Multi-Etch®

The Non-Acid Etching Alternative for Titanium and Other Metals

Safety

Multi-Etch® solution is crystal clear — it looks like water! All containers that are used to hold Multi-Etch® should be marked as poison. Dispense only into plastic containers. **Do not store in glass or metal containers!** Provide positive ventilation, eye and skin protection! See FIRST AID INSTRUCTIONS.

FIRST AID INSTRUCTIONS

SWALLOWING: Call a poison center or physician if feeling unwell. Rinse mouth.
*Do **NOT** induct vomiting.*
SKIN CONTACT: Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and was before reuse.
INHALATION: Remove to fresh air and keep at rest in a position comfortable for breathing. Call a poison center or physician if feeling unwell.
EYE CONTACT: Rinse cautiously with water for several minutes. If wearing contact lenses, remove if possible. Continue rinsing. If irritation persists, seek medical attention.

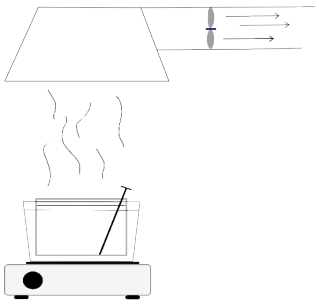
Further safety information is contained in the enclosed safety data sheets (SDS) for dry and liquid forms of Multi-Etch®.

24-HOUR EMERGENCY HOTLINE: (800)535-5053 US & Canada

The following instructions are for titanium. For other metals, see the enclosed chart.

EQUIPMENT NEEDED

1. A simple fume hood with exhaust fan is required for etching indoors. You can etch outdoors but power for the heat source is needed. A diagram of a suitable set-up is pictured below. Make sure there is enough clearance between the heated solution and the fume hood to dip and remove your metal.



2. A pickle pot OR all of the following:
    a. Basic hot plate
    b. Metal pan (filled partially with water)
    c. Plastic bowl to float in metal pan

3. Probe-type thermometer with a range up to 210°F (non-metallic)

4. A plastic container with lid to mix up and hold solution. The container should be a minimum volume of one gallon (3.78L) in order to have room for mixing. **Metal or Glass containers should NOT be used** as the solution will etch them.

5. Plastic stirrer

6. Plastic strainer, preferably with a handle for bulk etching.

7. Distilled water

Etching Titanium for Anodizing

Note: **You MUST mix up the entire unit**--you cannot mix smaller amounts of Multi-Etch® and have it be effective. Ideally, allow to sit overnight after mixing but it can be used right away. Shake well before using. Once the unit is mixed, if unused, it has a shelf life of at least 8 months. Pour out only as much as you need for the task at hand, leaving the rest unadulterated. One unit of Multi-Etch® will effectively clean at least 1,500 square inches of titanium with an etching time of 7-10 seconds at 125-150°F. Do not return used Multi-Etch® to original container; store separately in a sealed plastic container.

Heated or Unheated?

Heating the solution of Multi-Etch® is the most effective and quickest way to etch but using Multi-Etch® unheated is a lot simpler as you don't need to heat it after the first initial heating. Unheated working uses double strength Multi-Etch®. Mix the entire unit of Multi-Etch® with 1/2 gallon (1.89L) of distilled (or deionized) water and heat the entire bath one time and allow to cool. Mark the storage container "double strength" and "POISON" and use it as is at room temperature (70˚F). For hot working, add one gallon (3.78L) of distilled water to make regular strength and follow the hot working procedures. It is best to have your anodizing station ready to go before etching.

How is Surface texture affected?

Multi-Etch® will maintain whatever texture--from polished to matte-- you apply providing you do not etch too long. Longer etching times will remove the surface texture, but Multi-Etch® never "bites" as much as hydrofluoric acid.

PRE-CLEANING

Any grease or oil must first be washed off the metal. Simple Green® works well--spray on and rinse off. If the metal is very greasy, consider heating up the Simple Green. It works especially well in a heated ultrasonic. Always rinse thoroughly in distilled water before etching.

SET UP AND MIXING

Fill a rinse container with distilled water and place near the etching station. For optimum safety, wear eye protection and rubber gloves. Cut open the pouch of Multi-Etch® powder and slowly pour the ENTIRE contents into a plastic holding container. If you received your Multi-Etch® in a bottle you can use it for mixing-just add ½ or 1 gallon distilled or deionized water.

