



## Product Data Sheet

Date: 12/06/06  
Supersedes: 04/11/03  
**PRODUCT #: N8122**

# QUANTUM ETCH

Stabilized Hydrogen Peroxide Solution

**DESCRIPTION:** A stabilized peroxide product for use with sulfuric acid to form a peroxide/sulfuric microetch. *QUANTUM ETCH* provides a superior microetch which can be used for inner layer processing, pre-plate cleaning, and cleaning prior to solder leveling. For pre-plate cleaning of panels plated with electroless copper, use the low etch rate operating conditions. *QUANTUM ETCH* produces a uniformly etched surface, and will maintain a constant desired etch rate over a broad solubility range of copper sulfate in the bath.

**BENEFITS:**

- **Extremely consistent etch rate**
- **Loads two to three times higher than persulfate microetches**
- **Easily regenerated for minimal waste treatment**

**SPECIFICATIONS:** **Density:** 1.09 gm/ml, 9.0 lbs./gal.  
**Flash Point (TCC):** None  
**Shelf life:** 1 year

**INSTRUCTIONS:**

<u>BATH MAKE UP</u>	<u>STANDARD ETCH RATE</u>	<u>LOW ETCH RATE</u>
Sulfuric Acid (electronic grade)	8% - 12%	12% - 18%
<i>QUANTUM ETCH</i>		
Soak	7% - 9%	1% - 2%
Spray	9% - 12%	
Copper sulfate crystals	6 - 8 oz/gal	5 - 7 oz/gal
Copper (as metal)	1.5 - 3 oz/gal	1.25 - 1.75 oz/gal
Deionized water		Balance

Fill tank or sump half full with deionized water, then carefully add sulfuric acid. Add copper sulfate crystals and stir until dissolved. Add *QUANTUM ETCH* concentrate.

**INSTRUCTIONS:**

<u>OPERATING CONDITIONS</u>	<u>STANDARD ETCH RATE</u>	<u>LOW ETCH RATE</u>
<b>Soak</b>		
Temperature	100 - 120°F	80 - 90°F
Time	1 - 3 minutes	1 - 2 minutes
<b>Spray</b>		
Temperature	110 - 125°F	
Time	30 - 60 seconds	
Etch Rate	30 - 50 microinches	3 - 10 microinches

Panels must be agitated while in the solution to insure uniform activity and to move the solution through the holes.

### REPLENISHMENT

For the standard etch rate solution, analyze the working solution once per shift for

**REPLENISHMENT cont'd.**

peroxide, sulfuric acid, and copper concentration, according to analytical procedures.

Check etch rate periodically. When the copper concentration reaches 12 ounces per gallon (as copper metal, at 110°F) the solution is saturated and should be treated to remove copper sulfate.

For low etch rate solutions, more frequent analysis and replenishment will be necessary. Maintain *QUANTUM ETCH* concentration within 20% above or below the desired level of concentration. The solution will be saturated at approximately 6 - 7 ounces per gallon of copper (as copper metal, at 85°F)

Transfer the solution to a separate tank of suitable capacity. Raise the sulfuric acid level to 1% above operating concentration to aid in precipitation. The solution should be cooled to 50 - 60°F for 24 hours. Cooling coils can be used to accelerate the process. Copper sulfate will precipitate out and can be recovered.

Decant the solution to the process tank, analyze for peroxide and sulfuric acid, and replenish. Solution may be filtered to remove particulate matter if necessary.

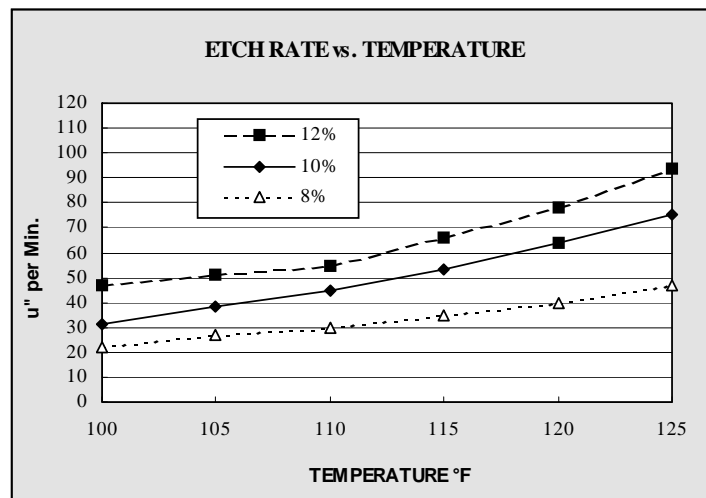
Equipment can be constructed of polypropylene, CPVC, PVC, Hypalon®, Viton®, Chemraz®, and Kalrez®. Heaters should be quartz or Teflon®.

