Safety Data Sheet
ASTM No. 157(chromium trioxide, HCl and water)

Section 1: Identification

MANUFACTURER: PACE Technologies
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International call collect CHEMTREC 202-483-7616
Customer No. 16568

TRADE NAME: ASTM 157 Hastelloy Etchant (Chromium trioxide, hydrochloric acid and water)

CHEMICAL FAMILY: Chromium trioxide, hydrochloric acid and water

HMIS RATING: HEALTH: 4 FLAMMABILITY: 0 REACTIVITY: 2

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 solids (Category 1), H271 Corrosive to metals (Category 1), H290 Acute toxicity, Oral (Category 3), H301 Acute toxicity, Dermal (Category 3), H311 Skin corrosion (Category 1A), H314 Skin sensitization (Category 1), H317 Serious eye damage (Category 1), H318 Acute toxicity, Inhalation (Category 2), H330 Respiratory sensitization (Category 1), H334 Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335 Germ cell mutagenicity (Category 1B), H340 Carcinogenicity (Category 1A), H350 Reproductive toxicity (Category 2), H361 Specific target organ toxicity - repeated exposure, Inhalation (Category 1), H372 Acute aquatic toxicity (Category 1), H400 Chronic aquatic toxicity (Category 1), H410

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PICTOGRAM(s):	
SIGNAL WORD:	Danger
HAZARD STATEMENTS:	**Hazard Statement(s):** H271- May cause fire or explosion; strong oxidizer H290- May be corrosive to metals H301- Toxic if swallowed H311- Toxic in contact with skin H314- Causes severe skin burns and eye damage H317- May cause an allergic skin reaction H318- Causes serious eye damage H330- Fatal if inhaled H334- May cause allergy or asthma symptoms or breathing difficulties if inhaled H335- May cause respiratory irritation H340- May cause genetic defects H350- May cause cancer H361- Suspected of damaging fertility or the unborn child H372- Causes damage to organs through prolonged or repeated exposure H400- Very toxic to aquatic life H410- Very toxic to aquatic life with long lasting effects
PRECAUTIONARY STATEMENTS:	**Precautionary Statement(s):** **Preventions:** P201- Obtain special instructions before use. P202- Do not handle until all safety precautions have been read and understood. 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. P272-Contaminated work clothing should not be allowed out of the workplace. P273- Avoid release to the environment. P280- Wear protective gloves/protective clothing/eye protection/face protection. P281- Use personal protective equipment as required. P283- Wear fire/flame resistant/retardant clothing. P284- P403+P233-Store in a well-ventilated place. Keep container tightly closed. P285- In case of inadequate ventilation wear respiratory protection. **Response:** P301+310- IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. P301+P330+P331- IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. P302 + P352- IF ON SKIN: wash with plenty of soap and water. P304+P340-IF INHALED: Remove victim to fresh air and Keep at rest in a position comfortable for breathing.

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	P304+P341- IF INHALED: If breathing is difficult, 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. P306+P360- IF ON CLOTHING: Rinse Immediately contaminated CLOTHING and SKIN with plenty of water before removing clothes. P308+P313- IF exposed or concerned: Get medical advice/attention. P310- Immediately call a POISON CENTER or doctor/physician. P312-Call a POISON CENTER or doctor/physician if you feel unwell. P314-Get medical advice/attention if you feel unwell. P320- Specific treatment is urgent (see Section 4 SDS). P321- Specific treatment (see Section 4 SDS). P322- Specific measures (see Section 4 SDS). P330- Rinse mouth. P333+P313-IF SKIN irritation or rash occurs: Get medical advice/attention. P342+P311- IF experiencing respiratory symptoms: call a POISON CENTER or doctor/physician. P361- Remove/Take off immediately all contaminated clothing. P363-Wash contaminated clothing before reuse. P370+P378- In case of fire: Use water for extinction. P371+P380+P375- In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion. P390- Absorb spillage to prevent material damage. P391- Collect spillage. Hazardous to the aquatic environment. **Storage:** 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. **Disposal:** P501- Dispose of contents/container to Federal, State and Local Regulations.

Emergency Overview

POISON! DANGER! CORROSIVE! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG DAMAGE. MAY CAUSE ALLERGIC REACTION. CANCER HAZARD, RISK OF CANCER DEPENDS ON DURATION AND LEVEL OF EXPOSURE.

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

Health Rating: 4 - Extreme (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 2 - Severe (Oxidizer)
Contact Rating: 3 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

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

Potential Health Effects

Inhalation:
Corrosive! Extremely destructive to tissues of the mucous membranes and upper respiratory tract. May cause ulceration and perforation of the nasal septum 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.
Ingestion:
Corrosive! Swallowing hydrochloric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract.
Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.
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 and lung damage. Long-term exposures seldom occur due to the corrosive properties of the acid. Repeated or prolonged exposure can cause ulceration and perforation of the nasal septum, respiratory irritation, liver and kidney damage and ulceration of the skin. Ulcerations at first may be painless, but may penetrate to the bone producing "chrome holes." Known to be a human carcinogen.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye disease, or cardiopulmonary diseases may be more susceptible to the effects of this substance. Persons with pre-existing skin disorders, asthma, allergies or known sensitization to chromic acid or chromates may be more susceptible to the effects of this material.