Slowly pour in 1/2 gallon (1.89L) or 1 gallon (3.78L) of distilled/deionized water. Stir with a plastic stirrer. Pour this into your plastic bowl. Place bowl into partially water filled metal container and put both on the hot plate. You can also heat in a pickle pot if you have one available. Note: Do **NOT** use any crock pots that have a Teflon lining. Heat to 150ºF one time for about 10 minutes. Allow to cool if using at room temperature. Return to storage bottle. If using heated, see Hot Work Procedures.

NOTE: **You must use the complete amount of powder in the packet; do not attempt to measure out smaller portions.**

MARK ALL CONTAINERS: POISON

UNHEATED WORKING PROCEDURES

All etching times are approximate and can vary according to the grade (chemical composition) of the metal, age of the solution and the desired effect.

ETCHING

Pour out only as much Multi-Etch® as you need for the task at hand.
After degreasing your metal place in an all plastic basket or stir with a plastic stirrer throughout the etching process so the metal does not sit still. You could also use something that vibrates the bath continuously during the etching process. Etch for at least 10 minutes. After etching, put the piece into the rinse container, then into your anodizing bath.

Apply a 5 volt color (a base coat) to the titanium which will stabilize/seal the surface and allow you to put the piece aside for more detailed coloring after the etching session. Rinse in distilled water, then dry. Years later it will still color beautifully. Base-coating is necessary for titanium only. This works great for preparing quantities of titanium to be anodized with higher voltages later. Practice on scrap first to make sure you get the colors you want. Store used etch in a separate heavy plastic container and reuse until spent.

HOT WORKING PROCEDURES

All etching times are approximate. The times can vary according to the grade (chemical composition) of the metal, temperature of the solution, age of the solution (including how long it has been heated) and the desired effect.

HEATING

Turn on the exhaust fan. Shake or stir contents of the stored Multi-Etch. When the undissolved powder is suspended, pour the necessary amount into the pickle pot or plastic container in which you will heat the solution. Heat only as much solution as you think you'll need for one session; more solution can be added as needed upon evaporation. Heat to 125-150°F and maintain that temperature until you have finished etching. Higher temperature will shorten the effective life of the solution. A pickle pot automatically maintains the correct temperature.

For fresh, unused Multi-Etch, another method to indicate when the proper temperature is reached is to look for the fine bubbles that come to the surface of the Multi-Etch®--when you see the bubbles, it's ready. After 10 minutes or so, the bubbles disappear but the etchant is still effective. Bubbles will not appear upon subsequent reheating, but the etch will still work.

Submerge your metal into the heated solution and count from 7-10 while moving the metal. After etching, put the piece into the rinse container, then into your anodizing bath. Do not expose to air for prolonged periods between baths.

Apply a 5 volt color (a base coat) to the titanium which will stabilize/seal the surface and allow you to put the piece aside for more detailed coloring after the etching session. Rinse in distilled water, then dry. Years later it will still color beautifully. Base-coating is necessary for titanium only. This works great for preparing quantities of titanium to be anodized with higher voltages later. Practice on scrap first to make sure you get the colors you want. Store used etch in a separate heavy plastic container and reuse until spent.

COLOR REMOVAL

Titanium

Removing color with Multi-Etch works much faster using regular strength Multi-Etch heated to 120-150ºF.

If you simply went past the target color you can dip the piece in heated Multi-Etch and it will work backward through the colors. Be sure to rinse as soon as you see the color you want.

If the color is uneven and you want to start over, etch time will be longer than when you etched the raw metal. Just keep etching until the color disappears.

Etch times for erasing high voltage colors will be longer than erasing low voltage colors.

For regular strength heated Multi-Etch, removing high voltage colors will take about 1.5 - 3 minutes.

For double strength room temperature Multi-Etch (that has previously been heated 120-150ºF one time), erasing high voltage colors will take about 15 minutes. The time can be reduced to about 5 minutes in unused double strength solution that is at least several months old.

Niobium

Erasing high voltage colors will take about 10 minutes in regular strength Multi-Etch heated to 120-150ºF.

Room temperature Multi-Etch, even if it has been heated one time, will take days to remove color from niobium.

DISPOSAL

Dispose of contents/container in accordance with local/regional/national/international regulations.

