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COLSID K-250

CHLORIDE ZINC PLATING PROCESS
TECHNICAL DATA
2-1-02

COLSID K-250

PROCESS FOR NON-AMMONIATED BRIGHT CHLORIDE ZINC PLATING

COLSID K-250 is an economical brightener process for depositing brilliant, level, ductile zinc deposits in acid chloride zinc plating electrolytes.

COLSID K-250 baths contain no ammonium salts, completely eliminating waste problems from this source.

COLSID K-250 additives have excellent bath solubility compared to competitive systems.

COLSID K-250 baths readily plate substrates such as malleable iron castings, heat treated, and carbonitrided steels.

COLSID K-250 operates at higher temperatures than competitive systems.

COLSID K-250 operates with a minimal amount of foam and can be used with air agitation and evaporative recovery systems.

COLSID K-250 deposits readily accept blue-bright and yellow chromate dips.

OPERATING PARAMETERS

	RACK	BARREL
Zinc Metal:	3 - 4.5 oz./gal. *(22 - 34 g/l)*	2.5 - 4 oz./gal. *(19 - 30 g/l)*
Chloride:	17 - 20 oz./gal. *(127 -150 g/l)*	16 - 18 oz./gal. *(120 - 135 g/l)*
Boric Acid:	3 - 5 oz./gal. *(22 - 34 g/l)*	2.5 - 4 oz./gal. *(19 - 30 g/l)*
COLSID K-250 WETTER:	3 - 5% by volume	3 - 5% by volume
pH (Electrometric):	4.8 - 5.9	4.8 - 5.9
Temperature:	75 - 120º F. *(24 - 48º C.)*	70 - 120º F. *(21 - 48º C.)*

SOLUTION MAKE-UP

	100 LITERS	100 GALLONS
Zinc Choride:	7.0 Kg.	58 pounds
Potassium Chloride:	20.7 Kg.	173 pounds
Boric Acid:	3.4 Kg.	28 pounds
COLSID K-250 WETTER	4 liters	4 gallons
COLSID K-250 BRIGHTENER	0.1 liters	1 pint

The bath is made-up by dissolving zinc chloride, potassium chloride and boric acid in hot water (approximately two-thirds the *final volume*). After the salts are thoroughly dissolved, add the required amount of COLSID K-250 WETTER; mix well. Dilute the COLSID K-250 BRIGHTENER with equal parts water and add to the bath. Mix and dilute with water to the final volume. (Use a high grade of zinc chloride, with a maximum of 0.009% heavy metals.)

Make-up of the bath as above will yield an *optimum operating analysis* of:

Zinc Metal:	4.5 oz./gal.	*34 g/l*
Chloride Ion:	18.0	*135 g/l*
Boric Acid:	4.5	*34 g/l*
pH (Electrometric):	5.2	

MAINTENANCE ADDITIONS

COLSID K-250 BRIGHTENER, a readily dispersible water-based brightener, is added to the bath at the rate of one gallon per 15,000 to 20,000 ampere hours of operation.

OR

COLSID NA-II-O, a highly concentrated solvent-containing brightener, is added to the bath at the rate of one gallon per 25,000 to 30,000 ampere hours of operation.

COLSID K-250 WETTER must be replaced in the plating bath as it is lost by drag-out and tied-up and removed by insoluble iron. To replace dragout losses, 2 gallons COLSID K-250 WETTER should be added for every 100 pounds potassium chloride added; however, this does not account for losses caused by iron.

The most efficient and effective way to replace COLSID K-250 WETTER is to add it along with K-250 BRIGHTENER additions, as follows:

LOW DRAGOUT/LOW IRON CONTAMINATION (Most Rack Baths)
add 1 gallon K-250 WETTER with each 4 - 5 gallon K-250 BRIGHTENER

MEDIUM DRAGOUT (Most Barrel Baths)
add 1 gallon K-250 WETTER with each 1 gallon K-250 BRIGHTENER

HIGH DRAGOUT/HIGH IRON CONTAMINATION (Some Barrel Baths)
add 2 gallons K-250 WETTER with each 1 gallon K-250 BRIGHTENER

Maintenance of COLSID K-250 additives should be checked by the use of periodic Hull cell evaluations.

pH of the bath should be maintained within operating limits by the addition of dilute hydrochloric acid. Care should be taken during pH adjustment as the pH changes quite rapidly with small additions. Hydrochloric acid should be diluted with equal parts water prior to adding to the bath to avoid localized precipitation of addition agents. The pH should be checked using a meter, not pH paper. Too high pH causes low current density dullness.

PLATING CHEMICAL ADDITIONS, EQUIPMENT & PROCEDURES

During operation, the only chemical maintenance additions normally required are KCl and boric acid for replenishment due to dragout losses. Low boric acid causes increased high current density burning. Low chloride causes loss of brightness, leveling, and covering power, in the low current density.

Zinc Metal is normally maintained by anodic dissolution during electrolysis. High grade zinc slab anodes of minimum 99.99% purity are recommended as an economical anode source. Anodes may be drilled and tapped or used in titanium anode baskets. No dissolution of anodes occurs during idle periods and anodes do not have to be removed from the bath during shutdowns. It is recommended to maintain as much anode area as possible to promote good current distribution. High dragout barrel operations may require supplemental additions of zinc chloride. Acid resistant anode bags of cotton, dynel, or polypropylene are optional but recommended for rack operation to reduce anode-caused roughness.

