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Your Global Plating Partner

1000 Western Drive
Brunswick, OH 44212
PHONE: 330/225-3200
FAX: 330/225-1499
www.columbiachemical.com

COLLOY I-Z-POSIT

ALKALINE NON-CYANIDE ZINC/IRON PLATING PROCESS
TECHNICAL DATA
2-01-02

COLLOY I-Z-POSIT

PROCESS FOR ZINC/IRON ALLOY PLATING FROM AN ALKALINE CYANIDE-FREE BATH

COLLOY I-Z-POSIT provides a bright, ductile electro-deposited zinc-iron alloy containing from 0.1% to 0.8% iron that is evenly distributed at low, mid and high current densities.

COLLOY I-Z-POSIT alloy deposits provide greatly enhanced corrosion resistance compared to zinc plate when properly chromated.

COLLOY I-Z-POSIT process operates at a zinc concentration of 1 - 2.5 oz./gal (7.5 - 18.75 g/l) allowing more flexibility when maintaining the range of zinc levels.

COLLOY I-Z-POSIT process does not require separate rectifiers or anodes for replenishment of iron in the bath.

COLLOY I-Z-POSIT deposits accept a non-silver black chromate as well as conventional yellow, clear, and silver-black chromates.

OPERATING PARAMETERS

RACK PLATING:	Range	Optimum
Zinc Metal:	1.0 - 2.0 oz/gal (7.5 - 15 g/l)	1.5 oz/gal (11 g/l)
Caustic Soda:	10 - 18 oz/gal (75 - 135 g/l)	15 oz/gal (112 g/l)
Iron Metal:	50 - 200 ppm	100 ppm
Solubilizer:	1 - 12 oz/gal (7.5 - 90 g/l)	6 oz./gal (45 g/l)
Operating Temp.:	70º - 95º F (21° - 34° C)	80º F (26° C)

BARREL PLATING:	Range	Optimum
Zinc Metal:	1.2 - 2.5 oz/gal (9 - 19 g/l)	1.7 oz/gal (13 g/l)
Caustic Soda:	10 - 20 oz/gal (75 - 135 g/l)	15 oz/gal 112 g/l)
Iron Metal:	35 - 200 ppm	100 ppm
Solubilizer:	1 - 12 oz/gal (7.5 - 90 g/l)	6 oz/gal (45 g/l)
Operating Temp.:	70º - 95º F (21° - 34° C)	80º F (26° C)

SOLUTION MAKE-UP

A new bath may be prepared either by dissolving zinc anodes in caustic soda or by using zinc oxide and caustic soda. In either case, the highest purity grade materials available should be used to eliminate metal impurities in initial makeup. Baths are prepared as follows:

RACK PLATING:

	100 Liters of Bath	100 Gallons of Bath
Zinc Oxide:	1.4 Kg.	11.7 pounds
Caustic Soda:	11.2 Kg.	93.7 pounds
I-Z-POSIT RESTORER:	0.5 liter	0.5 gallon
I-Z-POSIT BRIGHTENER:	1.5 liters	1.5 gallons
I-Z-POSIT SOLUBILIZER:	4.5 Kg.	37.5 pounds

BARREL PLATING:

	100 Liters of Bath	100 Gallons of Bath
Zinc Oxide:	1.6 Kg.	13.3 pounds
Caustic Soda:	11.2 Kg.	93.7 pounds
I-Z-POSIT RESTORER:	0.5 liter	0.5 gallon
I-Z-POSIT BRIGHTENER:	1.5 liters	1.5 gallons
I-Z-POSIT SOLUBILIZER:	4.5 Kg.	37.5 pounds

1. Slurry zinc oxide by slowly adding to minimal amount of water in plating tank, or preferably, in a separate make-up tank.
2. Slowly add caustic soda and water to approximately one-third the final volume.
3. Stir continuously until all zinc oxide is dissolved and solution is completely clear.
4. Dilute to 3/4 final volume with water and stir.
5. Add I-Z-POSIT SOLUBILIZER and stir until completely dissolved.
6. Add I-Z-POSIT BRIGHTENER and I-Z-POSIT RESTORER to bath and stir.
7. Dilute to final volume with water and stir until clear.

MAINTENANCE ADDITIONS

COLLOY I-Z-POSIT BRIGHTENER is added at the rate of 1 gallon (1 liter per 3,200 - 5,275) per 12,000 to 20,000 ampere-hours. It supplies the bath with brighteners, and is lost by electrolysis and drag out. Periodic Hull cell evaluations should be run to determine the optimum levels of brightener.

COLLOY I-Z-POSIT SOLUBILIZER is only lost by drag out. Once a history of drag out is established, regular additions can be made. It can generally be added based on the caustic soda additions to the bath. For instance, one pound of solubilizer is added for every 7.5 pounds of caustic soda (1 kilo per 3.75 kilos).

COLLOY I-Z-POSIT RESTORER is a specially blended solution containing solubilized iron and is added occasionally to replenish the iron supply in the bath. Additions of RESTORER can be determined analytically by Columbia Chemical. In general, a 0.1% by volume addition of RESTORER will raise the level of iron in the bath by 20 ppm.

COLLOY I-Z-POSIT ENHANCER is an aldehyde-based additive for increasing overall brightness especially at mid to low current densities. Typically COLLOY I-Z-POSIT ENHANCER is used “as needed” with an inital add off 0.025% - 0.05% and replenished at a rate of 1 gallon per 75,000 - 125,000 ampere-hours (1 liter per 20,000 - 33,000).