More information available at: www.multietch.com/multietch-resources

Rev. 11 November 2019

Multi-Etch® Effects on Multiple Metals

Multi-Etch® was originally developed for use on titanium but it was also found to be effective on other metals.
Note: below are etching times; for recommended titanium anodizing times, see preparing for anodizing.

All tests were conducted with fresh Multi-Etch heated to 135°F

Metal	Etch Time (minutes)	Etch Depth N/C = No Change	Surface change	Notes
Aluminum	3	.0005”	Bright/semi-polished	
Brass	15 188	.004” .050	Granular	
Copper (see also PMC copper below)	15 94	.008” .050	Granular	
Gold (14KY)	3	N/C	N/C	Note 4
Hafnium	3	N/C	Frosted/matte grey	
Magnesium	3	.001”	Chalky white smut	
Meteorite (Gibeon)	3	.002”	Crystal grain revealed; black smut. Leaving in longer will make the crystal grain more pronounced.	Note 6
Mokume, Ti + Nb	5	Variable	Patterns revealed by various depths	Note 7
Nickel	5	0.00025	Matte	
Niobium	3	N/C	N/C	Note 1,4
Palladium	3	N/C	N/C	Note 4
Pewter	15 375	.002” .050		
Platinum	3	N/C	N/C	Note 2, 4
PMC Bronze	3	0.0025	Brightened; no smut	

Multi-Etch® Effects on Multiple Metals

Metal	Etch Time (minutes)	Etch Depth N/C = No Change	Surface change	Notes
PMC Copper	3	.002”	Frosted; dark brown smut	
PMC Fast Bronze	3	.003”	Crystalized surface	
Rhodium	1	N/C	N/C	Note 9
Silver (925)	3	N/C	Slightly frosted	Note 4, 8
Stainless steel	3	.001”	Frosted with dark grey smut	
Tantalum	3	N/C	N/C	Note 1,4
Titanium--6/4--grade 5 (aircraft grade)	5	.0005”	Brightened/matte	Note 5
Titanium--CP--grade 2	5-20 seconds 15 150	not measurable .005” .050	See Note 3	Note 3
Tool steel (01)	15 94	.008” .050	Frosted finish	
Zinc	3	.0005”	Black smut	
Zirconium	15 250	.003” .050		

Note 1

Niobium and Tantalum: Multi-Etch can be used to erase anodizing “mistakes” on these two metals. If high voltage colors, i.e., turquoise-green, need to be removed, etch times can be between 15 minutes to one hour.

These metals normally anodize without the need to use ME. However, occasionally these metals arrive from the mill with oxides that can alter the brilliance of anodized colors. When that is the case, you can pre-etch these metals in order to achieve the normally brilliant colors. Etch times in these cases will vary depending on the thickness of these “mill oxides.”

Multi-Etch® Effects on Multiple Metals

Note 2
Platinum: Although ME will not etch platinum, it can be used to remove all steel ions prior to welding or soldering. Rather than using the standard protocols involving a 15 minute dip in nitric acid, a 15 *second* dip in Multi-Etch at 135ºF is just as effective.

Note 3
Titanium, CP grade 2: Preparing titanium for brilliant anodization requires just a 5-20 second dip. The surface finish whether polished, matte, etc. will be maintained as long as the etch time is less than 20 seconds. Longer etch times will tend to change polished finishes to matte. After five minutes, the finish starts to trend to polished.

Erasing anodizing "mistakes" takes 30 seconds to two minutes depending on the color (thickness of the oxide.) Low voltage colors take less time to remove than high voltage colors.

Note 4
Using Multi-Etch to remove broken drill bits: For gold, niobium, palladium, platinum, silver, and tantalum, dip the piece in Multi-Etch for approximately 3 minutes to remove enough of the drill bit so that it can be picked out. Leave in longer to dissolve the whole drill bit.

Note 5
Titanium, 6/4--grade 5 (aircraft grade): Generally 6/4 does not need any chemical preparation other than degreasing in order to achieve good anodized color but this can vary depending on whether or not there are stubborn oxides left from mill processing.

Note 6
Meteorite: The combinations of different metals enables Multi-Etch to reveal the crystals called Widmanstätten structures.

Note 7
Mokume: Different etch rates of metals used in mokume accounts for the pattern enhancement. Also works well with copper-based mokume; will not etch precious metals.

Note 8
Silver: Removes light fire scale on silver

Note 9
Rhodium: Removes iron contamination without removing any rhodium ions.

