DECOCHROME

DECORATIVE CHROMIUM CATALYST

INTRODUCTION

Decochrome is a high speed decorative chromium plating process. Decochrome Catalyst is supplied as a liquid which is added to chromic acid solution.

BENEFITS

- Wide current density range
- High cathode efficiency
- Excellent activation of nickel
- Consistent mirror bright deposits
- Economical

SOLUTION MAKE-UP

Decochrome Catalyst can be used in plating solutions of varying chromic acid concentrations as follows:

Chromic Acid	150 g/L	225 g/L	300 g/L
Decochrome Catalyst	9 ml/L (0.9% v/v)	14 ml/L (1.4% v/v)	18 ml/L (1.8% v/v)
Sulfuric Acid (1:200 ratio)	0.75 g/L	1.125 g/L	1.5 g/L
Spray Suppressant	2 – 3 ml/L	2 – 3 ml/L	2 – 3 ml/L

OPERATING DATA

Current density	100 – 150 ASF (See NOTES)
Temperature	95 – 125°F (See NOTES)
Time	3 – 5 minutes (See NOTES)
Expected Deposition	7 – 12 µ”

EQUIPMENT

Tanks	Steel, lined with PVC or other suitable material
Heaters	PTFE, lead alloy or tantalum immersion with thermostatic control.
Ventilation	Required, in conjunction with Spray Suppressant.
Agitation	Solution agitation is necessary to ensure uniform temperature and avoid layering. It is also useful for mixing the solution after additions, topping up with water etc.
Rectifier	9-18 volts with maximum 5% ripple.
Anodes	4% tin/lead

INSTALLATION

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

If in any doubt as to the cleaning procedure please contact *Automated Chemical Solutions* technical support.

1. Remove anodes and ancillary equipment (coils, thermostats, etc) to allow thorough cleaning of tank by scrubbing walls and bottom.
2. Rinse thoroughly with water.
3. Fill the tank to approximately 70% of required final volume and heat to approximately 120°F.
4. Add the calculated quantity of chromic acid and stir to dissolve.
5. Add the Decochrome Catalyst and mix thoroughly.
6. Analyze for sulfate and add sulfuric acid accordingly.
7. Add Spray Suppressant.
8. Replace anodes and electrolyze using dummy cathodes for 3-4 hours at required plating temperature (see NOTES).

MAINTENANCE AND CONTROL

Chromic Acid:
For every lb of chromic acid added, 27.3 ml of Decochrome Catalyst should be added. The chromic acid concentration can be estimated from the specific gravity of the solution, using Table 1 below.

The specific gravities shown in the table are for new solutions. As contaminants build up in the solution the specific gravity will not be a true measure of the chromic acid concentration and periodic chemical analysis is recommended.

Table 1

SPECIFIC GRAVITY OF DECOCHROME SOLUTION*		
Chromic Acid g/L	**Specific Gravity**	**Degrees Bé**
130	1.090	11.97
150	1.105	13.78
170	1.120	15.54
190	1.135	17.25
210	1.147	18.42
230	1.160	20.00
250	1.175	21.60
270	1.190	23.15
290	1.202	24.20
310	1.215	25.66

*Measured at 60ºF

NOTES:

Anodes:
It may be necessary to remove insulating scale from some anodes. This can be done by scrubbing while wet. If the solution is left idle for an extended period (over shut-down, etc.) the anodes should be removed and left suspended in air. When plating begins again they should be electrolyzed to re-form the brown film.

Chromic Acid Concentration
The Decochrome process can be used between 150 and 300 g/L chromic acid. Lower concentrations should be used where drag-out of hexavalent chromium must be minimized. Higher concentrations will be necessary to maintain performance as metallic contamination builds up.

Current Density
The optimum range is 100-150 ASF but this can be varied depending on the simplicity or complexity of the work to be plated. (See Throwing Power)

Temperature
The high end of the recommended range (95-125°F) will allow higher maximum current densities and thus faster plating speeds. Lower temperature will give better covering power.

NOTES (con't)

Time
Times can be varied when optimizing current densities to obtain desired deposits. Quick (<2min) operating times are common in the field.

