

Section 1: Identification

MANUFACTURER: PACE Technologies
 3601 E. 34th St.
 Tucson, AZ 85713

INFORMATION PHONE: 520-882-6598

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

TRADE NAME: Ralph's ferritic stainless steel etchant


CHEMICAL FAMILY: Flammable liquids, Corrosive, n.o.s. (Denatured alcohol, ferric chloride mixture)

HMIS RATING: HEALTH: 3 FLAMMABILITY: 3 REACTIVITY: 1

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)	Flammable liquids (Category 2), H225 Oxidizing liquids (Category 3), H272 Corrosive to metals (Category 1), H290 Acute toxicity, Oral (Category 4), H302 Acute toxicity, Dermal (Category 4), H312 Skin corrosion (Category 2), H315 Serious eye damage (Category 1), H318 Specific target organ toxicity - single exposure (Category 1), H370 Acute aquatic toxicity (Category 2), H401
PICTOGRAM(s):	
SIGNAL WORD:	Danger
HAZARD STATEMENTS:	Hazard Statement(s): H225 Highly Flammable liquid and vapor

Safety Data Sheet

Ralph's Reagent for Ferritic Stainless Steel

	H272 - May intensify fire; oxidizer H290 - May be corrosive to metals H302- Harmful if swallowed H312 - Harmful in contact with skin H315-Causes skin irritation H318 - Causes serious eye damage H370- Causes damage to organs H401-Acute aquatic toxicity
PRECAUTIONARY STATEMENTS:	<p>Precautionary Statement(s):</p> <p>Preventions: P210-Keep away from heat/sparks/open flames/hot surfaces. — No smoking. P233- Keep container tightly closed. P234- Keep only in original container. P240- Ground/bond container and receiving equipment. P241- Use explosion-proof electrical/ventilating/lighting/equipment. P242- Use only non-sparking tools. P243- Take precautionary measures against static discharge. P260- Do not breathe P264- Wash skin thoroughly after handling. P270- Do not eat, drink or smoke when using this product. P280- Wear protective gloves/protective clothing/eye</p> <p>Response: P301+312- IF SWALLOWED: call a POISON CENTER or doctor/physician IF you feel unwell. P302+352- IF ON SKIN: wash with plenty of soap and water. P303+ P361+P353- IF ON SKIN (or hair): Remove/Take off Immediately all contaminated clothing. Rinse SKIN with water/shower. P305+P351+P338- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P307+P311- IF exposed: call a POISON CENTER or doctor/physician. P310- Immediately call a POISON CENTER or doctor/physician. P312- Call a POISON CENTER or doctor/physician if you feel unwell. P322- Specific treatment (see first-aid instructions). P330- Rinse mouth. P332+P313-IF SKIN irritation occurs: Get medical advice/attention. P362-Take off contaminated clothing and wash before reuse. P363- Wash contaminated clothing before reuse. P370+P378- In case of fire: Use dry chemical, CO2 or appropriate foam for extinction. P390- Absorb spillage to prevent material damage.</p> <p>Storage: P403+P235- Store in a well-ventilated place. Keep cool. P405- Store locked up. P406- Store in corrosive resistant/... container with a resistant inner liner.</p> <p>Disposal: P501- Dispose of contents/container to Federal, State and Local Regulations. Incinerate under approved controlled conditions, using incinerators suitable for the disposal of flammable organics.</p>

Emergency Overview

POISON! DANGER! MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. VAPOR HARMFUL. FLAMMABLE! AFFECTS

CENTRAL NERVOUS SYSTEM. MAY CAUSE BLINDNESS. CANNOT BE MADE NONPOISONOUS. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. MAY AFFECT LIVER, BLOOD, REPRODUCTIVE SYSTEM.

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

Health Rating: 3 - Severe (Poison)

Flammability Rating: 3 - Severe (Flammable)

Reactivity Rating: 2 - Moderate

Contact Rating: 4 - Extreme (Corrosive)

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

Storage Color Code: Red (Flammable) , White (Corrosive)

Potential Health Effects

Inhalation:

Copper Chloride - Causes irritation to respiratory tract, symptoms may include coughing, sore throat, and shortness of breath. May result in ulceration and perforation of respiratory tract.

When heated, this compound may give off copper fume, which can cause symptoms similar to the common cold, including chills and stuffiness of the head.

Ferric Chloride - 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.

Denatured Alcohol - Exposure may cause irritation to the mucous membranes of the upper respiratory tract. Prolonged exposures to high concentrations may cause drowsiness, loss of appetite and inability to concentrate.