Safety Data Sheet
Multi-Etch

SDS Revision Date: **03/10/2015**

1. Identification

1.1. Product identifier

Product Identity Multi-Etch

Alternate Names Multi-Etch

1.2. Relevant identified uses of the substance or mixture and uses advised against

Intended use See Technical Data Sheet.

Application Method See Technical Data Sheet.

1.3. Details of the supplier of the safety data sheet

Company Name

Exotica Jewelry
PO Box 9
Clarkdale, AZ 86324

Emergency

CHEMTREC (USA) (800) 424-9300

24 hour Emergency Telephone No. 1-800-535-5053 (24-hour)

Customer Service: Exotica Jewelry

2. Hazard(s) identification

2.1. Classification of the substance or mixture

Ox. Sol. 3;H272	May intensify fire; oxidizer.
Acute Tox. 4;H302	Harmful if swallowed.
Acute Tox. 5;H313	May be harmful in contact with skin. (Not adopted by US OSHA)
Acute Tox. 4;H332	Harmful if inhaled.
Skin Irrit. 2;H315	Causes skin irritation.
Eye Irrit. 2;H319	Causes serious eye irritation.
Skin Sens. 1;H317	May cause an allergic skin reaction.
Resp. Sens. 1;H334	May cause allergy or asthma symptoms of breathing difficulties if inhaled.
STOT SE 3;H335	May cause respiratory irritation.

2.2. Label elements

Using the Toxicity Data listed in section 11 and 12 the product is labeled as follows.

Danger

H272 May intensify fire; oxidizer.
H302 Harmful if swallowed.
H313 May be harmful in contact with skin.
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.
H332 Harmful if inhaled.
H334 May cause allergic or asthmatic symptoms or breathing difficulties if inhaled.
H335 May cause respiratory irritation.

[Prevention]:

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.
P261 Avoid breathing dust / fume / gas / mist / vapors / spray.
P264 Wash 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.
P280 Wear protective gloves / eye protection / face protection.

[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.
P304+340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305+351+338 IF IN EYES: Rinse continuously with water for several minutes. Remove contact lenses if present and easy to do - continue rinsing.
P313 Get medical advice / attention.
P321 Specific treatment (see information on this label).
P330 Rinse mouth.
P333+313 If skin irritation or a rash occurs: Get medical advice / attention.
P337+313 If eye irritation persists: Get medical advice / attention.
P341 If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing.
P342+311 If experiencing respiratory symptoms: Call a POISON CENTER or doctor / physician.
P362 Take off contaminated clothing and wash before reuse.
P363 Wash contaminated clothing before reuse.
P370+378 In case of fire: Use extinguishing media listed in section 5 of SDS for extinction.

[Storage]:

P403+233 Store in a well ventilated place. Keep container tightly closed.
P405 Store locked up.

[Disposal]:

P501 Dispose of contents / container in accordance with local / national regulations.

3. Composition/information on ingredients

This product contains the following substances that present a hazard within the meaning of the relevant State and Federal Hazardous Substances regulations.

Ingredient/Chemical Designations	Weight %	GHS Classification	Notes
Ammonium persulphate **CAS Number: 0007727-54-0**	**75 - 100**	**Ox. Sol. 3;H272** **Acute Tox. 4;H302** **Eye Irrit. 2;H319** **STOT SE 3;H335** **Skin Irrit. 2;H315** **Resp. Sens. 1;H334** **Skin Sens. 1;H317**	**[1]**
Sodium fluoride **CAS Number: 0007681-49-4**	**10 - 25**	**Acute Tox. 3;H301** **Eye Irrit. 2;H319** **Skin Irrit. 2;H315**	**[1][2]**

In accordance with paragraph (i) of §1910.1200, the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.
[1] Substance classified with a health or environmental hazard.
[2] Substance with a workplace exposure limit.
[3] PBT-substance or vPvB-substance.
*The full texts of the phrases are shown in Section 16.

4. First aid measures

4.1. Description of first aid measures

General In all cases of doubt, or when symptoms persist, seek medical attention.
Never give anything by mouth to an unconscious person.

Inhalation Remove to fresh air, keep patient warm and at rest. If breathing is irregular or stopped, give artificial respiration. If unconscious place in the recovery position and obtain immediate medical attention. Give nothing by mouth.

Eyes Irrigate copiously with clean water for at least 15 minutes, holding the eyelids apart and seek medical attention.

