

Section 1: Identification

MANUFACTURER: PACE Technologies
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INFORMATION PHONE: 520-882-6598

EMERGENCY PHONE: CHEMTREC 800-424-9300 (US) Day or night
 Customer No. 16568

TRADE NAME: PS-41 Etch Reagent (FeCl₃, (NH)₄S₂O₈, HCl, HNO₃ and water)

CHEMICAL FAMILY: CORROSIVE LIQUIDS, ACIDIC, INORGANIC, N.O.S.
 (Ferric Chloride, Hydrochloric Acid Mixture)

HMIS RATING: HEALTH: 4 FLAMMABILITY: 0 REACTIVITY: 3

HAZARD RATING:

LEAST: 0 SLIGHT: 1 MODERATE: 2 HIGH: 3 EXTREME: 4

Section 2: Hazard(s) Identification

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)	Oxidizing liquids (Category 3), H272 Corrosive to metals (Category 1), H290 Acute toxicity, Oral (Category 4), H302 Skin corrosion (Category 1B), H314 Serious eye damage (Category 1), H318 Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335 Acute aquatic toxicity (Category 2), H401
PICTOGRAM(s):	
SIGNAL WORD:	Danger
HAZARD STATEMENTS:	Hazard Statement(s): H272- May intensify fire; oxidizer H290 - May be corrosive to metals H302- Harmful if swallowed H314- Causes severe skin burns and eye damage

	H318 - Causes serious eye damage H335- May cause respiratory irritation H401- Toxic to aquatic life
PRECAUTIONARY STATEMENTS:	<p>Precautionary Statement(s):</p> <p>Preventions:</p> <p>P210- Keep away from heat/sparks/open flames/hot surfaces. — No smoking. P220- Keep/Store away from clothing combustible materials. P221- Take any precaution to avoid mixing with combustibles. P234- Keep only in original container. P260- Do not breathe dust/fume/gas/mist/vapors/spray. P261-Avoid breathing dust/fume/gas/mist/vapors/spray. P264- Wash skin thoroughly after handling. P270- Do not eat, drink or smoke when using this product. P271-Use only outdoors or in a well-ventilated area. P273- Avoid release to the environment. P280- Wear protective gloves/protective clothing/eye protection/face protection.</p> <p>Response:</p> <p>P301+312- IF SWALLOWED: call a POISON CENTER or doctor/physician IF you feel unwell. P301+P330+P331- IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. P304+P340- IF INHALED: Remove victim to fresh air and Keep at rest in a position comfortable for breathing. P305+P351+P338- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P310- Immediately call a POISON CENTER or doctor/physician. P312-Call a POISON CENTER or doctor/physician if you feel unwell. P321- Specific treatment (see Section 4 SDS). P330- Rinse mouth. P370+P378- In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction. P390- Absorb spillage to prevent material damage. P391- Collect spillage. Hazardous to the aquatic environment.</p> <p>Storage:</p> <p>P403+P233- Store in a well-ventilated place. Keep container tightly closed. P405- Store locked up. P406- Store in corrosive resistant container with a resistant inner liner.</p> <p>Disposal:</p> <p>P501- Dispose of contents/container to Federal, State and Local Regulations.</p>

Emergency Overview

DANGER! STRONG OXIDIZER, CORROSIVE. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE BURNS TO SKIN AND EYES. MAY CAUSE ALLERGIC SKIN OR RESPIRATORY REACTION. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

SAF-T-DATA™ Ratings (Provided here for your convenience)

Health Rating: 4 - Severe (Life)

Flammability Rating: 0 - None

Reactivity Rating: 3 - Moderate

Contact Rating: 3 - Severe (Corrosive)

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD;
PROPER GLOVES

Storage Color Code: White (Corrosive), Yellow (Reactive)

Potential Health Effects

Nitric acid is extremely hazardous; it is corrosive, reactive, an oxidizer, and a poison.

Inhalation:

Corrosive! Inhalation of vapors can cause coughing, choking, inflammation of the nose, throat, and upper respiratory tract, and in severe cases, pulmonary edema, circulatory failure, and death. Extremely destructive to tissues of the mucous membranes and upper respiratory tract.

Symptoms may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting.

