



# Safety Data Sheet


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## Section 1 - Product and Company Identification

Product name: Mixed acid etchant (MAE 523)
Other names: --
Product use: --
Supplier's name: San Fu Chemical Co., Ltd.
Supplier's address : 1,Sec.1,Huanyuan E..Rd.,Liuying Dist.,Tainan, Taiwan 736.
Supplier's phone : 886-6-6231821                      Emergency phone : 886-6-6231821
FAX. : 886-6-6231822

## Section 2 - Hazards Identification

<p>Classification:</p> <ol style="list-style-type: none"><li>1. Oxidizing liquids, category 3</li><li>2. Flammable liquids, category 3</li><li>3. Corrosive to metals, category 1</li><li>4. Acute toxicity, category 2 (oral)</li><li>5. Acute toxicity, category 1 (skin)</li><li>6. Acute toxicity, category 3 (inhale)</li><li>7. Skin corrosion/irritation, category 1</li><li>8. Serious Eye Damage/Eye Irritation, category 1</li><li>9. Specific Target Organ Systematic Toxicity - Single Exposure Category 1</li><li>10. Specific Target Organ Systematic Toxicity - Repeated Exposure Category 1</li><li>11. Acute hazards to the aquatic environment, category 3(Acute toxicity)</li></ol>
<p>Label element:</p> <ul style="list-style-type: none"><li>■ Hazard symbol: flame over circle, flame, skull and crossbones, corrosion, healthy hazards</li></ul> <div style="text-align: center;"></div> <ul style="list-style-type: none"><li>■ Signal word: danger</li></ul>
<p>Hazard statement:</p> <ol style="list-style-type: none"><li>1. May intensify combustion; oxidizer</li><li>2. Toxic if inhaled</li><li>3. Fatal if ingested</li><li>4. Fatal by skin contact</li><li>5. May be corrosive to metals</li><li>6. Causes severe skin burns and eye damage</li><li>7. Flammable liquid and vapor</li><li>8. Causes serious eye damage</li><li>9. Can cause damage to organs</li><li>10. Causes damage to organs through prolonged or repeated exposure</li><li>11. Harmful to aquatic life</li></ol>
<p>Precautionary statement:</p> <ol style="list-style-type: none"><li>1. If in eyes: rinse immediately with copious amount of water and seek medical advice.</li><li>2. If exposed or if you feel unwell: immediately seek medical advice.</li><li>3. Wear appropriate protective clothing, gloves, eye protection/face protection.</li></ol>



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4. Keep container tightly closed. Store in a well-ventilated place.

Others Hazard:

Physical and chemical hazard:

1. Polymerization may occur.
2. Container may break or explode in fire.
3. The substance does not spontaneously ignite, however it may decompose under heat and release toxic and corrosive fumes and gases.

Special hazard:

1. Repeated or prolonged overexposure to inorganic fluoride may cause digestive system disorders, weight loss, anemia (low hemoglobin count), tooth lesion, and skeletal fluoride toxicity, the specific symptoms of which include bone and joint pain, limitation of joint or spinal motion, osseous weakening or degenerative changes (bone sclerosis) and ligament sclerosis. Overexposure will cause damage to the nervous system, blood function anomaly, abnormal liver function, and kidney damage.
2. Symptoms caused by contact or inhalation can be delayed. 3. Releases flammable hydrogen gas by contact with metal. Container may explode if heated.

## Section 3 - Composition/Information on Ingredients

Substance: mixture

Chemical property:

Hazardous component in Chinese and English	Concentration or concentration range (percent composition)	CAS No.
Nitric Acid 70%	Various formulas with different proportions 38.5~39.5%	7697-37-2
Hydrofluoric Acid 49%	Various formulas with different proportions < 10%	7664-39-3 ;
Acetic Acid 100%	Various formulas with different proportions 16.0~25%	64-19-7
Water	Added up to a 100% solution	NA

## Section 4 - First Aid Measures

The First-aid Information for different exposure routes:

■ Inhalation:

1. First-aiders should ensure their own safety first. Working in pairs is recommended.
2. Remove source of pollution or move victim to fresh air.
3. If breathing is difficult, oxygen should be administered by a trained individual under the instruction of a physician.
4. Do not move victim unless necessary.
5. Symptoms of pulmonary edema may be delayed up to 48 hours.
6. Immediately seek medical advice.



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■ Skin Contact:

1. Remove contaminated clothing and shoes, wash with soap and water for at least 15 minutes.
2. If irritation persists, rinse repeatedly.
3. Immediately seek medical advice.
4. Thoroughly wash and dry contaminated clothing and shoes before reuse.