Skin Remove contaminated clothing. Wash skin thoroughly with soap and water or use a recognized skin cleanser.

Ingestion Drink 1-2 glasses of milk or water and rinse mouth well. Do not induce vomiting. Never give anything by mouth to an unconscious person. Obtain immediate medical attention.

4.2. Most important symptoms and effects, both acute and delayed

Overview Ingestion: Moderate oral toxicity.
Eye Contact: May cause irritation.
Inhalation: May cause difficulty in breathing for sensitive persons.
Skin: May cause irritation.
This product has moderate oral toxicity and is minimally irritating to the eyes. Flooding of exposed areas with water is suggested, but gastric lavage or emesis induction for ingestions must consider the possible aggravation of esophageal injury and the expected absence of systemic effects. Treatment is controlled removal of exposure followed by symptomatic and supportive care. See section 2 for further details.

Inhalation	Harmful if inhaled. May cause allergy or asthma symptoms of breathing difficulties if inhaled.
Eyes	Causes serious eye irritation.
Skin	May be harmful in contact with skin. May cause an allergic skin reaction. Causes skin irritation.
Ingestion	Harmful if swallowed.

5. Fire-fighting measures

5.1. Extinguishing media

Deluge with water

5.2. Special hazards arising from the substance or mixture

Hazardous decomposition: No hazardous decomposition data available.

Keep away from heat / sparks / open flames / hot surfaces - No smoking.

Keep / Store away from clothing combustible materials.

Take any precaution to avoid mixing with combustibles.

Avoid breathing dust / fume / gas / mist / vapors / spray.

5.3. Advice for fire-fighters

Do not use carbon dioxide or other gas filled fire extinguishers; they will have no effect on decomposing persulfates. Wear full protective clothing and self-contained breathing apparatus.

On decomposition releases oxygen which may intensify fire. Presence of water accelerates decomposition.

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6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Put on appropriate personal protective equipment (see section 8).

6.2. Environmental precautions

Disposal is to be performed in compliance with all Federal, State and Local regulations.
Do not allow spills to enter drains or waterways.

Use good personal hygiene practices. Wash hands before eating, drinking, smoking or using toilet. Promptly remove soiled clothing and wash thoroughly before reuse.

6.3. Methods and material for containment and cleaning up

Steps To Be Taken in Case Quantities of Material are Released or Spilled: Put on safety glasses, or goggles and rubber gloves. Spilled material should be collected and put in approved DOT container and isolated for disposal. Isolated material should be monitored for signs of decomposition (fuming/ smoking). If spilled material is wet, dissolve with large quantity of water and dispose according to regulatory agencies procedures.

7. Handling and storage

7.1. Precautions for safe handling

See section 2 for further details. - [Prevention]:

7.2. Conditions for safe storage, including any incompatibilities

Handle containers carefully to prevent damage and spillage.

Incompatible materials: Acids, alkalis, halides, combustible materials, oxidizers. Keep away from glass.

See section 2 for further details. - [Storage]:

7.3. Specific end use(s)

For professional use only.

8. Exposure controls and personal protection

8.1. Control parameters

Exposure

CAS No.	Ingredient	Source	Value
0007681-49-4	Sodium fluoride	OSHA	TWA 2.5 mg/m3 [*Note: The REL also applies to other inorganic, solid fluorides (as F).]
		ACGIH	No Established Limit
		NIOSH	TWA 2.5 mg/m3 [*Note: The REL also applies to other inorganic, solid fluorides (as F).]
		Supplier	No Established Limit
0007727-54-0	Ammonium persulphate	OSHA	No Established Limit
		ACGIH	No Established Limit
		NIOSH	No Established Limit
		Supplier	No Established Limit

Carcinogen Data

CAS No.	Ingredient	Source	Value
0007681-49-4	Sodium fluoride	OSHA	Select Carcinogen: No
		NTP	Known: No; Suspected: No
		IARC	Group 1: No; Group 2a: No; Group 2b: No; Group 3: No; Group 4: No;
0007727-54-0	Ammonium persulphate	OSHA	Select Carcinogen: No
		NTP	Known: No; Suspected: No
		IARC	Group 1: No; Group 2a: No; Group 2b: No; Group 3: No; Group 4: No;

8.2. Exposure controls

Respiratory If workers are exposed to concentrations above the exposure limit they must use the appropriate, certified respirators.

