PMD (UK) Ltd, Broad Lane, Coventry, CV5 7AY, England. Telephone 024 7646 6691 Fax 024 7647 3034
Web Site: www.pmdgroup.co.uk Email: sales@pmdgroup.co.uk

ZINCOBRITE HT

INTRODUCTION

Zincobrite HT is a weakly acid process producing bright, highly levelled deposits and capable of high temperature operation. The solution contains no complexants or ammonia and the organic additive system contains no VOC solvents.

Zincobrite HT can be used for rack or barrel plating.

BENEFITS

Mirror bright, levelled deposits

Wide current density range

VOC free

Can be used up to 60°C

HPLC analysable

Easy to control

Economical in use

Good adhesion of yellow passivate

SOLUTION MAKE-UP

Zinc chloride	40-80g/L (see Maintenance and Control)
Potassium chloride	200g/L
Boric acid	20g/L
Zincobrite HT Carrier	30ml/L
Zincobrite HT Brightener	1ml/L

OPERATING DATA

Zinc	20-40g/L
Total chloride	110-150g/L
Boric acid	20-32g/L
Temperature	20-60°C, optimum 25-30° C
pH	5.0-5.4

Cathode current density	
Rack	2.0 – 10.0 A/sq.dm.
Barrel	0.5 – 1.5 A/sq.dm.

EQUIPMENT

Tank	Hard rubber-lined steel, polypropylene or PVC.
Heating	PTFE immersion with thermostatic control.
Cooling	Should not be necessary but titanium, PTFE or polypropylene heat exchangers or cooling coils should be used.
Filtration	Continuous recommended, all plastic construction pump. Should give 2-3 bath turnovers per hour.
Agitation	Air or solution movement to provide mild agitation for rack plating.
Anodes	High purity zinc (99.95%) with titanium hooks or in titanium baskets, with anode bags.

INSTALLATION

It is essential that the tanks to be used for Zincobrite HT are thoroughly cleaned and leached before any product is introduced. For new tanks or linings extended warm leaching is required.

If in any doubt as to the cleaning procedure please contact PMD (UK) Ltd technical department.

1. Clean the process tank with water and leach the tank with 10% v/v hydrochloric acid, pumping through all the filters, pumps and pipework. Allow to stand overnight then thoroughly clean with water.
2. Half fill tank with water (normal tap water is usually satisfactory) and heat to 50°C.
3. Add the appropriate amount of zinc chloride, 200g/l potassium chloride and 20g/L boric acid and stir to dissolve.
4. Allow to cool to 25-30°C then add 30ml/L Zincobrite HT Carrier.
5. Filter the solution thoroughly and adjust the pH to 5.0 – 5.4.

6. Top up to volume and add 1.0 ml/l Zincobrite HT Brightener and mix thoroughly.
7. The solution is now ready to use.

MAINTENANCE AND CONTROL

The zinc chloride and boric acid concentration should be analysed regularly using the methods detailed in analysis methods and adjusted accordingly:-

Zinc (g/l)	20	30	40
Chloride (g/l)	110 - 130	110 - 130	130 - 150
Boric acid (g/l)	20 - 32	20 - 25	20 - 25

Zincobrite HT Brightener - The consumption of Brightener will vary with temperature, drag-out etc. but as a guide 100 – 200 ml should be added every 1000 amp. hours. At higher temperature this may increase to 300ml/1000amp. hours.

Zincobrite HT Carrier - This is usually consumed by drag-out only and additions can be linked to the chloride analysis and addition e.g.

Nominal chloride conc:	120g/l
Nominal carrier conc:	30ml/l
Chloride conc. by analysis	102g/l
∴ chloride addition =	18g/l (15% of nominal)
Carrier addition =	4.5ml/l (15% of nominal)

pH - keep within a range of 5.0 – 5.4 using hydrochloric acid 50% v/v to lower or 10% w/v solution of potassium hydroxide to raise. During normal operation the pH will tend to rise.

Zinc concentration - This can vary between 20 and 40g/l depending on requirements. For higher current densities use higher zinc concentrations.

Temperature - Higher temperature will allow higher current densities to be used, but will also result in higher consumption of Brightener.