■ Eye Contact:

1. Immediately hold eyelids apart, initiate and maintain gentle and warm irrigation for 20 minutes.
2. If possible, rinse continuously with normal saline.
3. Prevent the rinsing water from entering the unaffected eye.
4. If irritation persists, rinse repeatedly.
5. Immediately seek medical advice.

■ Ingestion:

1. Seek medical advice as soon as possible. Do not induce vomiting, as induced vomiting will cause further harm to mouth and throat. If the victim is conscious,
2. Let victim rinse their mouth thoroughly and have them drink water or milk, as the calcium in the milk or magnesium in milk of magnesia may act as an antidote. If possible, keep victims attended at all times.

The Most Important Symptoms and Hazardous Effects: Can cause extremely painful deep burns, skin corrosion and irritation in the esophagus. Inhalation can cause fatal pulmonary edema.

Protection of First-aiders: First-aiders should wear level C personal protective equipment, and perform first-aid in a safe area.

Notes to a Physician:

1. Administer oxygen in case of inhalation.
2. Consider soaking victim in an ice bath in case of skin contact.
3. Avoid gastric lavage or induced vomiting.
4. Inquire about the route of exposure.
5. Symptoms may be delayed.
6. This substance contains hydrofluoric acid. Special care should be taken to monitor the occurrence of hypocalcemia and hypercalcemia. Symptoms vary with exposure concentration, but even with diluted solution, or if the exposure is left untreated for a prolonged period of time, the hydrofluoric acid can penetrate through the subcutis. Acute and systemic effects can occur as a result of high concentration of fluoride ions in the bodily tissues: if ingested, inhaled in large amounts or absorbed through skin contact, systemic effects including electrolyte (calcium, magnesium and potassium) imbalance and blood pH abnormalities will arise from circulation; if more than 5% of the skin comes in contact with hydrofluoric acid of any concentration, hypocalcemia becomes likely. Hazards caused by chronic exposure to hydrofluoric acid are less severe than those caused by acute exposure. Repeated exposure, or daily absorption of 10-80mg of fluorine ion, will lead to systemic fluorine toxicity. Preexisting functional abnormalities in the following organs or systems prior to the exposure can be aggravated through exposure: skin, lungs (e.g. asthma), liver, kidneys, neural system and skeleton. If victim has preexisting lung diseases, coronary artery disease or anemia, post-exposure oxygen utilization rate will drop dramatically. Exposure to high concentrations by victims with heart diseases will likely induce arrhythmia. Blood calcium levels should be monitored hourly within the first 12 hours following hydrofluoric acid toxicity, while 10% Ca Gluconate should be administered via intravenous injection to balance the calcium level. Victim should also be



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monitored by EKF, chest X-ray and physical examination to discover pulmonary and arrhythmia in time and prevent rapid deterioration. Blood calcium levels should be monitored for three consecutive days to prevent hypercalcemia.

## Section 5 - Fire Fighting Measures

### Extinguishing Media:

1. Dry chemical powder, foam, mist.
2. In case of vigorous fire, foam or mist spray is recommended for extinguishing.

### Specific Hazards when Fire-fight:

1. HF may burst out when this substance contacts water, therefore do not use direct water jet or allow water to reach leaking containers.
2. If HF is stored in a metal container, flammable hydrogen gas may form and accumulate.
3. This substance contains nitric acid, a strong oxidizer which is inflammable but will react with reagents or flammable organic compounds, and evolve heat that can cause ignition or explosion.
4. Reaction with water can cause violent exothermic reaction and splashing.
5. Irritating, corrosive and/or toxic fumes will be generated in fire.
6. Water used in fire control or dilution will turn corrosive and/or toxic and pollute the environment if released.

### Specific Fire-fighting Procedure:

1. In case of fire, water can be used to keep containers and surrounding equipment cool.
2. Do not get water into containers.
3. After the fire has been extinguished, continue cooling the containers with water.
4. Firefighters should use full-face self-contained or supplied air respirator and wear appropriate chemical protective clothing.

Specific Protection of Firefighters: Firefighters should wear full chemical protective clothing and self-contained respirator (plus aluminized flash jacket when necessary).

## Section 6 - Accidental Release Measures

### Personal Precautions:

1. Immediately contain and quarantine spill or release area. The quarantine area should extend to minimum radius of 50-100m (160-330ft) from the site.
2. Stay upwind and away from lowland until spills are thoroughly cleaned up.
3. Shut down the origin of spillage if it is safe to do so.
4. Restrict access to the contaminated area before it is completely cleaned.
5. Cleanup must be conducted by trained individuals. Keep untrained personnel away from spill area.

### Environmental Precautions:

1. Shut down or block the spill to prevent further flow.
2. Wear supplied air acid-resistant clothing for best protection.
3. Extinguish or remove all ignition sources.
4. Report to the health and safety as well as environment protection authorities.