Eyes Use cup type chemical type goggles. Face shield should be worn if there is a likelihood of

	splashing.
Skin	Neoprene or rubber oil and chemical resistant gloves should be worn. Thoroughly wash gloves prior to removal.
Engineering Controls	Provide adequate ventilation. Where reasonably practicable this should be achieved by the use of local exhaust ventilation and good general extraction. If these are not sufficient to maintain concentrations of particulates and any vapor below occupational exposure limits suitable respiratory protection must be worn.
Other Work Practices	Use good personal hygiene practices. Wash hands before eating, drinking, smoking or using toilet. Promptly remove soiled clothing and wash thoroughly before reuse.

See section 2 for further details. - [Prevention]:

9. Physical and chemical properties

Appearance	White Solid
Odor	Odorless
Odor threshold	Not Measured
pH	Not Measured
Melting point / freezing point	Decomposes
Initial boiling point and boiling range	Not Measured
Flash Point	Not Measured
Evaporation rate (Ether = 1)	Not Measured
Flammability (solid, gas)	Not Applicable
Upper/lower flammability or explosive limits	**Lower Explosive Limit:** Not Measured **Upper Explosive Limit:** Not Measured
Vapor pressure (Pa)	Not Measured
Vapor Density	Not Measured
Specific Gravity	1.98
Solubility in Water	Partially (87%)
Partition coefficient n-octanol/water (Log Kow)	Not Measured
Auto-ignition temperature	Not Measured
Decomposition temperature	Not Measured
Viscosity (cSt)	Not Measured
VOC Content	0

9.2. Other information

No other relevant information.

10. Stability and reactivity

10.1. Reactivity

Hazardous Polymerization will not occur.

10.2. Chemical stability

Stable under normal circumstances.

10.3. Possibility of hazardous reactions

No data available.

10.4. Conditions to avoid

Heat, moisture and contamination.

10.5. Incompatible materials

Acids, alkalis, halides, combustible materials, oxidizers. Keep away from glass.

10.6. Hazardous decomposition products

No hazardous decomposition data available.

11. Toxicological information

Acute toxicity

Ingredient	Oral LD50, mg/kg	Skin LD50, mg/kg	Inhalation Vapor LD50, mg/L/4hr	Inhalation Dust/Mist LD50, mg/L/4hr	Inhalation Gas LD50, ppm
Ammonium persulphate - (7727-54-0)	689.00, Rat - Category: 4	2,000.00, Rat - Category: 4	No data available	2.95, Rat - Category: 4	No data available
Sodium fluoride - (7681-49-4)	No data available	No data available	No data available	No data available	No data available

Note: When no route specific LD50 data is available for an acute toxin, the converted acute toxicity point estimate was used in the calculation of the product's ATE (Acute Toxicity Estimate).

Classification	Category	Hazard Description
Acute toxicity (oral)	4	Harmful if swallowed.
Acute toxicity (dermal)	5	May be harmful in contact with skin. (Not adopted by US OSHA)
Acute toxicity (inhalation)	4	Harmful if inhaled.
Skin corrosion/irritation	2	Causes skin irritation.
Serious eye damage/irritation	2	Causes serious eye irritation.
Respiratory sensitization	1	May cause allergy or asthma symptoms of breathing difficulties if inhaled.
Skin sensitization	1	May cause an allergic skin reaction.
Germ cell mutagenicity	---	Not Applicable
Carcinogenicity	---	Not Applicable
Reproductive toxicity	---	Not Applicable
STOT-single exposure	---	Not Applicable
STOT-repeated exposure	---	Not Applicable
Aspiration hazard	---	Not Applicable

12. Ecological information

12.1. Toxicity

The preparation has been assessed following the conventional method of the Dangerous Preparations Directive 1999/45/EC and GHS and is not classified as dangerous for the environment, but contains substance(s) dangerous for the environment. See section 3 for details

Aquatic Ecotoxicity

Ingredient	96 hr LC50 fish, mg/l	48 hr EC50 crustacea, mg/l	ErC50 algae, mg/l
Ammonium persulphate - (7727-54-0)	22.00, Cyprinus carpio	87.00, Daphnia pulicaria	13.20 (96 hr), Myriophyllum spicatum
Sodium fluoride - (7681-49-4)	Not Available	Not Available	Not Available

12.2. Persistence and degradability

There is no data available on the preparation itself.

12.3. Bioaccumulative potential

Not Measured

12.4. Mobility in soil

No data available.