Ingestion:

Corrosive! Swallowing hydrochloric acid or nitric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract. May cause nausea, vomiting, and diarrhea, and in severe cases, death. Pink urine discoloration is a strong indicator of iron poisoning. Liver damage, coma and death may follow, sometimes delayed as long as three days.

Skin Contact:

Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and discolor skin.

Eye Contact:

Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.

Chronic Exposure:

Long-term exposure to concentrated vapors may cause erosion of teeth. Long term exposures seldom occur due to the corrosive properties of the acid. Repeated ingestion may cause liver damage. Prolonged exposure of the eyes may cause discoloration.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or eye disease may be more susceptible to the effects of this substance.

Section 3: Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Ferric Chloride	7705-08-0	20 - 50%	Yes
Ammonium Persulfate	7727-54-0	10 - 25%	Yes
Hydrogen Chloride	7647-18-5	10 - 40%	Yes
Nitric Acid	7697-37-2	5 - 20%	Yes
Water	7732-18-5	30 - 50%	No

Section 4: First-Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Ingestion:

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Section 5: Fire-Fighting Measures

Fire:

Not considered to be a fire hazard. Irritating hydrogen chloride fumes may form in fire.

Explosion:

Reacts explosively with combustible organic or readily oxidizable materials such as: alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc. Reacts with most metals to release hydrogen gas which can form explosive mixtures with air.

Fire Extinguishing Media:

Water or water spray. Neutralize with soda ash or slaked lime. Do not get water inside container.

Do not allow water runoff to enter sewers or waterways.

Special Information:

Increases the flammability of combustible, organic and readily oxidizable materials. In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

Section 6: Accidental Release Measures

Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

Section 7: Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. When opening metal containers, use non-sparking tools because of the possibility of hydrogen gas being present. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Separate from combustibles, organic or other readily oxidizable materials. Avoid storage on wood floors. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

Section 8: Exposure Controls/ Personal Protection

Airborne Exposure Limits:

For Hydrochloric acid:

- OSHA Permissible Exposure Limit (PEL):

5 ppm (Ceiling)

- ACGIH Threshold Limit Value (TLV):

2 ppm (Ceiling), A4 Not classifiable as a human carcinogen

For Nitric acid

-OSHA Permissible Exposure Limit (PEL):

2 ppm (TWA), 4 ppm (STEL)

-ACGIH Threshold Limit Value (TLV):

2 ppm (TWA); 4 ppm (STEL)

For Ferric Chloride:

-ACGIH Threshold Limit Value (TLV):
1 mg/m³ (TWA) soluble iron salt as Fe

For Ammonium Persulfate

- ACGIH Threshold Limit Value (TLV):
0.1 mg/m³ (TWA) as persulfate

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, a full facepiece respirator with an acid gas cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. **WARNING:** Air purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure to prevent skin contact. **Eye Protection:** Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Section 9: Physical and Chemical Properties

Appearance:

Yellow brown liquid.

Odor:

Pungent odor.

Solubility:

Soluble in water.

Density: 2.90 @ 25C/4C

pH:

For HCL solutions: 0.1 (1.0 N), 1.1 (0.1 N), 2.02 (0.01 N)

% Volatiles by volume @ 21C (70F):

No information found

Boiling Point:

101 - 103C (214 - 217F)

Melting Point:

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Ammonium persulfate - 120C (248F) Decomposes.

Vapor Density (Air=1):

No information found.

Vapor Pressure (mm Hg):

No information found.

Evaporation Rate (BuAc=1):

No information found.

Section 10: Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Emits toxic fumes of chloride, nitrogen oxides and hydrogen nitrate when heated to decomposition. Will react with water or steam to produce heat and toxic and corrosive fumes.

Hazardous Polymerization:

This substance does not polymerize.

Incompatibilities:

A dangerously powerful oxidizing agent, concentrated nitric acid is incompatible with most substances, especially strong bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible organics. A strong mineral acid, concentrated hydrochloric acid is highly reactive with strong bases, metals, metal oxides, hydroxides, amines, carbonates and other alkaline materials. Incompatible with materials such as cyanides, sulfides, sulfites, and formaldehyde. Metals, allyl chloride, sodium, potassium. Will react with water to produce toxic and corrosive fumes. Reducing agents, organic material, sodium peroxide, water and powdered metals especially aluminum.

Conditions to Avoid: Moisture, combustible materials, heat, direct sunlight and incompatibles.

