protective equipment

Respiratory protection : Wear appropriate respirator when ventilation is inadequate.

Hand protection : Neoprene gloves.
Impervious gloves.
Wearing a thin inner glove in addition to heavy acid resistant outer glove is recommended.
The breakthrough time of the selected glove(s) must be greater than the intended use period.

Eye protection : Full face shield with goggles underneath.

Skin and body protection : Slicker Suit.
Impervious clothing.
Full rubber suit (rain gear).
Rubber or plastic boots.
If bulk quantities of product are handled, the person who is involved in the transfer operation must wear:
Hard hat with brim.

Environmental exposure controls : Construct a dike to prevent spreading.

Special instructions for protection and hygiene : Provide readily accessible eye wash stations and safety showers. Wash at the end of each workshift and before eating, smoking or using the toilet. Keep suitable chemically resistant protective clothing readily available for emergency use. Keep self contained breathing apparatus readily available for emergency use.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form : Liquid.

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Color	: Translucent.
Odor	: Pungent.
Relative density	: > 1
Vapor pressure	: 10.02 mmHg at 70 °F (21 °C)
Density	: 85.963 lb/ft ³ (1.377 g/cm ³) at 70 °F (21 °C)
pH	: Acidic. : > 212 °F (> 100 °C)
Flash point	: Not applicable.

10. STABILITY AND REACTIVITY

Stability	: Stable under normal conditions.
Conditions to avoid	: Avoid oil, grease and all other combustible materials. Decomposes on heating. Exposure to light.
Materials to avoid	: Amines. Incompatible with bases. Reducing agents. Flammable materials. Organic materials. Combustible material. Nitric acid attacks most metals vigorously with evolution of nitric oxide(s) fumes, hydrogen fumes, and formation of metallic nitrate salts. Strong nitric acid may cause spontaneous ignition when mixed with organic materials such as sawdust, shavings, cellulose (cotton) or burlap. Such materials ignite very readily from spark sources. If fire does start, it will burn vigorously. Corrosion rates will be directly dependent upon acid strength. An explosion may occur when nitric acid is contacted with hydrogen sulfide, carbides, metallic powders and turpentine. Nitration reactions evolve heat and may cause spontaneous ignition if confined. Materials made of glass or ceramic. May react violently with alkalis. Zinc. Brass. Aluminium.
Hazardous decomposition products	: Nitrogen oxides (NO _x). Gives off hydrogen by reaction with metals.

11. TOXICOLOGICAL INFORMATION

Acute Health Hazard

Ingestion	: No data is available on the product itself.
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Inhalation : Harmful by inhalation.

Inhalation - Components

Nitric acid	LC50 (4 h) : 49 ppm	Species : Rat.
Hydrofluoric acid	LC50 (1 h) : 1276 ppm	Species : Rat.

Skin. : No data is available on the product itself.

Chronic Health Hazard

Animals exposed to hydrogen fluoride have exhibited kidney, lung, heart and liver damage.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Aquatic toxicity : Toxic to aquatic organisms. May cause pH changes in aqueous ecological systems.

Toxicity to other organisms : No data available.

Persistence and degradability

Mobility : No data available.

Bioaccumulation : No data is available on the product itself.

Bioaccumulation - Components

Hydrofluoric acid : Negligible bioaccumulation potential.

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products : Contact supplier if guidance is required.

Contaminated packaging : Dispose of container and unused contents in accordance with federal, state, and local requirements.

14. TRANSPORT INFORMATION

CFR

Proper shipping name : Corrosive liquids, toxic, n.o.s. (Nitric acid, Hydrofluoric acid)
Class : 8 (6.1)
UN/ID No. : UN2922
Packing group : II

IATA

Proper shipping name : Corrosive liquid, toxic, n.o.s. (Nitric acid, Hydrofluoric acid)
Class : 8 (6.1)

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UN/ID No. : UN2922
Packing group : II

IMDG

Proper shipping name : CORROSIVE LIQUID, TOXIC, N.O.S. (Nitric acid, Hydrofluoric acid)
Class : 8 (6.1)
UN/ID No. : UN2922
Packing group : II

CTC

Proper shipping name : CORROSIVE LIQUID, TOXIC, N.O.S. (Nitric acid, Hydrofluoric acid)
Class : 8 (6.1)
UN/ID No. : UN2922
Packing group : II

15. REGULATORY INFORMATION

OSHA Hazard Communication Standard (29 CFR 1910.1200) Hazard Class(es)
Toxic. Oxidizer. Corrosive.

Country	Regulatory list	Notification
USA	TSCA	Included on Inventory.
EU	EINECS	Included on EINECS inventory or polymer substance, monomers included on EINECS inventory or no longer polymer.
Canada	DSL	Included on Inventory.
Australia	AICS	Included on Inventory.
Japan	ENCS	Included on Inventory.
South Korea	ECL	Included on Inventory.
China	SEPA	Included on Inventory.
Philippines	PICCS	Included on Inventory.

EPA SARA Title III Section 312 (40 CFR 370) Hazard Classification:
Acute Health Hazard Fire Hazard.

EPA SARA Title III Section 313 (40 CFR 372) Component(s) above 'de minimus' level:
Nitric acid
Hydrofluoric acid

US. California Safe Drinking Water & Toxic Enforcement Act (Proposition 65)
This product does not contain any chemicals known to State of California to cause cancer, birth defects or any other harm.

16. OTHER INFORMATION

HMIS Rating

Health : 3

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Flammability : 0
Physical hazard : 0

Prepared by : Air Products and Chemicals, Inc. Global EH&S Product Safety Department

For additional information, please visit our Product Stewardship web site at
<http://www.airproducts.com/productstewardship/>