### Methods for Cleaning up:

1. Cleanup should be conducted by trained individuals.
2. Equipment used to handle this substance should be earthed to eliminate static charge. Avoid contact with spills.
3. Prevent spills from entering the sewage, ditch or other confined space.



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4. Contain or reduce spill if it is safe to do so.
5. Small spills can be absorbed with an inert material and placed in an appropriate, tight and labeled container.
6. Cover spills with dry sand, dry soil, inert absorbents or other non-combustible materials and place in an appropriate, labeled tight container.
7. Cover contaminated area with sodium bicarbonate or a mixture of 50% soda and 50% lime. Use larger amounts and spray water if paste is needed.
8. Rinse the spill area with water.
9. Avoid getting water directly on the origin of leakage, or in HF tanks.
10. If possible, turn the leaking container upside down to exhaust the gas in lieu of liquid leaks.
11. If it is not possible to block the leak, move the leaking container to a safe place for drainage.
12. Scoop mixtures with a shovel and flush contaminated area with soda solution.

## Section 7 - Handling and Storage

<b>Handling:</b> <ol style="list-style-type: none"> <li>1. Containers of this substance may be hazardous when empty due to product residues (vapors, liquids and/or solids). All precautions described in the SDS should be observed when handling.</li> <li>2. Avoid letting released vapors into the air in working areas.</li> <li>3. Handle the substance in a well-ventilated area and adopt minimum usage.</li> <li>4. Emergency response facilities applicable to fire and spills should be available at all times.</li> <li>5. Fans and electric equipment should be explosion-proof.</li> <li>6. Consider installing leak detection and alert system.</li> <li>7. Post warning pictograms where appropriate.</li> <li>8. Periodically check for defects such as damage or leakage.</li> <li>9. When preparing solutions, acid should be added slowly into water.</li> </ol>
<b>Storage:</b> <ol style="list-style-type: none"> <li>1. All containers should be stored away from heat and direct sun exposure.</li> <li>2. The storage area should be equipped with appropriate independent ventilation and kept away from heat source and sparks.</li> <li>3. Building materials, lighting and ventilation system of the storage area should be made with non-corrosive materials.</li> <li>4. Store in a limited amount and restrict access to the storage area.</li> <li>5. Storage area should be separated from personnel-intensive working areas.</li> </ol>

## Section 8 - Exposure Controls & Personal Protection

<b>Engineering measures: --</b>			
Control parameters			
TWA	STEL	Ceiling	Biological standards BEIs
2ppm	4ppm	--	--
<b>Personal protective equipment:</b> <ul style="list-style-type: none"> <li>■ <b>Respiratory Protection:</b> <ol style="list-style-type: none"> <li>1. Concentration under 50ppm: Constant flow supplied air respirator, powered air purifying or full face chemical cartridge respirator, organic vapor cartridge respirator mask, full face self-contained or supplied air respirator.</li> <li>2. Unknown concentration: Positive pressure self-contained respirator, positive pressure full face supplied air respirator with auxiliary positive pressure self-contained respirator.</li> <li>3. Evacuation: Organic vapor cartridge gas mask, self-contained emergency escape</li> </ol> </li> </ul>			



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- respirator.
- Hand Protection: Impervious gloves preferably made of butyl rubber, Teflon, Viton, Saranex, Responder, 4H, Tychem 10000, etc.
  - Eye Protection: 1. Splash-proof safety goggles. 2. Mask. 3. Provide emergency eyewash stations or showers.
  - Skin and Body Protection: Chemical protective clothing.

#### Hygiene measures:

1. Take off all contaminated clothing as soon as possible after work. Wash before reuse or disposal. Laundry service must be informed of the hazards relating to the contamination.
2. Smoking, eating and drinking are prohibited in working areas.
3. Wash hands thoroughly after handling the substance.
4. Keep working areas clean and organized.

#### Section 9 - Physical & Chemical Properties

Appearance: liquid	Odor: --
Odor threshold: --	Melting Point: --
pH value: <1	Boiling point/boiling range: --
Flammability (solid, gas): --	Flash point: --
Decomposition temp: --	Test method (open or closed cup): --
Auto ignition temp: --	Explosion properties: NA
Vapor pressure: --	Vapor density: (air=1) --
Density: 1.2~1.4 g/cm <sup>3</sup> @25°C	Solubility: Soluble
log Kow: --	Evaporation Rate: --