Filtration - continuous filtration through polypropylene filter tubes of approximately 15 microns is recommended for routine operation. When carbon treatment or other bath purification is necessary, 5 - 10 micron filter tubes should be substituted.

Equipment - all plating tanks, racks, carriers, etc., which come into contact with COLSID K-250 solutions should be plastisol, polyethylene, hard rubber, or similarly coated to provide adequate protection from corrosion.

Agitation - unlike many competitive systems, COLSID K-250 does not foam excessively and both mechanical and air agitation can be used.

Ventilation - the spray from COLSID K-250 solutions (not fumes) is inherently corrosive. The use of fiberglass, PVC, or polyethylene ventilation equipment and exhaust fans is recommended to prolong equipment life.

Cooling Coils - made from teflon are optimum, but titanium coils may be used as long as they are insulated from the electrical circuit. Lead or steel coils are not suitable.

Pre-Plate Treatment - a standard cleaning and pickling cycle is recommended, as follows:

1. Hot alkaline soak clean;
2. Hot alkaline electroclean (anodic or periodic reverse);
3. Rinses;
4. 30% to 50% muriatic acid pickle with 1% to 2% COLUMBIA PICKLE PAL;
5. Rinses;
6. Acid Zinc Plate

Post-Plate Treatment - COLSID K-250 deposits are whiter and brighter than many competitive systems and provide surfaces that are highly receptive to most conventional blue-bright and yellow chromate dips.

ANALYSIS OF COLSID K-250 BATHS

Analysis for Zinc Metal

1. Pipette 2 ml. bath sample into a 250 ml. Erlenmeyer flask and add 100 ml. distilled water;
2. Add 10 ml. ammonium hydroxide;
3. Add approximately 0.2 gm. Eriochrome Black T Indicator Mix;
4. Add 10 ml. 8% formaldehyde solution;
5. Titrate immediatley with Standard EDTA Solution 0.0575 M to a blue endpoint.

FACTOR: (ml. Standard EDTA Solution 0.0575 M) · 0.25 = oz./gal. zinc metal

Analysis for Total Chloride

1. Pipette 10 ml. bath sample into a 250 ml. volumetric flask. Dilute to 250 ml. With distilled water and mix well.
2. Pipette 10 ml. of above dilute solution into a 500 ml. Erlenmeyer flask and add 100 ml. distilled water.
3. Add 5 ml. Sodium Chromate Indicator.
4. Titrate with Standard Silver Nitrate Solution 0.153 N to a reddish-brown endpoint. (The first permanent brown color is the endpoint.)

FACTOR: (ml. Standard Silver Nitrate Solution 0.153 N) · 1.82 = oz./gal. Chloride

Analysis for Boric Acid

1. Pipette 5 ml. bath sample into a 250 ml. Erlenmeyer flask.
2. Add Mannitol to form a thick slurry.
3. Add 3 - 5 drops Bromcresol Purple Indicator Solution.
4. Titrate with Sodium Hydroxide Solution 0.1 N to a purple endpoint.

FACTOR: (ml. Sodium Hydroxide Solution 0.1N) · 0.16 = oz./gal. Boric Acid

PREPARATION OF ANALYTICAL REAGENTS

EDTA 0.0575 M - dissolve 21.6 gm. C.P. Di-sodium EDTA salt in distilled water; dilute to exactly one liter.

Silver Nitrate 0.153 N - add 6 ml. Nitric Acid to 26.0 gm. C.P. Silver Nitrate; dissolve in distilled water, dilute to exactly one liter.

Sodium Hydroxide 0.1 N - dissolve 4 gm. A.R. grade sodium hydroxide in distilled water; dilute to one liter in a volumetric flask. Standardize against known acid.

Formaldehyde 8% Solution - dilute 200 ml. 40% C.P. Formaldehyde to one liter with distilled water.

Eriochrome Black "T" Indicator Mix - grind together 1 part indicator and 100 parts sugar.

Bromcresol Purple Indicator Solution - dissolve 0.1 gm. Bromcresol purple solid dye in 18 ml. 0.1 N Sodium Hydroxide; dilute to 250 ml. with de-ionized water.

Sodium Chromate Indicator - dissolve 10 gm. sodium chromate in 100 ml. distilled water.

Mannitol A.C.S. Grade

HANDLING AND STORAGE

COLSID K-250 additives can 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 COLSID K-250 additives. In case of contact, immediately flush with copious amounts of water and scrub well with soap and water. COLSID K-250 additives are stable on standing and have a shelf life in excess of two years.

FREEZABILITY: As with most chemical products, it is preferable that freezing be avoided. However if freezing should occur during transportation or storage, directions for handling the products covered in this technical data sheet are as follows:

If COLSID K-250 freezes, heat to 115-125F/46-51C in a warm water bath. Thoroughly mix until precipitates are completely dissolved.

If COLSID K-250 WETTER freezes, simply allow the container to completely thaw and bring to room temperature of 70-75F/ 21-24C. Thoroughly mix to bring back to original condition.

NON-WARRANTY

The data in this bulletin is believed by Columbia Chemical Corp. to be accurate, true, and complete. Since, however final methods of use of this product 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 assure any responsibility of the use of this product by the customer in any process which may infringe the patents of third parties.