12.5. Results of PBT and vPvB assessment

This product contains no PBT/vPvB chemicals.

12.6. Other adverse effects

No data available.

13. Disposal considerations

13.1. Waste treatment methods

Observe all federal, state and local regulations when disposing of this substance.

14. Transport information

	DOT (Domestic Surface Transportation)	IMO / IMDG (Ocean Transportation)	ICAO/IATA
14.1. UN number	UN1444	UN1444	UN1444
14.2. UN proper shipping name	UN1444, Ammonium persulfate, 5.1, III	Ammonium persulfate	Ammonium persulfate
14.3. Transport hazard class(es)	**DOT Hazard Class:** 5.1	**IMDG:** 5.1 **Sub Class:** Not Applicable	**Air Class:** 5.1
14.4. Packing group	III	III	III

14.5. Environmental hazards

IMDG Marine Pollutant: No

14.6. Special precautions for user

No further information

15. Regulatory information

Regulatory Overview The regulatory data in Section 15 is not intended to be all-inclusive, only selected regulations are represented.

Toxic Substance Control Act (TSCA) All components of this material are either listed or exempt from listing on the TSCA Inventory.

WHMIS Classification D2A C

US EPA Tier II Hazards

Fire: No

Sudden Release of Pressure: No

Reactive: Yes

Immediate (Acute): Yes

Delayed (Chronic): No

EPCRA 311/312 Chemicals and RQs (lbs):

Sodium fluoride (1,000.00)

EPCRA 302 Extremely Hazardous:
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

EPCRA 313 Toxic Chemicals:
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

Proposition 65 - Carcinogens (>0.0%):
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

Proposition 65 - Developmental Toxins (>0.0%):
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

Proposition 65 - Female Repro Toxins (>0.0%):
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

Proposition 65 - Male Repro Toxins (>0.0%):
To the best of our knowledge, there are no chemicals at levels which require reporting under this statute.

New Jersey RTK Substances (>1%):

Ammonium persulphate

Sodium fluoride

Pennsylvania RTK Substances (>1%):

Sodium fluoride

16. Other information

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, expressed or implied, is made with respect to the information contained herein. We accept no responsibility and disclaim all liability for any harmful effects which may be caused by exposure to our products. Customers/users of this product must comply with all applicable health and safety laws, regulations, and orders.

The full text of the phrases appearing in section 3 is:

H272 May intensify fire; oxidizer.

H301 Toxic if swallowed.

H302 Harmful if swallowed.

H315 Causes skin irritation.

H317 May cause an allergic skin reaction.

H319 Causes serious eye irritation.

H334 May cause allergic or asthmatic symptoms or breathing difficulties if inhaled.

H335 May cause respiratory irritation.

This is the first version in the GHS SDS format. Listings of changes from previous versions in other formats are not applicable.

The submission of this SDS may be required by law, but this is not an assertion that the substance is hazardous when used in accordance with proper safety practices and normal handling procedures. Data supplied is for use only in connection with occupational safety and health. The information contained herein has been compiled from sources considered by Exotica Jewelry to be dependable and is accurate to the best of the Company's knowledge. The information relates to the specific material designated herein, and does not relate to the use in combination with any other material or process. Exotica Jewelry makes no warranty, representation or guarantee as to the accuracy, sufficiency or completeness of the material set forth herein. It is the user's responsibility to determine the safety, toxicity and suitability of their own use, handling and disposal of the product. Exotica Jewelry assumes no responsibility for injury to the recipient or third persons, for any damage to any property resulting from misuse of the controlled products.

End of Document

Multi-Etch Frequently Asked Questions

How long will Multi-Etch last?
For dry powder, at least 11 years. For unused Multi-Etch in solution: at least one year (keep it capped)!

How much titanium or niobium will one gallon of Multi-Etch etch?
Approximately 1,500 square inches of titanium when dipped for three seconds at 120-150ºF. As you etch, the etchant gradually becomes ineffective and contaminated with titanium ions that can re-plate to the metal, causing uneven anodizing.

Can the effectiveness of Multi-Etch be restored after it has been used?
No, that's why it's best to use only as much as you need in any one sitting, leaving the rest unadulterated.

Troubleshooting Multi-Etch

I'm not getting any color on my etched titanium.
If there isn't any change in color, check your connections. After using many techniques to anodize since the 1970's, sometimes we still get our wires crossed!

