

ZINCOBRITE ALK PLUS

IMPROVED NEXT GENERATION ALKALINE ZINC

INTRODUCTION

Zincobrite ALK Plus is a unique additive system that exhibits excellent brightness across a range of current densities at low and high temperatures with tolerance to high impurity levels, from a cyanide-free, alkaline solution.

The ALK Plus additive package gives superior distribution of up to 15% higher thickness across the range of current densities when compared with standard Alkali Zinc processes. A further feature of ALK Plus is the minimal deviation seen in thickness from low to high current density areas, enabling tighter production controls and low cost in use.

The process does not contain complexing agents and rinse water can therefore be treated by simple neutralization and precipitation at pH 8 – 9. Alternatively, with suitable cascade rinsing, rinse water can be returned to the plating solution, as the process forms no detrimental decomposition products.

BENEFITS

- Dual functioning Brightener – excellent brightness while leveling
- Booster provides even thickness distribution and brightness at LCD
- Exceptional uniform thickness in both rack & barrel plating – approaching 1:1:1 (HCD:MCD:LCD)
- Enhanced leveling resulting in reduced plating times
- Higher loading capabilities vs. cyanide baths
- Can operate at higher temperatures
- High tolerance to impurities
- Ductile deposits
- Recyclable rinses – no chelators or detrimental decomposition products
- Ease of control (only two additives)
- Additives inhibit blistering
- Contains components which readily allow desired trivalent passivate colors

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Telephone (602) 268-3500
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Page 1 of 6
ZNALK PLUS-08/23
NA-ISSUE 05

SOLUTION MAKE-UP

	Rack and Barrel
Zinc Oxide	15 g/L (2.0 oz/gal)
Sodium Hydroxide	150 g/L (20.0 oz/gal)
Zincobrite ALK Plus Brightener	1.7 % v/v (64.4 ml/gal)
Zincobrite ALK Plus Booster	3.0 ml/L (11.4 ml/gal)
Zincobrite ALK Plus Purifier	4.0 ml/L (15.1 ml/gal)

OPERATING DATA

	Rack and Barrel
Zinc Oxide	10 – 15 g/L (optimum 12 g/L) 1.3 – 2.0 oz/gal (optimum 1.6 oz/gal)
Sodium Hydroxide	130 – 170 g/L (optimum 150 g/L) 17.4 – 22.7 oz/gal (optimum 20.0 oz/gal)
Cathode Current Density	20 – 40 ASF
Anode-To-Cathode Area	2:1
Temperature	60 – 105°F
Deposition Rate	Depends on current density, etc. (See NOTES)

EQUIPMENT

Tanks	Polypropylene or polypropylene lined steel
Heaters	PTFE or mild steel immersion with thermostatic control
Cooling	Mild steel heat exchanger or cooling coil
Filtration	Continuous recommended
Agitation	Solution or work movement recommended for rack plating
Anodes	a) High purity zinc balls in mild steel cages, with polypropylene anode bags b) Mild steel, in conjunction with an external zinc dissolving cell

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Page 2 of 6
ZNALK PLUS-08/23
NA-ISSUE 05

INSTALLATION

1. Clean the process tank with water then leach with a 50 g/L (0.4 lbs/gal) solution of sodium hydroxide overnight - pump through all filters, pumps and pipework. Pump out and rinse thoroughly with water.
2. Fill the tank approximately one quarter full with DI water. Add the required amount of sodium hydroxide carefully while continuously stirring.
3. Heat up to 175 – 195°F and add zinc oxide gradually and stir until dissolved. The hotter the solution, the easier to dissolve the zinc salts.
4. Add DI water to just short of the final volume.
5. Cool the solution to approximately 85°F and add the calculated quantities of organic additives.
6. Add DI water to final volume.
7. Electrolyze the solution at 10 – 20 ASF for approximately 7.5 amp hours/gal.

MAINTENANCE AND CONTROL

The solution should be analyzed regularly and replenished as necessary. (See Analysis Methods)
The addition rates for the organic additives will vary depending on the required brightness, drag-out etc.

Zincobrite ALK Plus Brightener is a primary brightener for make-up and replenishment
Zincobrite ALK Plus Booster is a secondary brightener for make-up and replenishment

The following can be used as a process control guide for additions:

Zincobrite ALK Plus Brightener: Rack or Barrel 140 – 200 ml/1000 amp-hrs (optimum 170 ml)
Zincobrite ALK Plus Booster: Rack 50-70 ml/1000 amp-hrs (optimum 60 ml)
Barrel 35-55 ml/1000 amp-hrs (optimum 45 ml)
Zincobrite ALK Plus Purifier: add as necessary

ALTERNATIVE ADDITION OF ADDITIVES SUMMARY:

Add ALK Plus Brightener and ALK Plus Booster in a ratio of 2.5:1 (rack) and 3.5:1 (barrel)
Add ALK Plus Purifier when adding sodium hydroxide: 5 ml for every 1 lb NaOH

NOTES OF THE USE OF ZINCOBRITE ALK PLUS

Zinc Content: If zinc anodes are used, they should be removed when the solution is idle for extended periods (e.g. weekends) as chemical dissolution will occur.

