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MARQUEE BMP

Bright Mid Phosphorous Electroless Nickel Plating Process
TECHNICAL DATA
05-24-11

MARQUEE BMP

PROCESS FOR MID PHOSPHOROUS ELECTROLESS NICKEL PLATING

MARQUEE BMP has one of the fastest deposition rates throughout the life of the bath.

MARQUEE BMP meets ASTM-B-733 and AMS-2404 C specifications.

MARQUEE BMP is a simple two component process with an easy to use 1:1 replenishment rate.

MARQUEE BMP provides a extremely deep, brilliant decorative finish.

MARQUEE BMP produces uniform plating thickness and hardness.

MARQUEE BMP has excellent stability with very long solution life up to 10+ turnovers

OPERATING PARAMETERS

		Range
Nickel Metal:	5.25-6 g/Liter	0.7-0.8 oz/gal
Operating Temperature:	88º - 92º C	190-197^{o}F
pH	4.4-4.9	4.8 optimum
Bath loading	0.5-2.50 sq.dm//L	0.20-1.0ft^{2}/gal
Typical Plating Rate	19.6 micron/hour	0.77 mil/hr

SOLUTION MAKEUP

MARQUEE BMP-A-11	6.0 %/vol
MARQUEE BMP-B-11	15.0 %/vol
MARQUEE BMP-C-11	Not required for make-up

It is important to follow these steps when making a new solution. Taking shortcuts can increase the cost of your electroless nickel process.

1. Remove the old operating solution.

2. Remove the old filter bags or cartridge filters. If necessary re-seal the filter unit. Fill the tank with 50 %/vol Nitric acid.

3. Circulate the solution through the pumps and filter housings. Turn off air agitation. Allow the solution to contact all the surfaces that it would contact when in operation. Allow the solution to stand overnight to completely strip and passivate the tank.

4. Remove the nitric acid solution from the tank.

5. Rinse the tank/ pumps and filter housings thoroughly.

6. Fill the tank with water higher than the level of the nitric solution and add approximately 1 liter Ammonium hydroxide per 400 liters of volume. Allow this solution to circulate for 1 hour. While the solution is circulating, turn the agitation on and off. The ammonium hydroxide will neutralize the Nitric acid.

7. Drain the system then rinse with clean water. Test the rinse water for nitrates (Fisher Scientific carries M-10020 EM quant test strips for testing for nitrates).

8. Install new filter bags or cartridges.

9. Equipment is now ready for a new operating solution.

10. Fill tank to half its volume with distilled or D.I. water.

11. Add the required amount of BMP-A-11 and mix well.

12. Add the required amount of BMP-B-11 and mix well.

13. Add distilled or D.I. water to volume and mix well.

14. Check pH and adjust to a pH of 4.8. Use dilute 1:1ammonium hydroxide or potassium Hydroxide to raise the pH. Use 20%/volume sulfuric acid to lower the pH.

MAINTENANCE ADDITIONS

MARQUEE BMP-A-11 See replenishment schedule below.

MARQUEE BMP-C-11 See replenishment schedule below.

Nickel Content by Analysis	%Nickel Activity	Amount of BMP-A-11 and BMP-C-11 to be added
6.0 g/L (0.80 oz/gal)	100%	0 ml/L (0.0 fl.oz./gal)
5.7 g/L (0.76 oz/gal)	95%	3 ml/L (0.38 fl.oz./gal)
5.4 g/L (0.72 oz/gal)	90%	6 ml/L (0.76 fl.oz./gal)
5.1 g/L (0.68 oz/gal)	85%	9 ml/L (1.15 fl.oz./gal)
4.8 g/L (0.64 oz/gal)	80%	12 ml/L (1.54 fl.oz./gal)
4.5 g/L (0.60 oz/gal)	75%	15 ml/L (1.92 fl.oz./gal)
4.2 g/L (0.56 oz/gal)	70%	18ml/L (2.30 fl.oz.gal)

Regular analysis of the nickel content should be the basis for additions of the BMP-A-11 and the BMP-C-11. Add back equivalent amounts of the BMP-A-11 and BMP-C-11 as needed from the chart above.

Example: If the nickel metal analysis is 5.7g/L (0.76 oz/gal) then add back 3 ml/L(0.38fl.oz/gal) BMP-A-11 and 3 ml/L(0.38 fl.oz/gal) BMP-C-11.

pH- Measure the pH after all other adjustment have been made. Make adjustments using dilute 1:1 ammonium hydroxide or potassium hydroxide to raise the pH. Use 20%/volume sulfuric acid to lower the pH.

