PLATING GUIDE

Contents

PLATING GUIDE

WARNING

Please be aware that this is a general guide to most types of plating and that methods vary because of environment, equipment and chemicals used. Please follow specific instructions from your supplier. AJS is the exclusive distributor for LEGOR plating products.

SAFETY

It is vitally important to be safety and health conscious when working with plating processes. Many plating solutions are poisonous and can be lethal if ingested and toxic fumes may result when using certain chemicals especially acids. Before use of any plating chemicals or solutions read and understand all label instructions and:

- Do not ingest
- Do not inhale fumes
- Protect eyes and all skin
- Make sure to use adequate ventilation of your dedicated plating area
- Keep out of reach of children
- Dispose of waste material safely and be environmentally friendly

PREPARATION

Items that are to be plated will need to be polished and buffed to produce the desired final finish. There are many buffing and polishing techniques and compounds depending on the metal and the type of finish desired. The main point is that the finish of the plated item will generally not be any better than the work before plating.

EQUIPMENT AND CHEMICALS

Power Supply/Plating Rectifier
Plating leads x 2 (+ve & -ve)
Copper Wire
Pyrex Beakers x 3 (Distilled water, Degreaser, Plating Solution)
Beaker covers or sealers x 3
Labels (Beakers should be used for the same liquid each time)
Anodes (Stainless-steel for degreaser & gold, Platinised Titanium for Rhodium)
Electrolytic Degreasing Salts
Plating Solutions
Distilled (Demineralised) Water
Hot Plate (Note: many plating solutions do not need heating)
Safety Supplies (Rubber Gloves, Chemical Resistant Apron, Face Mask, Protective Glasses)
Optional: Pen Plating Pen, cables, fibre tips

PRE-PLATING SURFACE CLEANING

The main concern here is to remove all traces of oxide, dirt or grease so that the plating material adheres evenly to the item being plated and so prior to plating surfaces must be chemically clean:

- Clean item using an ultrasonic cleaner containing a formulated solution or compound.
- Remove item from the ultrasonic cleaner being aware of any grease being "dragged" from the surface.
- Rinse thoroughly with clean water or better still use a steam cleaner.
- Dry off with air or clean cloth or tissue.
- Electro clean with degreasing salts using a stainless-steel anode in a Pyrex beaker. Heat to 60°, 4 – 6 volts for 15-60 seconds. The positive connection is attached to the anode whilst the negative connection is attached to the item being plated using copper wire. Connectors must never touch each other. Disconnect from work before removing from solution.
- Rinse again with distilled water and dry off as above.
- The "Water Break Test" – Water will not remain on a surface that is greasy. Dip work into cold clean water, withdraw carefully for inspection without touching it with your fingers. If work is covered uniformly with a thin layer of water (if it is wet) then the surface is clean. If the film breaks and water does not run freely from the surface the cleaning process must be repeated until the water break test is successful.
- The entire cleaning process must be fully completed just before plating to avoid contamination. Any delay between the cleaning process and plating could affect the final plating outcome.
- Make sure all beakers containing any of the liquids required for the plating process are kept covered or sealed when not in use.

NOTE BEFORE PLATING:

- +ve and -ve connectors should never touch each other
- Be careful when agitating to always avoid touching work and anode
- Disconnect power lead from work before removing from solution

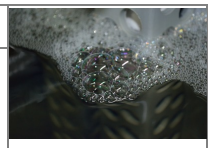
TECHNICAL DATA SHEETS

For specific guides to stocked LEGOR products please refer to the plating technical sheets in the following pages for Degreasing Salts

Technical data sheet and product guideline

SGR1P

Electrolytic degreasing powder for the plating process, 1 kg



Color coordinates

Product form

Form	**Liquid**
Material color	**White powder**
Storage time	**2 years**
Format	**Concentrated**
Chemical type	**Alkaline**
Volume	**1 kg**

Operating data

	Range	Optimal
Voltage (V)	**4 - 8**	**6**
Working temperature (°C)	**20 - 40**	**25**
Exposure time (sec)	**30 - 120**	**60**

