

ACTI/Plate DM-30 Microetch

A Single Component Copper Microetch for Pre/Post Direct Metallization Processing

Product Description

ACTI/Plate DM-30 (DM-30) is a single component, dry blend designed to provide optimum micro-roughening and cleaning of copper surfaces prior to direct metallization and/or copper electroplating processes. This unique formulation produces a uniformly clean and micro-roughened copper surface, promoting excellent post direct metallization dry film to copper adhesion; and/or copper to copper adhesion prior to copper electroplating without attacking the direct metallization film. DM-30 can be operated in spray or immersion applications, offers a wide operating window, is easy to make-up and maintain, and yields a consistently uniform micro-roughened copper surface. Additionally, DM-30 does not contain ammonium or chromate compounds, chlorides, fluorides, or nitrates, simplifying waste treatment.

Performance Features

- DM-30 was specifically designed to provide superior etch characteristics without undermining direct metallization films.
- DM-30 can be operated within a wide range of temperatures and concentrations, assuring optimum copper micro-roughening for most applications.
- DM-30 will produce a uniform matte copper surface at etch rates as low as 10 micro-inches per minute.
- DM-30 is suitable for use in spray or immersion applications.
- DM-30 exhibits excellent stability and can be operated at concentrations as low as 40 g/L, reducing operating costs and waste treatment volumes.
- DM-30 does not contain ammonium or chromate compounds, chlorides, fluorides, or nitrates, improving safety and reducing environmental impact.

Physical Specifications

Physical State	Solid
Appearance	White Crystalline Salt
Odor	Odorless
Freeze/Thaw Stability	Stable
Stability	Stable
Specific Gravity	2.2 g/cm ³
pH (1% In Water)	< 2

Technical Data Sheet

Equipment Requirements

Tanks: Constructed or Lined with Polypropylene, Polyethylene, PVC Or CPVC.

Heaters: Quartz Or Teflon Encased Steel.

Racks: Constructed or Lined with Polyethylene, Polypropylene, Or Plastisol Coated Steel.

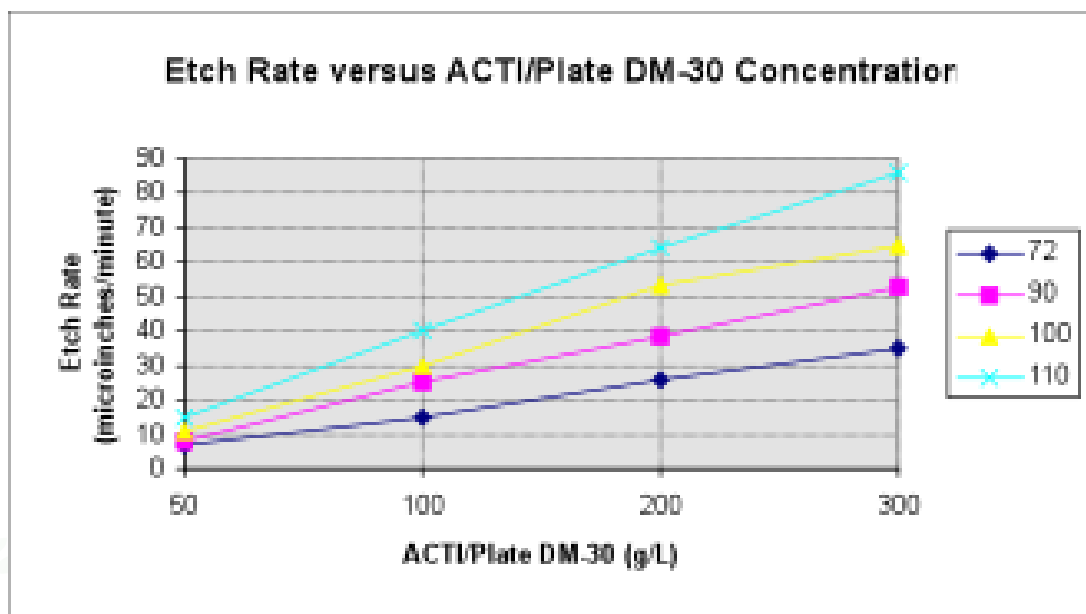
Cooling Coils: Constructed Of Polyethylene, Polypropylene, Or Plastisol Coated Steel.

Ventilation: Recommended

Product Make-Up

To determine the concentration of DM-30 to employ, refer to figure 1.0 and select the copper etch rate most suited to your equipment and operating requirements. The majority of applications require a minimum of 20, but no more than 40 micro-inches, of copper be etched to provide optimum copper cleanliness and surface topography. Select the DM-30 concentration based upon processing time and temperature of operation, to achieve 20-40 micro-inches copper removal. It is recommended DM-30 be dissolved in deionized or distilled water. Chlorides, fluorides, and/or carbonates present in some tap waters will reduce the performance and longevity of DM-30. Use the following recommended procedure when preparing a bath of DM-30.