ANALYSIS OF BMP: ELECTROLESS NICKEL SOLUTIONS

Determination of nickel metal

Reagents required:

Standardized 0.1M or 0.0575 M EDTA
Concentrated ammonia hydroxide
Murexide Indicator
Deionized water
Murexide indicator – combine approximately 0.25 grams murexide with 95 grams of table sugar and mix thoroughly.

1. Pipette 5 ml. bath sample into a 250 ml Erlenmeyer flask.
2. Add approximately 100 ml Deionized water.
3. Add 10 ml of concentrated ammonium hydroxide.
4. Add 0.2 grams murexide indicator.
5. Titrate immediately with the 0.1 or 0.0575M standardized EDTA to a magenta endpoint.

CALCULATION: Nickel metal (g/L) = ml 0.0575M EDTA x 0.674 or ml 0.1M EDTA x 1.174
Nickel metal (oz/gal) = ml 0.0575M EDTA x 0.090 or ml 0.1M EDTA x 0.1565

pH

Use a calibrated pH meter to check the pH. Make measurements with the sample cooled to room temperature. The solution pH should be checked regularly to insure it is maintained within the operating parameters.

To raise the pH use 1:1 dilute ammonium hydroxide or potassium hydroxide. To lower the pH use 20%/vol. sulfuric acid.

Temperature

Maintain the temperature of the plating bath within specified limits. The use of derated heaters (low watt density) is highly recommended to maintain the solution temperature of the bath.

High temperatures can spontaneously decompose the bath. Low temperatures will slow the plating rate of the bath.

EQUIPMENT

Tanks

Tanks sized less than 500 gallons should be constructed of high density, natural, unpigmented, polypropylene. It is recommended that two tanks are set-up so a spare is available should there be nickel build-up on the heaters or tank. Contact your Columbia Chemical representative for recommendations.

Heaters

316 Stainless Steel heat exchanger, PTFE steam coils, or electric immersion heaters fabricated from PTFE or 316 stainless steel is recommended.

Agitation

Clean, mild air agitation from a low pressure blower is recommended. Other means of agitation may be used such as mechanical or reciprocal.

NICKEL DEPOSIT PROPERTIES

Phosphorous Content - 6-9% (varies depending on operating pH and bath age)

Hardness - 500-700 (VHN) as plated, 900-1000(VHN) heat treated.

Appearance - Bright reflective deposit

Density - Approximately 7.9 g/cc

HANDLING & STORAGE

Use normal precautions when handling MARQUEE BMP addition agents - wear protective clothing, rubber gloves, and adequate eye protection. As with most chemicals, use in well ventilated areas.

NON-WARRANTY

The data contained in this bulletin is believed by Columbia Chemical Corp. to be accurate, true and complete. Since however, final methods of use of these products are in the hands of the customer and beyond our control, we cannot guarantee that the customer will obtain the results described in this bulletin, nor can we assume any responsibility for the use of this product by the customer in any process which may infringe the patents of third parties.

TROUBLE SHOOTING GUIDE

FOR MARQUEE BMP

PROBLEM	CAUSE	SOLUTION
Poor adhesion to substrate	Poor cleaning prior to plating	Improve the cleaning process
	Organic contamination	Dump bath
	Metallic contamination	Dummy plate
Bath plate out	Temperature too high	Lower the temperature
	pH too high	Lower the pH
	Additives out of balance	Adjust additives
	Nickel build-up on equipment	Strip and passivate tank
Slow plating rate	Temperature is too low	Increase the temperature
	pH is too low	Increase the pH
	Additives out of balance	Adjust additives
	Metallic contamination	Dummy plate
No deposit	Temperature is too low	Increase the temperature
	pH is too low	Increase the pH
	Metallic contamination	Try to dummy plate
	Organic contamination	Dump bath
	Additives out of balance	Adjust additives
Pitting	Low agitation	Increase agitation
	Organic contamination	Dump bath
	Metallic contamination	Dummy plate
Dull deposit	pH is too low	Increase the pH
	Organic contamination	Dump bath
	Metallic impurities	Dummy plate
	Additives out of balance	Adjust additives
Rough deposit	pH is too high	Lower the pH
	Particulate in bath	Improve filtration
	Additives out of balance	Adjust additives
Dark deposit	Metallic contamination	Dummy plate
	Organic impurities	Dump bath
Streaks and/or patterns	Metallic contamination	Dummy plate
	Organic contamination	Dump bath
	Low surface area	Increase surface area
Blisters	Poor cleaning prior to plating	Improve the cleaning process
	Metallic contamination	Dummy plate
	Organic contamination	Dump bath
	Temperature is too high	Lower the temperature