

AUTO / Prep NU-3

Permanganate and Permanganate Residue Neutralizer

Product Description

AUTO/Prep NU-3 is the third step in the AUTO/Prep Desmear-Etchback Process designed to remove resin smear and expose interconnects, and at the same time optimize the surface topography of the dielectric for eventual electroless copper deposition. AUTO/Prep NU-3 will neutralize permanganate and manganese dioxide residues adhering to the hole wall after desmear-etchback thus providing a clean hole wall ideal for electroless deposition. AUTO/Prep NU-3 features process flexibility (can be incorporated with a glass etch), minimal copper attack (non-chloride formulation), and a long solution life.

Performance Features

- AUTO/Prep NU-3 is a non-chloride formulation reducing copper attack for easier waste treatment.
- AUTO/Prep NU-3 will completely dissolve permanganate, manganate, and magnesium dioxide, leaving a clean hole wall for optimum electroless deposition and adhesion.
- AUTO/Prep NU-3 offers long solution life and minimal operator maintenance for ease of use.
- AUTO/Prep NU-3 exhibits very low surface tension, ensuring small hole wetting and penetrating, thus enhancing permanganate neutralization.
- AUTO/Prep NU-3 can be combined with AUTO/Prep GE-4 to reduce the number of process steps.

Physical Specifications

Physical State	Crystalline Solid
Appearance	Semi-Transparent
Odor	None
Stability	Stable
Specific Gravity	1.7 – 1.9
pH	3 – 4 (30% solution)
Flash Point	None
Storage Requirements	Reducing Agent

Equipment Requirements

Tanks: Molded Polypropylene, PVC, Or Polyethylene

Heaters: Teflon Or Quartz

Racks: PVC Coated Stainless Steel

Agitation And Filtration: Chemically Impervious Recirculation Pump With Filter Will Enhance The Treatment Process. Mechanical Agitation Satisfactory. Air Agitation Not Recommended (Fuming).

Ventilation: Recommended

Technical Data Sheet

Product Make-Up

AUTO/Prep NU-3 is operated at 40 – 55 g/L (5 - 7 ounces per gallon) and is acidified with sulfuric acid. Use the following procedure when making up a new bath:

1. Thoroughly rinse the tank and inspect for cleanliness paying special attention to the heaters and heater sheathings.
2. Fill the tank half full with de-ionized water and slowly add sulfuric acid such that it will be 7% by volume of the final bath volume. Caution!! The addition of sulfuric acid to water will generate heat. Be careful not to exceed the heat specifications of the tank being employed.
3. After the sulfuric acid has been added, add AUTO/Prep NU-3 at a concentration of 50 g/L. Dilute to final volume and mix until all of the NU- 3 is in solution.
4. Turn on heaters and verify temperature when preparing AUTO/Prep NU-3, use only distilled or de-ionized water.

Operating Parameters

A typical etchback-desmear process line employing the AUTO/Prep process is as follows:

Process	Immersion Time (Minutes)	Temperature (°F)	Agitation
HS110-S ¹	5-15	100-140	Solution
Water Rinse	1-2	Ambient	Air
Water Rinse	1-2	Ambient	Air
DS-2 - 55g/L	15-30	150-180	Solution
Water Rinse	1-2	Ambient	Air
Water Rinse	1-2	Ambient	Air
NU-3 50g/L	4-8	70-130	Solution
Water Rinse	3-5	Ambient	Air
GE-4 - 50g/L ²	2-4	70-90	Solution
Water Rinse	1-2	Ambient	Solution
Sulfuric Acid Dip 10%	2-5	Ambient	Solution

Perform a final rinse prior to electroless processing.

NOTE 1. When using HS-110S at full strength, you should not exceed process times of 15 minutes. General rule of thumb is 5 minutes immersion when operating HS-110S at full strength and 10 minutes when at 50%.

NOTE 2. AUTO/Prep GE-4 can be incorporated directly into the NU-3 bath thus reducing the number of steps in the process line.

Due to the many dielectrics employed and variance in processing, parameters must be optimized for each type of resin and the desired rate of etchback and/or desmear. It is not uncommon for resin etch rates to vary from vendor to vendor and even lot to lot. It is advisable to periodically observe the topography of the sidewall via SEM photography and measure the etch rate in the permanganate of random samples to ensure proper processing.

Technical Data Sheet

Control and Replenishment

It is necessary to monitor the concentration of NU-3 to ensure bath is within accepted strength parameters.

Determination of AUTO/Prep NU-3 Concentration

Equipment Required	Reagents Required
Buret, 50 ml	Ferric Ammonium Sulfate
Erlenmeyer Flask, 250 ml	Phosphoric Acid Concentrated
Pipet, 5 ml	Potassium Permanganate .10N Standardized
	Sulfuric Acid 20%

Procedure

1. Pipette a 5 ml sample of working bath into a 250 ml Erlenmeyer flask containing 50 ml of de-ionized water. Add 5 ml of saturated ferric ammonium sulfate solution and mix. Add 10 ml of dilute sulfuric acid solution and mix. Bring to boil on a hot plate for 5 minutes. Remove and cool.
2. Add 5 ml of concentrated phosphoric acid and mix thoroughly. Titrate with standardized potassium permanganate until the solution changes from colorless to the first stable pink endpoint. Record the number ml required.

Calculations

$$\frac{A \times B \times 110}{C} = \text{g/L NU-3}$$

Where A = ml of potassium permanganate required
B = N of potassium permanganate
C = sample volume in ml

Maintain the concentration of NU-3 between 40 and 55 g/L with additions of granular NU-3.

Determination Of Sulfuric Acid Weight

Equipment Required	Reagents Required
Buret, 50ml	Bromocresol Green Indicator
Erlenmeyer Flask, 250 ml	Sodium Hydroxide 1.0N Standardized
Pipet, 25 ml	

Procedure

1. Pipette 25 ml of working bath into a 250 ml Erlenmeyer flask containing 50 ml of deionized water.
2. Add 10 – 15 drops of indicator and titrate with standardized sodium hydroxide until the solution changes from a yellow to a blue-green endpoint. Record the number of ml required.

Technical Data Sheet

Calculations

$$\frac{A \times B \times 2.77}{C} = \% \text{ v/v sulfuric acid}$$

Where A = ml of sodium hydroxide required
B = N of sodium hydroxide
C = sample volume in ml

The sulfuric acid concentration should be maintained between 6 – 8% by volume with additions of concentrated sulfuric acid.

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

AUTO/Prep NU-3 is available in 25# and 50# pails, and 500# fiber drums.

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