Deposit data

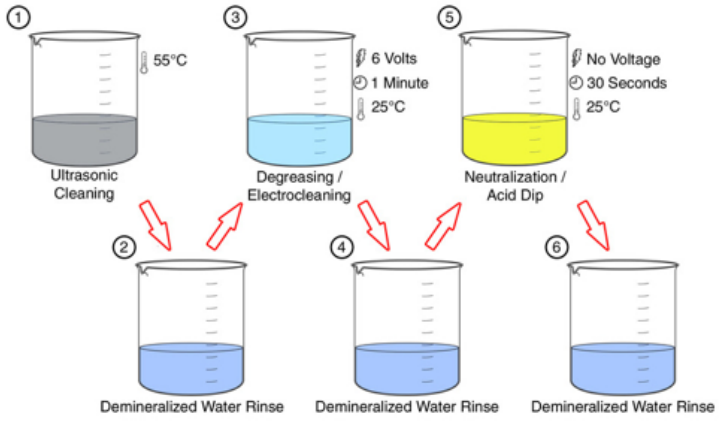
Preparation

SOLUTION PREPARATION PROCEDURE
SGR1P is used in the concentration of 80 grams per liter of solution to be prepared. Fill in half of the tank with preferably deionized water or tap water, add under stirring the needed quantity of SGR1P and, once dissolved, bring to final volume with water.

Example: preparing 10 liters of solution
1. Fill the working tank with 5 liters of water
2. Add under stirring 800 grams of SGR1P
3. Once all the powder has been dissolved, bring to final volume with other 5 liters of water.

Saline concentration: 50 - 100 g/l (Range) ; 80 g/l (Optimum)

Cleansing procedure



Supplementary Information

SOLUTION LIFETIME
Degradation of the degreasing solution made with SGR1P is directly dependant on the quantity of material washed and on the level of contamination present in the solution. It is not possible to determine before the lifetime of the solution. Once exhausted, the solution must be discharged according to the local laws present to this concern.

Disclaimer

All recommendations and suggestions in this bulletin concerning the use of our products are based upon tests and data believed to be reliable. Since the actual use by others is beyond our control, no guarantee expressed or implied, is made by Legor Group, its subsidiaries of distributors, as to the effects of such use or results to be obtained, nor is any information to be construed as a recommendation to infringe any patent.

CYANIDE FREE GOLD PLATING

1. Pre-plating surface cleaning as above – all steps.
2. Optional: Wash in Pickle solution (250g/1L) at room temperature to etch surface for maximum adhesion.
3. Rinse with distilled/demineralised water and dry.
4. Bath Temperature: 50-60° C
5. Voltage: 3 - 4 V (4 - 6 V for Pink Gold Solution)
6. Anode: Stainless-steel (curved suggested for even build up) or pure Gold
7. Agitation: Moderate.
8. Treatment Time: 40-45 Seconds (30-50 Seconds for Pink Gold Solution).
9. Connection: +ve to anode/ -ve to jewellery through copper wire
10. Rinse again with distilled/demineralised water and dry thoroughly.

TECHNICAL DATA SHEETS

For specific guides to stocked LEGOR products please refer to the plating technical sheets in the following pages for Pink Gold Bath

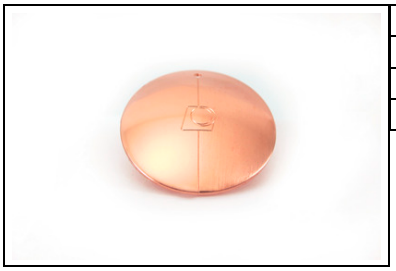
Technical data sheet and product guideline

GFRED

Red gold flash solution for bath plating 0.8 g/l (ready-to-use)

BATH

Color coordinates



L	**85**
a	**10.1**
b	**14.7**
c	

Product form

Metal concentration	**0.8 g/l (Au)**
Form	**Liquid**
Material color	**Transparent**
Storage time	**2 years**
Format	**Ready to use**
Chemical type	**Alkaline**
Volume	**1 liter**

Operating data

	Range	Optimal
Voltage (V)	**3.5-5.5**	**4.5**
Working temperature (°C)	**55-65**	**60**
Exposure time (sec)	**10-60**	**35**
pH	**9-11**	**10**
Cathode efficiency (mg/Amin)	**8-12**	**10**
Solution density (Bé)	**2 - 6**	**4**
Anode/cathode ratio	**>1:1**	**>1:1**
Anode type	**Platinized titanium or stainless steel**	
Agitation	**Moderate**	

Metal concentration

Metal	Range (g/l)	Optimal (g/l)
Gold	**0.4 -1.0**	**0.8**

Deposit data

Purity (%)	**99.9**
Hardness (HV 0,01)	**90-100**
Density (g/cm3)	**19**
Thickness (um)	**0.1-0.2**
Appearance	**Shiny**
Color	**Red**

Preparation

GFRED is a ready-to-use plating bath at the concentration of 0.8 g/l of gold. No preparation is required while filling the working tank.

