Electrochemical Products Inc.
17000 WEST LINCOLN AVE. / NEW BERLIN, WI 53151-2781
PH 262-786-9330 / FAX 262-786-9403

TECHNICAL DATA

E-Brite™ Ultra-Chlor™ NA

Brightener for Non-Ammonium Chloride
Bright Acid Zinc Plating

E-Brite Ultra-Chlor NA is the latest development in acid zinc chloride technology that utilizes less organics than other zinc chloride processes.

It is a highly concentrated liquid addition agent for the deposition of brilliant, level, ductile deposits even on difficult substrates such as cast iron, heat treated and carburized steel from non-ammonium chloride electrolytes.

E-Brite Ultra-Chlor NA produces better distribution than any other chloride process.

Benefits

- Excellent brightness in HCD and LCD.
- No foam.
- Excellent rinsing.
- Low organics. Produces easier iron control and ease of chromating.
- 30,000 to 35,000 amp hours per gallon brightener consumption.
- Cloud point of 190°F
- Wide window of operation.
- Rack or barrel installation.
- Good distribution.
- Plates up to 120 ASF
- Operates as high as 120°F.
- The water soluble brightener goes into solution much more readily than a solvent based brightener. Hydrochloric acid can be added directly to the bath without kicking out (oiling out) of the brightener, because of the water solubility. HCl does not destroy the additives.

Material Information

1. **E-Brite Ultra-Chlor NA** is a liquid product that provides refining and partial brightness to the zinc deposit.
2. **E-Brite Ultra-Chlor B** is a liquid product which provides brightness and luster to the zinc deposit.

Operating Parameters

	Optimum	**Range**
Zinc Metal	4.5 oz/gal	3-5
Chloride Ion	19 oz/gal	16-20
Boric Acid	4.5 oz/gal	2.5-4.6
Ratio : Cl to Zn	4.2:1	
PH (Electrometric)	5.0	4.8-5.8
Temperature	80°F	70 - 120°F

Bath Make-Up	**Per one (1) gallon**
Zinc Chloride	0.58 lbs
Potassium Chloride	1.73 lbs
Boric Acid	0.28 lbs
E-Brite Ultra-Chlor NA	4% by volume
E-Brite Ultra-Chlor B	0.05% by volume

The bath is made up by dissolving the Zinc Chloride, Potassium Chloride and Boric Acid in approximately two thirds of the final bath volume of hot water. After all the salts have been thoroughly dissolved add the required amount of **E-Brite Ultra-Chlor NA** mixed with an equal amount of water. Dilute **E-Brite Ultra-Chlor B** with 5 parts water and add to the bath. Mix thoroughly and add water to bring to final volume.

Brightener and Chemical Maintenance Additions

E-Brite Ultra-Chlor B is used in the bath at the rate of approximately one gallon per 30,000 to 35,000 ampere-hours. Continuous addition with an addition agent pump is recommended. Dilute **E-Brite Ultra-Chlor B** with 4 to 5 parts of water prior to addition.

E-Brite Ultra-Chlor NA (make-up) is generally added only at time of initial make-up and to replace drag out losses. It should be maintained by adding 2 gallons of **E-Brite Ultra-Chlor NA** for each 100 lb of Potassium Chloride added to the bath. It must be diluted with an equal part of water prior to addition. Periodic Hull Cell tests should be used to evaluate the additions of **E-Brite Ultra-Chlor B** and **E-Brite Ultra-Chlor NA**.

Potassium Chloride and Boric Acid will be the only chemical additions normally required to maintain the solution. They should be added on a regular basis based on periodic analysis.

To raise chloride content 1.0 oz/gal requires 2.08 oz/gal Potassium Chloride.

To raise zinc metal content 1.0 oz/gal requires 2.08 oz/gal Zinc Chloride. The zinc metal is normally maintained by the dissolution of the anodes.

pH Control

If the pH of the bath is allowed to rise above 6.0, low current density dullness may occur. High pH may be readily adjusted by the addition of Hydrochloric Acid. Note: No dilution is necessary.

Low pH conditions are not normally encountered and occur only if excessive amounts of Hydrochloric Acid have been added when adjusting the pH. If this occurs, Potassium Hydroxide may be added to bring the pH to proper level.

Operating Temperature

E-Brite Ultra-Chlor NA baths have a very wide range of bright operating temperatures from approximately 70° to 120°F. The optimum temperature range for best brightness at minimum brightener consumption is 80° and the bath should be maintained at this temperature whenever economically feasible by cooling coils or refrigeration systems depending upon bath capacity. Barrel plating at 115°F is very feasible.

Cathode Current Density

Barrel plating 5 ASF and Rack plating 15 ASF.

Agitation

Solution circulation with low-pressure, high-volume (oil-less) air agitation is preferred. The blower intake must be placed away from acids and filtered to avoid dust and fumes from entering into the solution. The blower size is calculated at 0.5 to 1.0 cubic foot per minute for each foot of perforated agitation pipe with blower pressure at 1 psi for every 18 inches of solution depth.

Other mechanical movement of solution (eg. filter or recirculation pumps) through sparges may be sufficient to maintain fresh solution contact with both the cathode and anode.

Rod agitation is preferred for Hull Cells.