Deposition rate - This depends on current density. At 3A.sq.dm. the current efficiency is 95% and deposition speed is 0.75µ/minute.

ANALYSIS METHODS

1. Zinc

Reagents

0.1M EDTA (standard volumetric solution)
Eriochrome Black T indicator
Ammonium chloride buffer solution – 40g/l ammonium chloride
200ml/l ammonium hydroxide (0.88)
Deionised water to 1 litre

Method

1. Pipette 2 ml of the plating solution into a 500ml conical flask.
2. Add 50ml buffer solution and 50ml DI water.
3. Add a trace of Eriochrome Black T indicator.
4. Titrate with 0.1M EDTA to a blue end-point.
5. Record titre = t mls.

Calculation

t x 3.27 = g/l zinc.

Replenishment

For every 1g/l low add 2.1g/l zinc chloride.

2. Chloride

Reagents

0.1N silver nitrate (standard volumetric solution)
Sodium chromate indicator – 20g/l sodium chromate (aqueous)

Method

1. Pipette 10ml of the plating solution into a 250ml volumetric flask and make up to the mark with DI water.
2. Pipette 10ml of the diluted sample into a 500ml conical flask and add approximately 100ml DI water.
3. Add approximately 2ml of indicator solution and titrate with 0.1N silver nitrate.

During titration a white precipitate of silver chloride will be seen immediately. The end point is when the solution/precipitate becomes reddish brown.

4. Record titre = t mls.

Calculation

t x 8.875 = g/l chloride.

Replenishment

For every 1g/l low add 2.1g/l potassium chloride and 0.25ml/L Zincobrite HT Carrier

3. Boric acid

Reagents

Mannitol
Bromocresol purple indicator
0.1M sodium hydroxide solution (standard volumetric solution)

Method

1. Pipette 5ml of the plating solution into a 500ml conical flask.
2. Add mannitol to make a slurry then add a few drops of bromocresol purple indicator.
3. Titrate with 0.1N sodium hydroxide to a purple end point.
4. Record titre t mls.

Calculation

t x 1.24 = g/l boric acid.

Replenishment

For every 1g/l low add 1g/l boric acid

TROUBLE SHOOTING GUIDE

Contamination with foreign materials should be avoided. Copper, lead, cadmium, arsenic and antimony can cause problems with loss of brightness, dark deposits or poor colour. They can usually be removed by plating out or by zinc dust treatment.

Iron contamination should not exceed 80-100ppm. Iron can be removed by additions of 100 vol hydrogen peroxide (1-2ml/l).

Problem	Reason	Remedy
Insufficient brightening and levelling	Low Brightener Low current density	Add 0.3-0.5ml/L Brightener Increase current density
Streaks at high current density	Low Carrier	Add 2-4ml/L Carrier
Poor coverage at low current density	Low chloride Low Carrier	Correct as per analysis Add 2-4ml/L Carrier
High current density burning	Low temperature Low zinc Excessive current density Organic contamination	Heat solution Add zinc chloride as per analysis Reduce Carbon treat
Roughness, pitting	pH too high Suspended solids	Reduce pH Filter
Dark deposit	pH too high Iron (II) contamination	Reduce pH Add 1ml/L hydrogen peroxide (100vol) for every gm/L iron (II) and filter
Deposit will not passivate easily	Low Carrier Excessive concentration of additive decomposition products	Add 2-4ml/L carrier Carbon treat
Barrel hole “burning”	Low temperature Low chloride Iron (II) contamination Decomposition products	Heat solution Correct as per analysis Add hydrogen peroxide Carbon treat
Spots developing during passivation	Low carrier Poor rinsing after zinc	Add 2-4ml/L Carrier Improve rinsing

Cloudy solution which does not clear with filtration, accompanied by burning and/or loss of brightness	Decomposition product	Carbon treat
Cloudy solution which does not clear with filtration, but plating generally is satisfactory	Contamination, probably iron	Add hydrogen peroxide and filter

DISPOSAL

Dispose of in accordance with Local Authority requirements.

PRODUCT FAMILIES

The following products are referred to in this data sheet.

Product Name	Product Number
Zincobrite HT Carrier	581006
Zincobrite HT Brightener	581007
Zinc chloride	M166
Potassium chloride	M319
Boric acid	M132