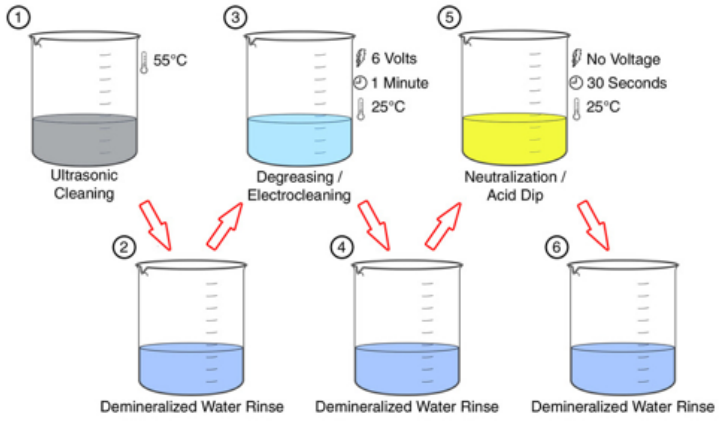
Equipment

Working vessel materials: Pyrex glass / PVC / polypropylene
Power supply: DC current rectifier with low residual AC (<5%)
Heating element
Anode type: Platinized titanium [1.5-2.5 µm] or stainless steel

For larger bath volumes:

Magnetic driven filter pumps with 5-15 µm cartridge (before use, boil and wash the cartridges with demineralized water for 3 hours to prevent organic contamination)
Amp/min counter.

Pre treatment Cleansing procedure



Bath maintenance

This process is easy to maintain, but will initially requires frequent analytical controls in order to obtain a correct concentration level of all the metals present. Metal concentrations greatly influence the final deposited color; therefore, an incorrect management of these parameters shall inevitably lead to unwanted colors. Some general guidelines for maintenance are below described:

- Adding GF1AGR will lead the colour towards green-/pale hues.

- Adding GF1CUR will lead the colour towards red/pink hues.

- Adding GF10AUR will lead the colour towards yellow hues.

- Adding AUS683 is used to replenish the gold content

- Potassium cyanide concentration must be frequently controlled to be maintained at the correct working concentration (0.6 - 1.2 g/l)

Post treatment

Electrolyte should be removed from the surface as quick as possible. Rinse off the bath rests in a recovery rinse (still rinse). Rinse the parts in circulating deionized water and dry.

Water purity

To prevent contamination of the bath both during its preparation and any subsequent replenishing operations, use demineralized water with a conductivity of less than 3 µS/cm (containing no traces of organic compounds, Chlorine, Silicon, or Boron).

Safety information

Being an alkaline solution, the electrolyte is an irritant to the skin, eyes and mucous membranes. Caution should be exercised when using the product, avoiding contact with the eyes and skin. Use gloves and safety goggles. Keep away from acid based chemicals. For further information please refer to the relative MSDS.

Supplementary Information

For maximum performance and in particular in terms of resulting color do not use an excessive agitation. A moderate agitation of the pieces to be plated will be sufficient. For larger volumes it is sufficient the use of a magnetic drive filter pump with a not too much high capacity.

Disclaimer

Related products

AUS683	Gold replenisher in salt form (100 g, Gold title: 68.3%)	

CYANIDE FREE SILVER PLATING

1. Pre-plating surface cleaning as above – all steps.
2. Bath Temperature: Room Temperature
3. Voltage: 1.4 - 1.8 V
4. Anode: Stainless-steel (curved suggested for even build up)
5. Agitation: Moderate.
6. Treatment Time: 15-90 Seconds
7. Connection: +ve to anode/ -ve to jewellery through copper wire.
8. Rinse under cold water tap and dry thoroughly.

TECHNICAL DATA SHEETS

For specific guides to stocked LEGOR products please refer to the plating technical sheets in the following pages for Silver Bath.

