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# TRIVECTA® BLACK 24

## TRIVALENT BLACK LIQUID CHROMATE

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## TRIVECTA® BLACK 24

- TRIVECTA® BLACK 24 is the easiest most economical trivalent black process.
- TRIVECTA® BLACK 24 is optimized to operate for a 24 hour shift with minimal additions required.
- TRIVECTA® BLACK 24 works equally well over acid chloride zinc (both ammoniated and non-ammoniated systems), cyanide zinc, alkaline cyanide zinc free and zinc-iron/cobalt alloy deposits.

### SOLUTION MAKEUP: CHROMATE

	<u>Range</u>	<u>Optimum</u>
TRIVECTA BLACK A-24	10% - 18% by volume	15%
TRIVECTA BLACK B-24	0.3 - 0.8% by volume	0.5%
pH	2.0 - 2.6 (Optimum 2.3)	
Temperature	75° - 85°F/24° - 29°C (Optimum 80°F/26°C)	
Dip Time	30 to 60 seconds	
Agitation	Mechanical or circulating pump Air agitation is NOT recommended for extended production periods and rack applications	

### SOLUTION MAKEUP: TRIVECTA SEALER 350

TRIVECTA SEALER 350	Rack - 12% - 15% by volume (Optimum 15% by volume) Barrel - 20% - 25% by volume (Optimum 20% by volume)
pH	4.4 - 5.0 (optimum 4.8) To raise the pH use Caustic Soda Liquid 50% To lower the pH use Sulfuric Acid or Hydrochloric Acid
Temperature	115° - 125°F / 46° - 52°C (Optimum 120°F/48°C)
Dip Time	20 - 30 seconds
Agitation	Recommended (mechanical or circulating pump) Note: Turn agitation off when not in use

## SOLUTION MAINTENANCE: CHROMATE

To maintain optimum appearance and performance of the TRIVECTA BLACK 24 CHROMATE, the following tests are recommended once per 8 hour shift.

1. **pH**, If necessary, adjust within optimum. (Optimum 2.0 to 2.6)  
 High pH - slowly adjust with Sulfuric Acid or Nitric Acid within optimum range.  
 Low pH - slowly adjust with Caustic Soda Liquid 50% within optimum range.  
 \*Avoid NaOH adjustments if possible.
2. **Temperature**, Maintain temperature at the optimum of 75° to 85°F/24° to 29°C.  
 High temperature - If possible, cool to within optimum range.  
 Low temperature - Heat to optimum.
3. **Appearance of Finished Work**  
 A: Used to adjust level chromate activity for processing.  
 B: Used to adjust chrome levels to avoid smutty deposit, increase thickness.  
 C: Used rarely, but helps to adjust "blackening" when other parameters are already in order.
4. **Replenishment Recommendations**

### Make a replenishment solution of:

17 liters of the TRIVECTA BLACK A-24 mixed with 2 liters of the TRIVECTA BLACK B-24.  
 Only make enough solution that will be used in one day.

BARREL LINE (200 gallon line) - Add back 5 gallons for every 50 barrel loads.

RACK LINE (200 gallon line) - Add back 5 gallons for every 100 to 150 racks.

## SOLUTION MAINTENANCE: SEALER

To maintain optimum appearance and performance of the TRIVECTA SEALER 350, the following tests are recommended once per 8 hour shift.

1. **pH**, If necessary adjust within optimum. (Optimum 4.4 to 5.0)  
 High pH - slowly adjust with Sulfuric Acid within optimum range.  
 Low pH - slowly adjust with Caustic Soda Liquid 50% within optimum range.
2. **Temperature**, Maintain temperature at optimum of 115° to 125°F/46° to 52°C.  
 High temperature - If possible, cool to within optimum range.  
 Low temperature - Heat to optimum.
3. **Chrome (Cr)**, Using Atomic Absorption or X-Ray Fluorescence, determine content of chrome (Cr) in g/L or mg/L. Follow the Sealer Analytical Procedure. Optimum range is 3,500 to 5,800 mg/L (12 to 20%).

### Adjusting TRIVECTA SEALER 350 Working Solution Concentration

See TRIVECTA SEALER 350 Analytical Procedure and add back the required amount.

## ADDITIONAL OPERATING INSTRUCTIONS

### NITRIC ACID PRE-DIP

A nitric acid pre-dip of 0.2% to 0.4% by volume is recommended prior to the working TRIVECTA BLACK 24 chromate to polish the zinc deposit and to extend the life of the chromate solution.