Hydrogen Chloride Acid- - Corrosive. Effects should be less severe than from exposure to higher concentrations where symptoms may include irritation of the nose and throat, labored breathing, as well as lung edema, damage to the mucous membranes and upper respiratory tract.

Ingestion:

Copper Chloride - May cause burning pain in the mouth, esophagus, and stomach. Hemorrhagic gastritis, nausea, vomiting, abdominal pain, metallic taste, and diarrhea may occur. If vomiting does not occur immediately systemic copper poisoning may occur. Symptoms may include capillary damage, headache, cold sweat, weak pulse, kidney and liver damage, central nervous excitation followed by depression, jaundice, convulsions, blood effects, paralysis and coma. Death may occur from shock or renal failure.

Ferric Chloride - Corrosive. Swallowing can cause severe burns of the mouth, throat, and stomach. Can cause sore throat, vomiting, diarrhea. Low toxicity in small quantities but larger doses (30 mg/kg) may cause nausea, vomiting and diarrhea. Pink urine discoloration is a strong

indicator of iron poisoning. Liver damage, coma and death may follow, sometimes delayed as long as three days.

Denatured Alcohol - Cause headaches, gastritis, intoxication, blindness and, in acute cases, death.

Hydrogen Chloride Acid- Corrosive. Effects should be less severe than from exposure to higher concentrations where symptoms may include severe burns of the mouth, throat, and stomach, leading to death.

Skin Contact:

Copper Chloride - Causes irritation, redness, and pain. Some individuals may develop copper allergies.

Ferric Chloride - Corrosive. Symptoms of redness, pain, and severe burn can occur.

Denatured Alcohol - Causes skin irritation, cracking or flaking due to dehydration and defatting action.

Hydrogen Chloride Acid- Corrosive. Effects should be less severe than from exposure to higher concentrations where symptoms may include redness, pain, and burns to the skin.

Eye Contact:

Copper Chloride - Causes severe irritation with symptoms of redness, pain, blurred vision, discoloration, and possible eye damage.

Ferric Chloride - Corrosive. Contact can cause blurred vision, redness, pain and severe tissue burns.

Denatured Alcohol - Can cause eye irritation. Splashes may cause temporary pain and blurred vision.

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

Chronic Exposure:

Copper Chloride - Prolonged or repeated skin exposure may cause dermatitis. Prolonged or repeated exposure to dusts of copper salts may cause discoloration of the skin or hair, blood and liver damage, ulceration and perforation of the nasal septum, runny nose, metallic taste, and atrophic changes and irritation of the mucous membranes.

Ferric Chloride - Repeated ingestion may cause liver damage. Prolonged exposure of the eyes may cause discoloration.

Denatured Alcohol - Prolonged skin contact causes drying and cracking of skin. May affect the nervous system. May affect liver, blood, reproductive system. Continued ingestion of small amounts could result in blindness.

Hydrogen Chloride Acid- 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.

Aggravation of Pre-existing Conditions:

Copper Chloride - Persons with pre-existing skin disorders, impaired liver, kidney, or pulmonary function, glucose 6-phosphate-dehydrogenase deficiency, or pre-existing Wilson's disease may be more susceptible to the effects of this material.

Ferric Chloride - No information found.

Denatured Alcohol - Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance.

Hydrogen Chloride Acid- Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

Section 3: Composition/Information on Ingredients

HAZARD INGREDIENTS

CHEMICAL	CAS NUMBER	% PRESENT	Hazardous
Ethyl Alcohol	64-17-5	35-55	Yes
Ferric Chloride	7705-08-0	1-5	Yes
Copper (II) chloride	7447-39-4	0.5-1.5	Yes
Hydrogen Chloride	7647-01-0	20-30	Yes
DI Water	7732-18-5	20-30	No
Methyl Alcohol	67-56-1	0-5	Yes
Isopropyl Alcohol	67-63-0	0-2	Yes

Section 4: First-Aid Measures

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. Never give anything by mouth to an unconscious person.

Skin Contact:

In case of contact, wipe off excess material from skin then immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. Call a physician.

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:

Flash point: 25C CC

Autoignition temperature: 422C (792F)

Flammable limits in air % by volume:

lcl: 3.3; ucl: 19

Flammable liquid and vapor!

Dangerous fire hazard when exposed to heat or flame.

Explosion:

Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Sealed containers may rupture when heated. Sensitive to static discharge.

Fire Extinguishing Media:

Water spray, dry chemical, alcohol foam, or carbon dioxide. Water may be ineffective.

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.

Water spray can be used to extinguish fires and cool fire-exposed containers. Water may be used to flush spills away from exposures and to dilute spills to non-flammable mixtures.