Section 3: Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Hydrogen Chloride	7647-01-0	40 - 70%	Yes
Chromium Trioxide	1333-82-0	10 - 25%	Yes
Water	7732-18-5	25 - 50%	No

Section 4: First-Aid Measures

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Immediate first aid treatment reduces the health effects of this substance.

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:
DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

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 combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Can react with metals to release flammable hydrogen gas.

Explosion:
Contact with oxidizable substances may cause extremely violent combustion. Containers may explode when involved in a fire.

Fire Extinguishing Media:
Use water, however, the decomposing material will form a hot viscous foam and caution should be exercised against the possibility of a steam explosion. Neutralize with soda ash or slaked lime.

Special Information:
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. Structural firefighter's protective clothing is ineffective for fires involving hydrochloric acid. Stay away from ends of tanks. Cool tanks with water spray until well after fire is out.

Section 6: Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! 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.

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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. 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.

Section 8: Exposure Controls/ Personal Protection

Airborne Exposure Limits:

Hydrochloric Acid
-OSHA Permissible Exposure Limit (PEL):
5 ppm Ceiling
-ACGIH Threshold Limit Value (TLV):
5 ppm Ceiling

Chromium Trioxide
0.005 mg/m3 (TWA). - ACGIH Threshold Limit Value (TLV):
For water-soluble Cr(VI) compounds, as Cr = 0.05 mg/m3
(TWA), A1 - confirmed human carcinogen

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, a half-face dust/mist respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece dust/mist respirator 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.

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Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, 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:
Redish fuming liquid.
Odor:
Pungent odor of hydrogen chloride.
Solubility:
Soluble.
Specific Gravity:
1.3
pH:
1.0 (0.1M solution)
% Volatiles by volume No information found.
Boiling Point:
No information found.
Melting Point:
No information found.
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. Containers may burst when heated.
Hazardous Decomposition Products:
When heated to decomposition, emits toxic hydrogen chloride fumes and will react with water or steam to produce heat and toxic and corrosive fumes. Burning may produce chrome oxides. Thermal oxidative decomposition produces toxic chlorine fumes and explosive hydrogen gas.
Hazardous Polymerization:
Will not occur.

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Incompatibilities:
Any combustible, organic or other readily oxidizable material (paper, wood, sulfur, aluminum or plastics). Incompatible with arsenic, ammonia gas, hydrogen sulfide, phosphorus potassium; sodium and selenium will produce incandescence. Corrosive to metals. Incompatible with mineral acid, cyanides, sulfides, sulfites, and formaldehyde.

Conditions to Avoid:
Light, heat and contact with combustible or organic materials, incompatibles..

Section 11: Toxicological Information

Chromium Trioxide: Oral rat LD50: 80 mg/kg. LC50 Inhalation - rat - 4 h - 21.7 mg/m3; LD50 Dermal - rabbit - 57 mg/kg. Investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Hydrogen Chloride (7647-01-0)	No	No	3
Chromium trioxide (1333-82-0)	Yes	No	1
Water (7732-18-5)	No	No	None

Section 12: Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into water, this material is not expected to evaporate significantly. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.
Environmental Toxicity:
This material is expected to be toxic to aquatic life.

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.

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Section 14: Transportation Information

Domestic (Land, D.O.T.)

Proper Shipping Name: CORROSIVE LIQUID, OXIDIZING, N.O.S. (HYDROCHLORIC ACID, CHROMIUM TRIOIXDE, MIXTURE)
Hazard Class: 8 (5.1)
UN/NA: UN3093
Packing Group: II

International (Water, I.M.O.)

Proper Shipping Name: CORROSIVE LIQUID, OXIDIZING, N.O.S. (HYDROCHLORIC ACID, CHROMIUM TRIOIXDE, MIXTURE)
Hazard Class: 8 (5.1)
UN/NA: UN3093
Packing Group: II

Section 15: Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
Hydrogen Chloride (7647-01-0)	Yes	Yes	Yes	Yes
Chromium Trioxide (1333-82-0)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

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

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Hydrogen Chloride (7647-01-0)	Yes	Yes	No	Yes
Chromium Trioxide (1333-82-0)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

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

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Hydrogen Chloride (7647-01-0)	500	500	Yes	No
Chromium Trioxide (1333-82-0)	No	No	No	Chromium com
Water (7732-18-5)	No	No	No	No

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

-RCRA- -TSCA-

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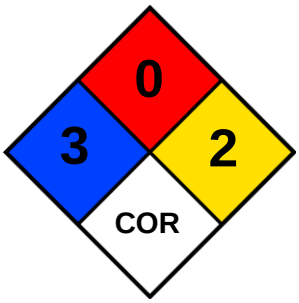
Ingredient	CERCLA	261.33	8(d)
Hydrogen Chloride (7647-01-0)	5000	No	No
Chromium Trioxide (1333-82-0)	No	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: Yes (Mixture / Liquid)

Australian Hazchem Code: 2R, 2W
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 swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.

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Product Use:
Laboratory Reagent.

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