### RINSING

Optimum rinsing should be used between the TRIVECTA BLACK 24 and TRIVECTA SEALER 350 processes.

### AGITATION

Maintain good "mechanical" agitation in the TRIVECTA BLACK 24 chromate and TRIVECTA SEALER 350 to ensure good solution flow over the parts. Good solution flow is essential for optimum black color and film growth. Shorter dip times and/or reduced barrel rotation are recommended for barrel applications. Air agitation is NOT recommended.

### ALKALINE ZINC PLATED PART

Alkaline zinc plated parts may darken and turn black more quickly than acid chloride plated parts. Shorter dip times or lower concentrations of the TRIVECTA BLACK A-24 may be required for optimum black appearance.

### ACID CHLORIDE ZINC PLATED PARTS

Acid chloride zinc plated parts may take longer to turn black than alkaline zinc plated parts. Optional addition of the TRIVECTA BLACK C-24 may be required for optimum black appearance. Incremental additions of 0.025% by volume TRIVECTA BLACK C-24 are recommended until black color is achieved. DO NOT INCREASE THE TOTAL TRIVECTA BLACK C-24 BY MORE THAN 0.2% BY VOLUME.

## ANALYTICAL PROCEDURE: TRIVECTA SEALER 350

### TITRATION PROCEDURE

#### Items Needed

1. DI Water
2. 20% Sodium Hydroxide Solution
3. 35% Hydrogen Peroxide Solution
4. 10% Nickel Chloride Solution
5. Conc. Hydrochloric Acid
6. Ammonium Bifluoride
7. 10% Potassium Iodide Solution
8. Starch Indicator Solution
9. 0.010N Sodium Thiosulfate Solution

#### Procedure

1. Pipette a 10 ml sample of working chromate into a 100 ml volumetric flask. Dilute to 100 ml with DI water.
2. Pipette 10 ml of the above diluted solution into a 250 ml Erlenmeyer flask and dilute to approx. 100 ml with DI water.
3. Add 5 ml of 20% Sodium Hydroxide solution and mix.
4. Add 1 ml of 35% Hydrogen Peroxide solution and mix.

5. Place solution on a hot plate and with mixing heat until boiling. Boil for 5 minutes.
6. Add 1 ml of 10% Nickel Chloride solution to the flask and continue boiling for an additional 2 minutes.
7. Remove solution from hot plate and cool to room temperature.
8. With mixing add the following in order; 10 ml of concentrated Hydrochloric Acid, 1 gram Ammonium Bifluoride, 10 ml Potassium Iodide, and 1 ml Starch Indicator.
9. Titrate solution with 0.010N Sodium Thiosulfate to a clear/slight greenish endpoint.

CALCULATION for % TRIVECTA SEALER 350= mL of 0.010N Sodium Thiosulfate x 0.62

## ***ANALYTICAL PROCEDURE: TRIVECTA 24 CHROMATE***

### **TITRATION PROCEDURE**

#### **Items Needed**

1. DI Water
2. 20% Sodium Hydroxide Solution
3. 35% Hydrogen Peroxide Solution
4. 10% Nickel Chloride Solution
5. Conc. Hydrochloric Acid
6. Ammonium Bifluoride
7. 10% Potassium Iodide Solution
8. Starch Indicator Solution
9. 0.010N Sodium Thiosulfate Solution

#### **Procedure**

1. Pipette a 10 ml sample of working chromate into a 100 ml volumetric flask. Dilute to 100 ml with DI water.
2. Pipette 25 ml of the above diluted solution into a 250 ml Erlenmeyer flask and dilute to approx. 100 ml with DI water.
3. Add 5 ml of 20% Sodium Hydroxide solution and mix.
4. Add 1 ml of 35% Hydrogen Peroxide solution and mix.
5. Place solution on a hot plate and with mixing heat until boiling. Boil for 5 minutes.
6. Add 1 ml of 10% Nickel Chloride solution to the flask and continue boiling for an additional 2 minutes.
7. Remove solution from hot plate and cool to room temperature.
8. With mixing add the following in order; 10 ml of concentrated Hydrochloric Acid, 1 gram Ammonium Bifluoride, 10 ml Potassium Iodide, and 1 ml Starch Indicator.
9. Titrate solution with 0.010N Sodium Thiosulfate to a clear/slight greenish endpoint.

CALCULATION for % TRIVECTA 24 = mL of 0.010N Sodium Thiosulfate x 0.755

## NON-WARRANTY

The data contained 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 assume responsibility of the use of this product by the customer in any process which may infringe the patents of third parties.