Section 6: Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. 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. Use non-sparking tools and equipment. Collect liquid in an appropriate container or 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.

Section 7: Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment,

including explosion proof ventilation. 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 (Copper Chloride):

-OSHA Permissible Exposure Limit (PEL):

1 mg/m³ (TWA) for copper dusts & mists as Cu

-ACGIH Threshold Limit Value (TLV):

1 mg/m³ (TWA) for copper dusts & mists as Cu

Airborne Exposure Limits (Ferric Chloride):

-ACGIH Threshold Limit Value (TLV):

1 mg/m³ (TWA) soluble iron salt as Fe

Airborne Exposure Limits (Denatured Alcohol):

- OSHA Permissible Exposure Limit (PEL):

1000 ppm (TWA) for ethyl alcohol

400 ppm (TWA) for isopropyl alcohol

200 ppm (TWA) for methyl alcohol

- ACGIH Threshold Limit Value (TLV):

1000 ppm (TWA), A4 - not classifiable as a human carcinogen for ethyl alcohol

200 ppm (TWA), 400 ppm (STEL), A4 - not classifiable as a human carcinogen for isopropyl alcohol
200 ppm (TWA), 250 ppm (STEL) skin, for methyl alcohol

Airborne Exposure Limits: (For Nitric Acid):

OSHA Permissible Exposure Limit (PEL):

2 ppm (TWA)

ACGIH Threshold Limit Value (TLV):

2 ppm (TWA); 4 ppm (STEL)

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 half facepiece particulate respirator (NIOSH type N95 or better filters) 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 particulate respirator (NIOSH type N100 filters) 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. If oil

particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. 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:

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 full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Section 9: Physical and Chemical Properties

Appearance:

Reddish color.

Odor:

Mild pleasant whiskey-like odor with slight odor of hydrochloric acid.

Solubility:

Miscible in water.

Specific Gravity:

0.8-0.9

pH: No information found.

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

>90%

Boiling Point:

78C (172F) (ethanol)

Melting Point:

-114C (-173F) (ethanol)

Vapor Density (Air=1):

1.6 (ethanol)

Vapor Pressure (mm Hg):

40 @ 19C (66F) (ethanol)

Evaporation Rate (BuAc=1):

ca. 1.4 (CCl4=1) (ethanol)

Section 10: Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Oxides of the contained metal and halogen, possibly also free, or ionic halogen. Emits toxic fumes of chloride when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Copper Chloride-Potassium, sodium, hydrazine, nitromethane, aluminum, strong oxidizers, acetylene, and sodium hypobromite. Corrosive to aluminum; on contact with acids it may release toxic chloride fumes.

Ferric Chloride- Metals, allyl chloride, sodium, potassium. Will react with water to produce toxic and corrosive fumes.

-Denatured Alcohol – Strong oxidants, silver salts, acid chlorides, alkali metals, metal hydrides, hydrazine, and many other substances.

Conditions to Avoid:

Product is used for etching metals, take precaution when using in conjunction with incompatibles.

Avoid heat, flames, ignition sources.

Section 11: Toxicological Information

Copper Chloride - Oral rat LD50: 584 mg/kg; investigated as a mutagen.
 (data for anhydrous material)

-----\Cancer Lists\-----			
---NTP Carcinogen---			
Ingredient	Known	Anticipated	IARC Category
Copper Chloride (7447-39-4)	No	No	None
Ferric Chloride (7705-08-0)	No	No	None
Hydrogen Chloride (7647-01-0)	No	No	3
Water (7732-18-5)	No	No	None

Ethyl alcohol: oral rat LD50: 7060 mg/kg; inhalation rat LC50: 20,000 ppm/10H; Irritation data, eye, rabbit: 500 mg/24H moderate; Investigated as a tumorigen, mutagen, reproductive effector. Methyl alcohol: oral rat LD50: 5628 mg/kg; inhalation rat LC50: 64000 ppm/4H; skin rabbit LD50: 15800 mg/kg; Irritation data, skin, rabbit: 20 mg/24H, Moderate; Investigated as a tumorigen, mutagen, reproductive effector. Isopropyl alcohol: oral rat LD50: 5045 mg/kg; skin rabbit LD50: 12.8 gm/kg; inhalation, rat: 16,000 ppm 8 hr. Investigated as a mutagen, tumorigen, reproductive effector.

Reproductive Toxicity:

Ethanol has been linked to birth defects in humans.

Carcinogenicity:

Ethanol has been linked to cancer in humans. Chronic ethanol ingestion is associated with liver

cancer. Most industrial ethanol contains denaturants that render it undesirable to drink.