Typically, mild steel anodes are used and zinc content is maintained by holding some of the electrolyte in a reserve tank and dissolving zinc chemically from anode balls.

Temperature: For heavily worked baths cooling may be necessary.

Deposition Rate: Depending on current density and zinc concentration the cathode efficiency can vary between 50 and 90%. Lower zinc concentrations give reduced efficiency but better distribution. As a guide, 8 g/L zinc and at 20 ASF will deposit 20 μ"/min.

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Page 3 of 6
ZNALK PLUS-08/23
NA-ISSUE 05

ANALYSIS METHODS

1. Zinc

Reagents

0.1M EDTA

Eriochrome Black T indicator

Chloral hydrate (alternative is 37% formaldehyde)

Ammonium chloride buffer solution – (dissolve 54 g ammonium chloride in 500 ml DI water. Add 350 ml of 29% ammonia and make up to 1 liter.)

Method

1. Pipette a 5 ml sample of the plating solution into a 250 ml Erlenmeyer flask.
2. Add 25 ml buffer solution and 25 ml DI water.
3. Add a trace Eriochrome Black T indicator and 1g chloral hydrate (or 10 mls 37% formaldehyde)
4. Titrate with 0.1M EDTA to a blue end point.

Calculation

Zinc (g/L) = mls of 0.1M EDTA X 1.308

Replenishment

For every 1 g/L zinc required add 1.24 g/L zinc oxide

2. Sodium hydroxide

Reagents

1.0N hydrochloric acid

11-13 indicator (Available from ACS)

Method

1. Pipette a 5 ml sample of the plating solution into a 250 ml Erlenmeyer flask.
2. Add 50 ml deionized water and a few drops 11-13 indicator.
3. Titrate with 1.0N hydrochloric acid to a yellow end point.

Calculation

Sodium hydroxide (g/L) = mls of 1.0N hydrochloric acid X 8.0

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Page 4 of 6
ZNALK PLUS-08/23
NA-ISSUE 05

TROUBLE SHOOTING GUIDE

PROBLEM	REASON	REMEDY
Generally dull deposit	Lack of Brightener	Add 0.5 – 1.0 ml/L Brightener
	Excess Brightener	Work out Brightener, add 1 – 2 ml/L Purifier
	Solution Contamination	Add 1 – 2 ml/L Purifier or 10 ml/L sodium hypochlorite solution (12% active)
	Temperature too high	Cool solution
Bright dark deposits	Low Purifier	Add 0.25 ml/L increments of Purifier
	Metallic impurities	Plate out solution at 10 – 20 ASF
	Low sodium hydroxide concentration	Analyze and correct
Poor bright throwing power	Low sodium hydroxide concentration	Analyze and correct
	Low Brightener	Add 0.2 ml/L increments of Brightener
	Zinc concentration too high	Plate down zinc content
Poor zinc anode solubility	Anode current density too high	Increase zinc anode area
	Low sodium hydroxide concentration	Analyze and correct
	Excessive use of Purifier	Reduce additions. Do not pour directly over anode

Role of Additives:

ALK Brightener – improves high current density (HCD) to middle current density (MCD) brightness

ALK Booster – extends the brightness to the low current density (LCD) areas

ALK Purifier – ties up undesirable impurities found in technical grade sodium hydroxide

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Page 5 of 6
ZNALK PLUS-08/23
NA-ISSUE 05

STORAGE

Store in original containers above 40°F

SAFETY

CAUTION! Zincobrite ALK Plus concentrates and working solution contain alkaline ingredients. Avoid contact with eyes, skin and clothing. Wear chemical handler's gloves, goggles and protective clothing when handling. Read and understand Material Safety Data Sheet before using this product.

The following products are referred to in this data sheet.

PRODUCT NAME	PRODUCT NUMBER
Zincobrite ALK Plus Brightener	581023
Zincobrite ALK Plus Booster	581024
Zincobrite ALK Plus Purifier	585019

NOTICE

The information and recommendations of PMD (UK), Ltd. and Automated Chemical Solutions, Inc., and its representatives, regarding this product are, to the best of our knowledge, true and accurate. We make no guarantee of results because the conditions of actual use are beyond our control. We assume no liability for damages or penalties resulting from the use of this product or following our recommendations. Our recommendations and suggestions for use of this product are not intended to grant license to operate under or infringe any patent.

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Page 6 of 6
ZNALK PLUS-08/23
NA-ISSUE 05