Section 11: Toxicological Information

Oral rat LD50: 316 mg/kg (anhydrous); investigated as a mutagen, reproductive effector.

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		
	Known	Anticipated	IARC Category
Ferric Chloride (7705-08-0)	No	No	None
Ammonium Persulfate (7727-54-0)	No	No	None
Hydrogen Chloride (7647-01-0)	No	No	3
Nitric Acid (7697-37-2)	No	No	None
Water (7732-18-5)	No	No	None

Section 12: Ecological Information

Environmental Fate:

No information found.

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Emergency phone number (CHEMTREC 800-424-9300)

Environmental Toxicity:

24 Hr LC50 striped bass (fingerling): 6 mg/L (static);
24 Hr LC50 striped bass (larvae): 4 mg/L (static)

Section 13: Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

Section 14: Transportation Information

Domestic (Land, D.O.T.)

Proper Shipping Name: CORROSIVE LIQUIDS, ACIDIC, INORGANIC, N.O.S. (Ferric Chloride, Hydrochloric Acid Mixture)

Hazard Class: 8

UN/NA: UN3264

Packing Group: II

Limited Quantity Shipping: < 1 L

International (Water, I.M.O.)

Proper Shipping Name: CORROSIVE LIQUIDS, ACIDIC, INORGANIC, N.O.S. (Ferric Chloride, Hydrochloric Acid Mixture)

Hazard Class: 8

UN/NA: UN3264

Packing Group: II

International (Air, I.C.A.O.)

Proper Shipping Name: CORROSIVE LIQUIDS, ACIDIC, INORGANIC, N.O.S. (Ferric Chloride, Hydrochloric Acid Mixture)

Hazard Class: 8

UN/NA: UN3264

Packing Group: II

Section 15: Regulatory Information

-----\Chemical Inventory Status - Part 1\-----

Ingredient	TSCA	EC	Japan	Australia
Ferric Chloride (7705-08-0)	Yes	Yes	Yes	Yes
Ammonium Persulfate (7727-54-0)	Yes	Yes	Yes	Yes
Hydrogen Chloride (7647-01-0)	Yes	Yes	Yes	Yes
Nitric Acid (7697-37-2)	Yes	Yes	Yes	Yes
Water (7732-18-5)	No	No	No	No

-----\Chemical Inventory Status - Part 2\-----

Ingredient	Korea	DSL	NDSL	Phil.
Ferric Chloride (7705-08-0)	Yes	Yes	No	Yes
Ammonium Persulfate (7727-54-0)	Yes	Yes	No	Yes
Hydrogen Chloride (7647-01-0)	Yes	Yes	No	Yes
Nitric Acid (7697-37-2)	Yes	Yes	No	Yes
Water (7732-18-5)	No	No	No	No

-----\Federal, State & International Regulations - Part 1\-----

Ingredient	RQ	TPQ	List	Chemical Catg.
Ferric Chloride (7705-08-0)	No	No	No	No
Ammonium Persulfate (7727-54-0)	No	No	No	No
Hydrogen Chloride (7647-01-0)	5000	500*	Yes	No
Nitric Acid (7697-37-2)	1000	1000	Yes	No
Water (7732-18-5)	No	No	No	No

-----\Federal, State & International Regulations - Part 2\-----

Ingredient	CERCLA	-RCRA-	-TSCA-
Ferric Chloride (7705-08-0)	1000	No	No
Ammonium Persulfate (7727-54-0)	No	No	No
Hydrogen Chloride (7647-01-0)	5000	No	No
Nitric Acid (7697-37-2)	1000	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes

SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No

Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: 2PE

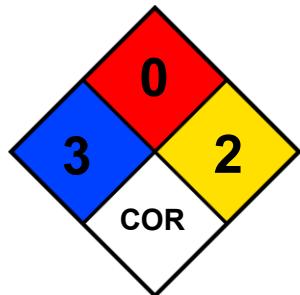
Poison Schedule: S6

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

Section 16: Other Information

16.1 NFPA 704



Top, Flammability: 0 – Minimal Hazard

Left, Health Hazard: 3 – Severe Hazard

Right, Reactivity: 2 – Moderate Hazard

Bottom, Special Notice: COR – Corrosive

Label First Aid:

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

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