Filtration

Continuous filtration through polypropylene filter tubes of approximately 15 microns is recommended for routine operation with the capacity to filter the plating solution two times per hour. When carbon treatment or other bath purification is necessary, 5 - 10 micron filter tubes should be used. Polypropylene, polyethylene or PVC hoses should be used (Not sulfur containing rubber). Any other filter parts that come in contact with the plating solution should be non-metallic. Do not use cellulose as a filter media.

Anodes and Anode Baskets

Ball, flattop or slab zinc anodes (99.99% pure) should be used and accompanied with a certificate of analysis.

Anode baskets must be made with commercially pure titanium. Maintain sufficient anode area (current density below 30 A/ft^2) by keeping the baskets full of zinc balls at solution level. Do not exceed 9 volts. Do not use steel anode hooks or baskets in acid zinc solutions. Anode bags made of a polypropylene type material (not cellulose-based materials) should be used for rack plating. Anode bags should be cleaned semi-annually and replaced, if torn, with new, leached (to remove sizing) bags.

Anode bars should be wrapped with Plastisol tape, nickel plated or covered with a PVC piping to minimize corrosion and contamination of solution. If taping the anode bar, make certain to expose the metal bar where the hooks will be making contact.

Equipment

All plating tanks, racks, carriers, etc., which come into contact with solutions should be plastisol, polypropylene, polyethylene or Koroseal or similarly coated steel to provide adequate protection from corrosion. Equipment normally suitable for nickel plating is suitable for **E-Brite Ultra-Chlor NA** operations.

Ventilation

The spray or mist from **E-Brite Ultra-Chlor NA** solutions (not fumes) is corrosive. The use of fiberglass, PVC or polyethylene ventilation equipment and exhaust fans is recommended.

Cooling Coils

Teflon cooling coils are optimum for the bath, but titanium coils may be used as long as they are insulated from the electrical circuit. Lead or steel coils are not suitable.

Analysis For Chloride Zinc Plating solutions

1. Zinc Metal
2. Chloride analysis
3. pH
4. Cloud point

Zinc Metal

1. Pipette a 2 ml sample into a 250 ml Erlenmeyer flask.
2. Add 50 ml of distilled water.
3. Add 10 ml of ammonium hydroxide/chloride buffer solution.
4. Add a small amount of Eriochrome Black-T.
5. Add 10 ml of Formaldehyde (37%).
6. Titrate with 0.1M E.D.T.A.

   Calculation: ml of E.D.T.A. x 0.438 = oz/gal zinc metal

   - Make up ammonium hydroxide/chloride buffer solution by dissolving 50 grams of reagent ammonium chloride in 400 ml of reagent ammonium hydroxide. Dilute to 1.0 liter with distilled water. Mix thoroughly and store in a clean polyethylene bottle. PH=10.
   - Make up for Eriochrome Black-T Mixture = 1 gram Eriochrome Black –T added to 100 grams of reagent Sodium Chloride. Mix thoroughly. Store in dark brown bottle.
   - Make up 0.1M E.D.T.A. by dissolving 38 grams of reagent disodium E.D.T.A. in approximately 900 ml of distilled water. Dilute to 1.0 liter with distilled water and store in a polyethylene bottle.

Chloride

1. Pipette a 0.5 ml sample into a 250 ml Erlenmeyer flask.
2. Add 50 ml of distilled water and 1-2 ml of 2% potassium chromate solution.
3. Titrate with 0.1N Silver Nitrate until a permanent rusty color appears.

   Calculation: oz/gal Chloride Ion = (ml 0.1N Silver Nitrate) x 0.945

Cloud point

1. Obtain a sample of the working solution and if the solution is cloudy due to iron or other insoluble matter, filter approximately 200 ml and pour into a 250 ml beaker.
2. Insert magnetic spin bar and thermometer into solution and place on magnetic stirring hot plate.
3. Start the magnetic stirring and raise the temperature of the solution using a medium temperature setting on the hot plate.
4. Observe the solution temperature and note the temperature at which the first permanent cloudiness appears in the solution. The cloud point is the temperature at which the first permanent cloudiness appears. Note: Just prior to reaching the cloud point, small white clouds will rise from the bottom of the beaker.
5. Record the results in the appropriate manner.
6. A cloud point of less than 140°F indicates significant organic contamination. Consult your service representative for advice.

Handling and Storage

E-Brite Ultra-Chlor NA and **Ultra-Chlor B** produce temporary irritation when they come into contact with the skin. Therefore, care should be taken to prevent accidental eye and skin contact. Rubber gloves, a rubber apron and protective goggles should be worn when handling **E-Brite Ultra-Chlor NA** and **Ultra-Chlor B** and their solutions. In case of contact, immediately flush with copious amounts of water and scrub well with soap and hot water. **E-Brite Ultra-Chlor NA** and **E-Brite Ultra Chlor B** are stable on standing and have excellent shelf life.

PACKAGING

5 gal or 55 gallon non-returnable containers

IMPORTANT NOTICE! For Industrial Use Only

The following is made in lieu of all warranties, expressed or implied, including the implied warranties of merchantability and fitness for purpose: seller's and manufacturer's only obligation shall be to replace such quantity of the product as proved to be defective. Before using, user shall determine the suitability of the product for its intended use, and user assumes all risk and liability whatsoever in connection therewith. **Neither seller nor manufacturer shall be liable either in tort or in contract for any loss or damage, direct, incidental or consequential, arising out of the use or the inability to use the product.**

5-5-04