Technical data sheet and product guideline

AG-ECO1

ECO SILVER – Cyanide free silver plating solution 1L (ready-to-use)

BATH

Color coordinates

L	**97.7**
a	**-1.2**
b	**2.7**
c	**2.9**

Product form

Metal concentration	**25 g/l (Ag)**
Form	**Liquid**
Material color	**Transparent**
Storage time	**2 years**
Format	**Ready to use**
Chemical type	**Alkaline**
Volume	**1 liter**

Operating data

	Range	Optimal
Voltage (V)	**0.1-1.0**	**0.5**
Current density (A/dm2)	**0.1-2**	**1.0**
Working temperature (°C)	**20-30**	**25**
Exposure time (sec)	**1-30 mins**	**1-5 mins**
pH	**10-11**	**10.5**
Cathode efficiency (mg/Amin)	**69**	
Solution density (Bé)		**12 Bé**
Anode/cathode ratio	**2:1**	**3:1**
Anode type	**99.98 Silver**	
Agitation	**Moderate**	

Metal concentration

Metal	Range (g/l)	Optimal (g/l)
Silver	**20 - 40**	**25**

Deposit data

Purity (%)	**99.99**
Hardness (HV 0,01)	**80**
Density (g/cm3)	**10.5**
Thickness (um)	**1.0 - 20.0**
Appearance	**Glossy**
Color	**Silver**

Suitable substrates

AG-ECO1 can be deposited directly onto Silver, Palladium, Gold, Nickel and its alloys. An intermediate deposit or precious metal plating strike (Ag or Au) is necessary before depositing onto Tin, Lead, Zinc, Cadmium, Aluminum and Iron.

Preparation

AG-ECO1 is a ready-to-use galvanic bath at the concentration of 25 g/l. No preparation is required.

Equipment

Working vessel: Pyrex glass / PVC / polypropylene.

Power supply: DC current rectifier with low residual AC (<5%).

Heating element.

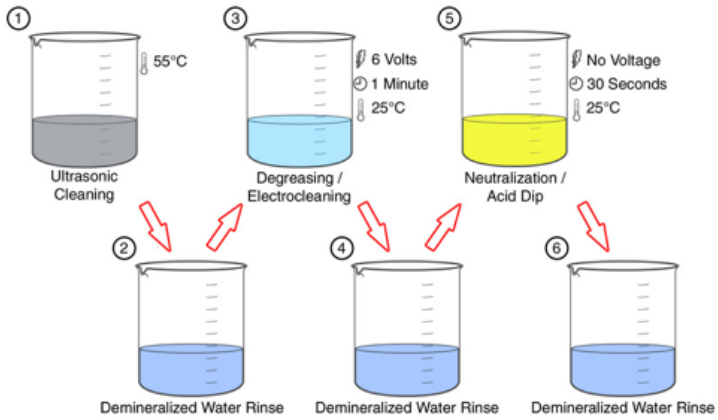
Anode Type Platinized Titanium [1.5-2.5 µm].

For larger bath volumes:

Magnetic driven filter pumps with 5-15 µm cartridge (before use, boil and wash the cartridges with demineralized water for 3 hours to prevent organic contamination).

Amp/min counter.

Pre treatment Cleansing procedure



Bath maintenance

AG-ECO1 ready-to-use solution is set for 1 liter of bath. As consequence, the bath has to be used until its complete consumption. Furthermore, light exposition may promote silver precipitation in form of dust, that reflects a more darker aspect of the solution itself. This problem is easily resolved by filtering the silver oxide dust from the solution by using a simple funnel and a filter paper system. In any case to limit this problem store the solution in an environment well repaired from light.

Post treatment

It is extremely important after the silver plating to follow these steps:

Pieces come out from the silver solution greyish after plating so you must always follow the silver plating process with the mandatory post treatment process by dipping the pieces just silver plated inside the AG-ECO1B solution at 60°C for 30 seconds. THIS SOLUTION WORKS IN ABSENCE OF CURRENT.

FOR THE POST TREATMENT PROCESS WE RECOMMEND the following procedure:

- After the silver plating, wash with current water
- Wash 1-2 times in deionized water at room temperature
- Submerge in AG-ECO1B post plating solution at 60°C leaving the silver plated pieces inisde for 30 seconds
- Remove the pieces form the post treatment solution
- Then appearing bright and shiny Double wash again in deionized water
- Passivate worked items with **T-PRO**. **If this step will not be done, the silver plated surfaces will suffer tarnish in a short time**

Water purity

To prevent contamination of the bath both during its preparation and any subsequent replenishing operations, use demineralized water with a conductivity of less than 3 µS/cm (containing no traces of organic compounds, Chlorine, Silicon, or Boron).