***CAUTIONS:***

*QUANTUM ETCH* working solution is an acid oxidizing solution. Avoid contact with skin and eyes. Protective clothing, goggles and gloves should be worn when handling this product. In case of contact with skin, flush with water. For eye contact, flush immediately with water and obtain medical assistance. Use in a well ventilated area. Refer to Material Safety Data Sheet for further information.

***DISPOSAL:***

Cool the solution to precipitate out copper sulfate, following the procedure for replenishment. Analyze remaining solution for copper and neutralize pH with caustic. Dispose of spent solution in accordance with all local, state and federal regulations.



This product should be used only for its intended purpose. The information stated above is based on our laboratory tests and experience, and is accurate to the best of our knowledge. Since actual use is beyond our control, the recommendations or suggestions are made without warranty, expressed or implied.

***QUANTUM ETCH***  
**Analysis Procedures**

**Peroxide Concentration**

**Reagents:**      **50% Sulfuric Acid solution** - carefully dilute reagent sulfuric acid 50% by volume by adding to distilled water.

**Ferriin Indicator** - mix 1.285 grams 1, 10-Phenanthroline with 0.695 grams ferrous sulfate heptahydrate, and dissolve in 100 ml of distilled water.

**Ceric ammonium sulfate solution, 0.1N** - purchase standardized solution from laboratory chemical supplier.

**Procedure:**

1. Pipet a 2.0 ml sample of standard etch rate solution, or a 20.0 ml sample of low etch rate solution, into a 500 ml Erlenmeyer flask containing 300 ml distilled water. Swirl to mix.
2. Add 5 ml of 50% sulfuric acid solution and mix.
3. Add 1 ml Ferriin indicator.
4. Titrate with standard ceric solution from an orange-red to a blue end point.

**Calculation:**

$$\frac{\text{mls of standard ceric solution} \times N \times 6.428}{\text{volume of sample}} = \% \text{ (by volume) } \mathbf{QUANTUM ETCH}$$

Add **QUANTUM ETCH** concentrate to replenish bath to desired operating concentration.

$$\frac{[\text{Desired concentration} - \text{actual concentration}]}{100} \times \text{Volume of tank (gals)} \times 3785 = \text{milliliters of } \mathbf{QUANTUM ETCH} \text{ to add}$$

**Sulfuric Acid Concentration**

**Reagents:**      1.0N Sodium Hydroxide (NaOH) solution  
Methyl Orange Indicator

**Procedure:**

1. Pipet 5 ml sample of working solution into a 100 ml Erlenmeyer flask containing 25 ml distilled water.
2. Add 2-4 drops Methyl Orange indicator.
3. Titrate with 1.0N sodium hydroxide solution from red to a yellow end point.

**Calculation:**

$$\frac{\text{ml NaOH} \times N \times 2.8}{\text{ml of sample}} = \% \text{ sulfuric acid by volume}$$

Add electronic grade sulfuric acid to raise concentration to desired level.

$$\frac{[\text{Desired concentration} - \text{actual concentration}]}{100} \times \text{Volume of tank (gals)} = \text{gallons of sulfuric acid to add}$$

Continued on reverse side →

*QUANTUM ETCH* Analysis Procedures - continued

**Copper Concentration**

**Reagents:** Ammonium Chloride Buffer  
(140 g/l Ammonium Chloride adjusted to pH 9.5 with Ammonium Hydroxide.)  
0.1M EDTA solution  
Murexide indicator (ammonium salt of purpuric acid)

**Procedure:**

1. Pipet 2 ml sample of working solution into a 250 ml Erlenmeyer flask containing 100 ml DI water.
2. Add 15 ml ammonium chloride buffer solution. Solution will turn dark blue.
3. Add 5 - 10 mg murexide powder. Mix for 1 minute before starting titration.
4. Titrate with 0.1M EDTA to a purple end point. (Color change is from dark blue through yellowish brown, then gradually changing through wine-red, then finally a sharp change to deep purple, similar to grape juice).

**Calculation:**

mls of 0.1M EDTA X 0.425 = oz/gal copper (as copper metal)

**Etch Rate Determination**

**Equipment:** Analytical balance  
Copper clad panels 3" X 3" (single sided)

**Procedure:**

1. Weigh copper panel on analytical balance to 0.1 mg and record weight. Panels must be clean and dry.
2. Place copper panel in working solution for 1 minute, or desired time.
3. Rinse panel well with water, and dry completely.
4. Re-weigh panel, and subtract weight from original weight to obtain weight lost.

**Calculation:**

$$\frac{\text{Weight lost in grams}}{(\text{area sq.in.})(\text{time})} \times 6826 = \text{Etch Rate (microinches per minute)}$$