#### Section 10 - Stability & Reactivity Data

Stability: Stable
Possible hazardous reactions under specific conditions: <ol style="list-style-type: none"><li>1. Most metals, metal oxides and powdered metals (such as antimony, bismuth, aluminum, manganese, magnesium, titanium): Contact may cause violent or explosive reactions, heat emission and possibly the release of nitrogen oxide.</li><li>2. Organic compounds (such as anhydrides, ketones, alcohols, amines, aldehydes, ethers, hydrocarbons, nitroaromatics and alkanes): Contact may cause violent or explosive reactions or auto ignition.</li><li>3. Organic solids (such as paper, clothes, charcoal, sawdust, sulfides, nonmetallic hydrides and carbides): Contact will cause immediate or delayed explosion, violent reaction or auto ignition.</li><li>4. Reducing agents: Contact will cause violent or explosive reactions.</li></ol>
Conditions to avoid: <ol style="list-style-type: none"><li>1. Avoid heat, flame, spark and other ignition sources.</li><li>2. Contact with combustible materials may cause ignition or explosion.</li></ol>
Materials to avoid: <ol style="list-style-type: none"><li>1. Most metals and metal oxides: Contact may cause violent or explosive reactions, heat emission and possibly oxides of helium.</li><li>2. Organic compounds: Contact may cause violent or explosive reactions.</li><li>3. Reducing agents: Contact will cause violent or explosive reactions.</li></ol>



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Hazardous decomposition products: Nitric oxide, hydrogen gas

## Section 11 - Toxicological Information

Route of exposure: inhalation, skin contact, eye contact, ingestion.

Symptoms: irritation, bronchitis, pleural effusion, burn, hematemesis, renal damage, conjunctivitis, enamel erosion.

Immediate Toxicity:

- Inhalation: Inhaling high concentration vapor will irritate the nose and throat, causing hyperpnoea, cough, asthma and lung damage.
  - Skin:
    1. Concentrated solutions or pure acetic acid will cause deep burn, tissue necrosis and erosive tissue lesions that heal with permanent scars.
    2. Dilute solutions will cause mild to severe irritation.
  - Eye:
    1. Even dilute solutions will cause severe irritation.
    2. Concentrated solutions will erode the eyes leading to permanent eye damage including blindness.
  - Ingestion:
    1. Ingesting 100-200 ml of 80-100% acetic acid will cause severe erosive lesions to digestive tracts and the stomach.
    2. Aspiration of even a small amount into the lungs will cause fatal pulmonary edema, and may cause severe lung damage, respiratory failure, cardiac arrest and death.
- LD<sub>50</sub>: mg/kg ( test animal , route of absorption ) : --
- LD<sub>50</sub>: mg/kg ( test animal , route of absorption ) : --

Chronic Toxicity:

1. May cause edema in pulmonary tissues or trachea and lead to chronic pneumonia and tracheitis.
2. Will damage tooth enamel.

## Section 12 - Ecological Information

Ecotoxicology:

- LC<sub>50</sub>(Fish): --
- EC<sub>50</sub>(Aquatic Invertebrates): --
- Bioconcentration factor (BCF): --

Persistence and degradability: --

- Half-Life (Air): --
- Half-Life (Water surface): --
- Half-Life (Groundwater): --
- Half-Life (Soil): --

Bioaccumulative potential: -

Mobility in soil: --

Other adverse effects: /

## Section 13 - Disposal Considerations

Methods of disposal:

1. Observe all relevant laws and regulations.



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|--|
| 2. Recycle as much as possible, or contact manufacturer for recycling.   |
| 3. Consult a waste disposal agency about disposal.                       |
| 4. Dispose by landfill or incineration in an approved area.              |
| 5. Recycle container if possible, or dispose of in an approved landfill. |

## Section 14 - SDS Transport Information

UN classification number: --
Proper D.O.T Shipping Name: --
Hazard Class: Class 8 Corrosive Substance, Class 5.1 Oxidizing Liquids, Class 3 Flammable Liquids
Packing Group: I
Marine pollution: --
Specific precautionary transport measures and conditions: --

## Section 15 - Regulatory Information

Regulations:
1. Occupational Safety and Health Facility Regulations
2. Regulations for the Labeling and Hazard Communication of Hazardous Chemicals
3. Standard of Hazard Prevention for Specific Chemicals
4. Standards of Permissible Exposure Limits of Airborne Hazardous Substances in Workplace
5. Road Transportation Safety Regulations
6. Methods and Facilities Standards for the Storage, Clearance and Disposal of Industrial Waste

## Section 16 - Other Information

Literature references	1. RTECS database, TOMES PLUS Disc, Vol. 68, 2006 2. ChemWatch databse, 2006-1 3. OSH SDS database, 2006 4. HSDB database, TOMES PLUS Disc, Vol. 68, 2006	
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Remarks	Symbols Explanations: "--" No information is available at this time. "/" Not applicable to this substance.	
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