Throwing Power
Striking Decorchrome initially produces best throwing power.

Sulfate
A ratio of 200:1 (chromic acid : sulfate) should be maintained. High sulfate will cause poor throwing power and should be reduced by additions of barium carbonate as shown in Table 2 below.

Table 2

BARIUM CARBONATE ADDITIONS TO REDUCE SULFATE LEVEL				
g/L Sulfate To be removed	**Grams Barium Carbonate Required**			
	66 gal	132 gal	198 gal	264 gal
0.1	50	100	150	200
0.2	100	200	300	400
0.3	150	300	450	600
0.4	200	400	600	800
0.5	250	500	750	1000

ANALYSIS METHODS

Hexavalent chrome

Reagents

Ammonium bifluoride
Concentrated hydrochloric acid
Potassium iodide
Starch indicator
0.1N Sodium thiosulfate

Method

1. Pipette a 10 mls sample of the plating solution into a 500 ml volumetric flask and fill to the mark with DI water.
2. Mix thoroughly.
3. Pipette 10 mls of above dilution into a 250 ml Erlenmeyer flask.
4. Add 100 mls of DI water and 2 g of ammonium bifluoride and stir to dissolve.
5. Add 10 mls of concentrated hydrochloric acid and mix.
6. Add one spatula of potassium iodide and stir to dissolve.
7. Place in the dark to react for 5 minutes.
8. Titrate with 0.1N sodium thiosulfate to a pale straw color, add starch indicator and continue titration to a light green color.

Calculation

Chromic acid (g/L) = mls of 0.1N sodium thiosulfate X 16.67

Replenishment

For every 1 g/L required add 1 g/L chromic acid and 0.06 mls/L Decochrome Catalyst

ANALYSIS METHODS (Cont.)

Sulfuric acid (sulfate)

Reagents

Concentrated hydrochloric acid
Hydrogen peroxide solution
30% w/v barium chloride solution
5% v/v hydrochloric acid

Method

1. Filter a sample of the working solution.
2. Pipette a 10 mls sample of the filtered solution into a 500 ml beaker.
3. Add 20 mls DI water and 20 mls concentrated hydrochloric acid.
4. Add hydrogen peroxide drop by drop until no further effervescence is seen and the solution is a blue-green color.
5. Heat to boiling and add 2 mls of 30% barium chloride solution.
6. Continue boiling for 2 minutes.
7. Add 200 mls boiling DI water and continue boiling for 2 hours.
8. Allow to stand overnight.
9. Filter into a Whatman 542 filter paper.
10. Rinse the beaker into filter with hot DI water.
11. Rinse beaker into filter paper with hot 5 % hydrochloric acid.
12. Rinse filter with hot DI water until paper is clean.
13. Weigh a dried crucible and record weight as ‘A’ in grams.
14. Transfer paper to the crucible and burn off in furnace for 1 hour at 1472°F (800°C).
15. Ensure no carbon residues remain in the crucible.
16. Transfer crucible to a desiccator and allow to cool.
17. Weigh the crucible and record weight as ‘B’ in grams.

Calculation

Sulfuric acid (sulfate) (g/L) = (weight B – weight A) X 42.02

Replenishment

For every 1 g/L required add 0.54 mls/L sulfuric acid

STORAGE

Store in original containers above 40 °F.

SAFETY

CAUTION! Decochrome Catalyst and working solutions contain acidic and Chrome components. Avoid contact with eyes, skin and clothing. Wear chemical handler's gloves, goggles and protective clothing when handling. Read and understand Material Safety Data Sheet before using this product.

PRODUCT GROUPS

The following products are referred to in this data sheet.

PRODUCT NAME	PRODUCT NUMBER
Decochrome Catalyst	417001
DHC Spray suppressant	411009

NOTICE

The information and recommendations of PMD (UK), Ltd. and Automated Chemical Solutions, Inc., and its representatives, regarding this product are, to the best of our knowledge, true and accurate. We make no guarantee of results because the conditions of actual use are beyond our control. We assume no liability for damages or penalties resulting from the use of this product or following our recommendations. Our recommendations and suggestions for use of this product are not intended to grant license to operate under or infringe any patent.