1. Thoroughly rinse the tank and inspect for cleanliness paying special attention to the heaters and heater sheathings, and cooling coils.
2. Fill the tank half full with deionized water. Add 40 - 300 g/L DM-30 and fill the tank to operating level with deionized water.
3. Thoroughly mix the solution until the DM-30 is completely dissolved.
4. Turn on heaters and/or cooling coils, and verify temperature with a thermometer.



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Operating Parameters

Temperature	70 - 110°F
Time	30 - 180 Seconds
Agitation	Mechanical Solution Or Spray

Figure 1.0 above provides a guideline for selecting the immersion time, concentration, and temperature at which to employ DM-30. It is recommended DM-30 be operated at conditions yielding between 20 - 40 micro-inches copper microetch. The exact rate will vary depending upon the condition of the copper substrate and the age and condition of the DM-30 bath.

The DM-30 bath should be controlled by a combination of visual inspection, determination of copper etch rate (by weight loss technique), and periodic verification of active DM-30 concentration. Due to chemical breakdown and accumulation of impurities, it is recommended the DM-30 bath be dumped when the copper concentration exceeds 30 g/L copper as metal. It is not recommended this bath be operated on a feed/bleed basis!

Control and Replenishment

Determination Of DM-30 Etch Rate

The etch rate of DM-30 can be determined by the procedure below.

Equipment Required	Reagents Required
Beaker, 250 ml	None
Stir/Hot Plate	
Analytical Balance	

Procedure

1. Transfer 200 ml of working bath into a 250 ml beaker and measure and adjust the temperature of the solution accordingly.
2. Completely immerse a representative copper coupon for five minutes. Remove the coupon and thoroughly rinse with deionized water followed by an ethanol rinse. Use forced air to dry the sample if necessary.
3. Once dry, record the weight of the copper coupon to the nearest 0.0001 grams and record as "A".
4. Immerse the sample completely into solution a second time for five minutes, rinsing, drying, reweighing to the nearest 0.0001 grams as before. Record the weight after etching a second time as "B". Use the calculation below to measure the copper etch rate in micro-inches per minute.

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Calculation

$$\frac{(A - B) \times C}{D \times E} = \text{micro-inches copper removed/minute}$$

Where	A	=	weight of the sample before etching in grams
	B	=	weight of the sample after etching in grams
	C	=	7.010
	D	=	copper surface area of sample in square inches
	E	=	time of immersion

Refer to Figure 1.0 and adjust the temperature, and/or concentration, and/or immersion time accordingly to achieve the desired etch rate.

Determination Of DM-30 Concentration

The concentration of DM-30 can be measure employing the oxidation/reduction titration below.

Equipment Required	Reagents Required
Buret 50, ml	Ceric Sulfate Standardized 0.10 N
Erlenmeyer Flask, 250 ml	Ferrous Ammonium Sulfate Standardized 0.20 N
Pipettes, 2 ml and 20 ml	Ferrouin Indicator

Procedure

1. Pipet 2.0 ml of DM-30 bath into a 250 ml Erlenmeyer flask labeled flask labeled as "DM-30". Label a second 250 ml Erlenmeyer flask as "B" for "Blank".
2. To each flask add exactly 20 ml of 0.20 N ferrous ammonium sulfate and mix for 1 minute.
3. Add 3-5 drops of ferrouin indicator and titrate with 0.10 N ceric sulfate to a ferrouin endpoint. Record the number of mls required.

Calculation

$$\frac{(A - B) \times C \times D \times (S)}{E} = \text{g/L DM-30}$$

Where	A	=	ml of ceric sulfate required for the "Blank" solution
	B	=	ml of ceric sulfate required for the sample
	C	=	N of the ceric sulfate
	D	=	158.7
	E	=	sample volume in ml
	S	=	stoichiometry (1.5)

Adjust to the DM-30 to the desired concentration by direct addition. The operating range recommended is 50 - 300 g/L.

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Determination Of Copper Concentration

Equipment Required	Reagents Required
Buret, 50 ml	Ammonium Hydroxide / Chloride Buffer Solution
Erlenmeyer Flask, 250 ml	EDTA Standardized 0.10 M
Pipet, 10 ml	Methanol, ACS Grade
	Pan Indicator

Procedure

1. Pipet a 10.0 mls sample of the bath into a 250 ml Erlenmeyer flask containing 50 ml of ammonium hydroxide/ammonium chloride buffer.
2. Add approximately 20 ml of methanol and mix.
3. Add 4-5 drops of PAN indicator and titrate with standardized EDTA from blue to the first stable light green endpoint. Record the number of ml of titrant required.

Calculations

$$\frac{A \times B \times C}{D} = \text{g/L copper}$$

Where	A	=	ml of titrant required
	B	=	M of titrant (0.1)
	C	=	M.W. of copper (63.54)
	D	=	sample volume in ml (10.0)

The bath should be dumped when the copper concentration reaches 30 g/L.

Safety and Handling

Read and understand this products MSDS before handling.

Waste Treatment

Individual users should verify the nature of spent solutions to assure compliance with local, state, and federal regulations. Contact Seacole for specific details and/or further waste treatment recommendations.

Ordering Information

DM-30 is available in 50# pails.

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