Why is the anodized color on my titanium pieces splotchy in places?

1. Did you **mix the entire amount of Multi-Etch** powder? The ingredients in Multi-Etch are not blended so you must mix the entire amount with 1/2 gallon of distilled or deionized water for double-strength or one gallon for regular strength.

2. If you are **using Multi-Etch unheated**, you must heat the entire solution one time, 120-150ºF—then you can use it right away or wait for it to cool to room temperature, 70ºF.

3. Make sure you have **degreased the metal** before etching. If the metal is really dirty, e.g., after tumbling, etch once, rinse well, and etch again. Hold the pieces by the edges so that you don't leave fingerprints.

4. Did you accidentally **contaminate your etching bath**? If you introduce brass, copper or iron into the etching bath, those materials will tend to plate onto the titanium and interfere with anodizing. If that happens, you will need to throw

out your contaminated etching bath and start with a fresh one. These contaminants could come from the tooling you use to form your piece--files, saws, etc. If possible, keep a separate set of tools or clean the piece with an ultrasonic before etching.

5. What are you **holding the titanium with while anodizing**? Using something other than titanium or niobium as hanging/holding wires when anodizing can prevent the voltage getting to the titanium. Some metals, such as copper, brass, gold, etc. will draw off the voltage. Some people use a plastic container with a titanium or niobium probe to anodize--this works great for anodizing lots of small parts.

6. Make sure you **rinse well** after etching the metal. If you drag Multi-Etch into your anodizing bath, it can inhibit good color. If you are not going to anodize immediately after etching, protect the clean surface by applying a 10-volt color. If you don't want to anodize at all, then store the etched pieces in distilled water. This will allow you to wait months if necessary, before anodizing.

7. **What alloy and form of titanium** are you using? Our experience is mostly with grades 1 and 2 "commercially pure" titanium sheet and wire. Sometimes the ends of a batch of wire or sheet have a heat oxide that is very hard to remove. You also can't see it! But if you suspect that might be the problem because most of the pieces in a batch anodize fine, try etching the "bad" pieces longer and avoid using the high-voltage colors if possible. The aircraft grade--6/4--usually colors well with minimal etching.

8. **Cast titanium parts** like medical implants sometimes have a whitish alpha-case from heat which must be mechanically removed (e.g., sand-blasting) If this is not removed, it may be difficult or impossible to anodize evenly with higher voltage colors. Try etching longer before anodizing.

9. **Grow the oxide slowly**. If you're aiming for the color at 70 volts, start at 60 and, while leaving the piece in your anodizing bath, keep the voltage at 60 and see if the color continues to advance to the higher voltage color. If it doesn't, try increasing the voltage slowly.

10. **What is your anodizing solution**? We use 1 tablespoon of **ammonium sulfate** per gallon of distilled water. You can get ammonium sulfate wherever gardening supplies are sold.

Reactive Metals Studio recommends using **TSP**. Start with 1/8 cup per

gallon of distilled water. If the anodizing reaction is too slow, add a little more TSP. For a bath of either ammonium sulfate or TSP, you can squirt a little dish detergent or Simple Green to act as a surfactant, which is important when you are after a smooth gradation from one color to another. Without that, sometimes the liquid "beads up" when lifting the titanium out of the bath.

If burning or pitting occurs while anodizing, particularly at higher voltages, then the electrolyte has been mixed too strong.

DO NOT ANODIZE WITH Multi-Etch, sulfuric acid, or detergents with fancy spot retardants.

11. It's possible that **if you purchased distilled water in a plastic jug** that has been sitting around the store awhile, the water may have absorbed something from the plastic jug itself. Try using water from one of those purified water vending machines.

12. Poor color can be a sign that you haven't etched long enough or you have used up the etchant and need to replace the bath.

13. If you wire-brushed or used other steel tools, make sure you have thoroughly **cleaned any contaminants** from the tools before etching.

Using Multi-Etch at room temperature (70ºF) requires heating the whole bath to 120-150ºF one time. Make sure you mix double strength (1/2 gallon distilled or deionized water.) Shake the container before heating.

Sometimes everything is "correct" but you still can't get even color in the higher voltages. This can be due to inconsistencies on the metal itself. High-voltage colors are the hardest colors to achieve so if you have a choice, choose a lower voltage color, especially for the problem pieces.

If you discover something not covered here, please let us know!
info@multietch.com