CONVERSION FROM NON-ALLOY SYSTEMS

The COLLOY I-Z-POSIT system is completely compatible with the COLZINC ACF-II and COLZINC ACF systems. Simply stop the ACF-II or ACF additions and begin to add the COLLOY I-Z-POSIT additives.

CONVERSION FROM COMPETITIVE SYSTEMS

Most competitive systems can be converted with simple slide in additions of the COLLOY I-Z-POSIT system but a sample should be sent to Columbia Chemical for evaluation and conversion.

ANODES

Inert steel anodes are used in the I-Z-POSIT alkaline system. The zinc is replenished by an external zinc generating tank. High purity zinc anodes, 99.99 Zn, are dissolved in a concentrated caustic soda solution. This solution is then pumped into the plating tank to maintain the zinc at optimum operating levels. Typically, the zinc generating tank is one-fifth (1/5) the volume of the zinc-alloy plating tank.

Zinc anodes may also be used but will result in depleting the bath of iron more rapidly and also will dissolve the anodes at a quicker rate.

HANDLING & STORAGE

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

COLLOY I-Z-POSIT plating baths are highly alkaline and all the customary precautions associated with the use of caustic soda solutions should be observed.

COLLOY I-Z-POSIT addition agents are stable on standing, with a shelf live in excess of 2 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 COLLOY I-Z-POSIT BRIGHTENER 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.

If COLLOY I-Z-POSIT SOLUBILIZER 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.

If COLLOY I-Z-POSIT ENHANCER freezes, heat to 115-125F/46-51C in a warm water bath. Thoroughly mix until precipitates are completely dissolved.

Basic Analysis for COLLOY I-Z-POSIT Alkaline Baths

Analysis for Zinc Metal

Reagents Used

+ Xylenol Orange Indicator - add 0.1 gms xylenol orange tetrasodium salt to 100 gms sodium chloride and mix well.
+ Acetate Buffer - dissolve 90 gms of anhydrous sodium acetate in 750 mls of distilled water. Add 15 mls of concentrated acetic acid, dilute to 1 liter with DI water. Mix well.
+ 0.0575 M EDTA - dissolve 21.6 gms C.P. disodium EDTA salt in distilled water, dilute to exactly one liter.

Titration Procedure

1. Pipette a 5 ml sample of the bath sample into a 250 ml Erlenmeyer flask.
2. Add a small amount of the xylenol orange indicator to produce a purple color.
3. Add 100 mls of Acetate Buffer solution and mix solution (pH should be 5.5).
4. Titrate solution with 0.0575 M EDTA solution to a constant yellow endpoint.

FACTOR: (mls 0.0575 M EDTA) x 0.10 = oz/gal zinc metal (oz/gal x 7.5 - g/l)

Analysis for Sodium Hydroxide

Regents Used

+ 10% Sodium Cyanide - dissolve 100 gms Sodium Cyanide solid in 750 mls distilled water. Add distilled water to final volume of 1 liter, mix well.
+ Caustic Blue Indicator solution - mix 0.5 gms Indigo Carmine in 500 mls distilled water.

Titration Procedure

1. Pipette 5 ml bath sample into a 250 mls Erlenmeyer flask and add 50 mls of distilled water.

2. Add 10 mls of 10% Sodium Cyanide solution and 1-2 mls of Caustic Blue Indicator solution.

FACTOR: (mls 0.94 N Sulfuric Acid Solution) = oz/gal Caustic Soda (oz/gal x 7.5 = g/l)

Analysis for Iron Metal in the Bath Solution

Reagents Used

+ Concentrated Nitric Acid

Procedure

1. Pipette 10 ml bath solution into a 100 ml volumetric flask.
2. Add 50 mls distilled water and 2-3 mls concentrated nitric acid to the flask.
3. Dilute to volume with distilled water. Mix well.
4. Determine iron content through Atomic Absorption Spectroscopy.

FACTOR: (AA Conc.) x 10 = ppm Iron metal (ppm = mgs per liter)

Analysis for % Iron in Deposit of Plated Parts
(Best results are obtained when using brass parts)

Regents Used

+ Concentrated Hydrochloric Acid
+ Pickle Pal

Procedure

1. Weigh sample part or parts and record the weight as “Weight #1”
2. Add approx. 1% Pickle Pal to enough conc. hydrochloric acid to cover the sample part(s). If total volume to immerse the parts is 500 mls solution then you would use 5mls. of Pickle Pal and 495 mls conc. hydrochloric acid.
3. Immerse the parts in the acid solution and strip the electroplate off the base metal. The stripping is complete when the blackish color is totally removed from the substrate.
4. Remove the parts from the solution and rinse with additional water. Record total volume of water used.
5. Add the acid stripping solution to the rinse water. Record the total volume as “Acid Volume”.
6. Completely dry the part(s) that were stripped and weigh. Record this as “Weight #2”.
7. Determine iron content of the acid solution by Atomic Absorption Spectroscopy.

Calculations:

1. “Weight #1” - “Weight #2” = “Weight of electroplate” (in gms)

2. $$\frac{\text{“Weight of electroplate” (gms)}}{\text{“Acid Volume” (mls)}} \times 1{,}000{,}000 = \text{ppm electroplate}$$

3. $$\frac{\text{ppm Iron (from AA)}}{\text{ppm electroplate}} \times 100 = \textbf{\% Iron in deposit}$$

Note: Steel parts may contribute slightly to the iron content when stripped in the acid.

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.