Section 12: Ecological Information

Environmental Fate:

Following data for ethanol: When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into water, this material is expected to readily biodegrade. When released into water, this material may evaporate to a moderate extent. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to be readily removed from the atmosphere by dry and wet deposition. When released into the air, this material is expected to have a half-life between 1 and 10 days.

Following data for copper chloride: When released into the soil, this material is not expected to biodegrade. When released into the soil, this material may leach into groundwater. When released into water, this material is not expected to biodegrade. When released into water, this material is not expected to evaporate significantly. This material is expected to significantly bioaccumulate. This material has an experimentally-determined bioconcentration factor (BCF) of greater than 100. Bioaccumulation data for copper.

Environmental Toxicity:

Following data for ethanol: This material is expected to be very toxic to aquatic life. The LC50/96-hour values for fish are less than 1 mg/l. The IC50/72-hour values for algae are less than 1 mg/l. Toxicity data for copper.

Following data for copper chloride: This material is not expected to be toxic to aquatic life. The LC50/96-hour values for fish are over 100 mg/l.

Following data for ferric chloride:

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 handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility.

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: FLAMMABLE LIQUIDS, CORROSIVE, N.O.S. (Denatured alcohol, ferric chloride mixture)
Hazard Class: 3,8
UN/NA: UN 2924
Packing Group: II
Label Codes: 3,8
 Limited Quantity Shipment <1 L

NMFC: 45615-11
 Shipping Class CL125

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

Proper Shipping Name: FLAMMABLE LIQUIDS, CORROSIVE, N.O.S. (Denatured alcohol, ferric chloride mixture)
Hazard Class: 3,8
UN/NA: UN 2924
Packing Group: II
Label Codes: 3,8

Section 15: Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
Ferric Chloride (7705-08-0)	Yes	Yes	Yes	Yes
Copper Chloride (7447-39-4)	Yes	Yes	Yes	Yes
Hydrogen Chloride (7647-01-0)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes
Ethyl Alcohol (64-17-5)	Yes	Yes	Yes	Yes
Methyl Alcohol (67-56-1)	Yes	Yes	Yes	Yes
Isopropyl Alcohol (67-63-0)	Yes	Yes	Yes	Yes

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

	--Canada--			
Ingredient	Korea	DSL	NDSL	Phil.

Safety Data Sheet

Ralph's Reagent for Ferritic Stainless Steel

Ferric Chloride (7705-08-0)	Yes	Yes	No	Yes
Copper Chloride (7447-39-4)	Yes	Yes	No	Yes
Hydrogen Chloride (7647-01-0)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes
Ethyl Alcohol (64-17-5)	Yes	Yes	No	Yes
Methyl Alcohol (67-56-1)	Yes	Yes	No	Yes
Isopropyl Alcohol (67-63-0)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----				
Ingredient	-SARA 302-		-----SARA 313-----	
	RQ	TPQ	List	Chemical Catg.
Ferric Chloride (7705-08-0)	No	No	No	No
Copper Chloride (7447-39-4)	No	No	No	Copper compo
Hydrogen Chloride (7647-01-0)	5000	500*	Yes	No
Water (7732-18-5)	No	No	No	No
Ethyl Alcohol (64-17-5)	No	No	No	No
Methyl Alcohol (67-56-1)	No	No	Yes	No
Isopropyl Alcohol (67-63-0)	No	No	Yes	No

-----\Federal, State & International Regulations - Part 2\-----			
Ingredient	CERCLA	-RCRA-	-TSCA-
		261.33	8 (d)
Ferric Chloride (7705-08-0)	1000	No	No
Copper Chloride (7447-39-4)	10	No	No
Hydrogen Chloride (7647-01-0)	5000	No	No
Water (7732-18-5)	No	No	No
Ethyl Alcohol (64-17-5)	No	No	No
Methyl Alcohol (67-56-1)	5000	U154	No
Isopropyl Alcohol (67-63-0)	No	No	No

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

Australian Hazchem Code: 2[S]E , 2Z, 2R, 2PE

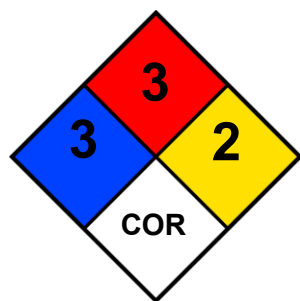
Poison Schedule: S5, S6

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: 3 – Severe Hazard

Left, Health Hazard: 3 – Severe Hazard

Right, Reactivity: 2 – Moderate Hazard

Bottom, Special Notice: COR – Corrosive

Label First Aid:

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 case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. In all cases call a physician.

Product Use:

Laboratory Reagent.

Disclaimer:

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