Safety information

AG-ECO1 process is a chemical solution totally cyanide free and for this reason is not particularly dangerous for the operator neither for the external environment. In any case we can not exclude completely possible irritating effects on the skin, eyes and mucous membranes. Caution must be observed while using the product avoiding direct contact with eyes and skin. For further information please refer to the relative Material Safety Data Sheets.

Supplementary Information

As the process works at lower current density values, we recommend the use of a rectifier which permits to set low values of both voltage and amperage with good sensibility.

Packaging

The product is sold in a kit form made of two 1 liter bottles each of them containing ready to use solutions: AG-ECO1A and AG-ECO1B.

- AG-ECO1A is the really cyanide free silver plating solution;
- AG-ECO1B is the post silver solution, essential to maximize the final result of the cyanide free silver plating solution.

IMPORTANT: Avoid the direct exposure of the AG-ECO1A solution to the external light when it is not working in order to prevent silver precipitation as oxide
from the solution.

General Notes On Cyanide Free Silver Plating

As the process works at lower current density values, we recommend the use of a rectifier which permits to set low values of both voltage and amperage with good sensibility. The items to be plated have to be prepared according with the normal practice. Generally we suggest to start with a ultrasonic degreasing process followed by rinse and subsequent electrolytic degreasing step (i.e. SGR1) at 5-6 V for 1-2 minutes. Neutralize them by dipping the items in acidic solution 5% sulphuric acid or with something similar (i.e. NEUT1) and then rinse again with pure water.

Disclaimer

Packaging

RHODIUM PLATING

Solution can be either ready mixed/diluted or concentrate.
For concentrate be careful to add exact amount of distilled water to concentrate to make up exactly.
Always add distilled water to the Rhodium concentrate and not the other way around.
1 litre (Example - 250ml concentrate added to 750ml distilled water)

1. Pre-plating surface cleaning as above – all steps.
2. Bath Temperature: 20-40° C
3. Voltage: 2 - 4 V
4. Anode: Platinized Titanium or pure Platinum
5. Agitation: Gentle to Moderate.
6. Treatment Time: 20-30 Seconds
7. Connection: +ve to anode/ -ve to jewellery through copper wire.
8. Rinse under cold water tap and dry thoroughly.
9. When plating bath is depleted do not top up but rather use all new solution.

TECHNICAL DATA SHEETS

For specific guides to stocked LEGOR products please refer to the plating technical sheets in the following pages for:

- Rhodium Bath Ready Mixed
- Rhodium Bath Concentrate

Technical data sheet and product guideline

RH2W

White rhodium for bath plating 2 g/l ready-to-use

BATH

Color coordinates

L	**88.6**
a	**0.6**
b	**2.1**
c	**2.2**

Product form

Metal concentration	**2g/l (Rh)**
Form	**Liquid**
Material color	**Orange**
Storage time	**2 years**
Volume	**1 liter**

Operating data

	Range	Optimal
Voltage (V)	**2-6**	**3**
Current density (A/dm2)	**0.5-10**	**3**
Working temperature (°C)	**20-60**	**40 - 50**
Exposure time (sec)	**20-60**	**40**
Cathode efficiency (mg/Amin)	**4-8**	**6**
Anode/cathode ratio	**1:1-4:1**	**2:1**
Anode type	**Titanium platonized**	
Agitation	**Moderate**	

Metal concentration

Metal	Range (g/l)	Optimal (g/l)
Rhodium	**0.6 - 5.0**	**2.0**

Deposit data

Purity (%)	**99.9**
Hardness (HV 0,01)	**800-900**
Density (g/cm3)	**12.4**
Thickness (um)	**0.02-0.20**
Appearance	**Shiny**
Color	**White**

Preparation

RH2W is a ready-to-use galvanic bath at the concentration of 2 g/l. No preparation is required.

Equipment

Working vessel: Pyrex glass / PVC / polypropylene.

Power supply: DC current rectifier with low residual AC (<5%).

Heating element.

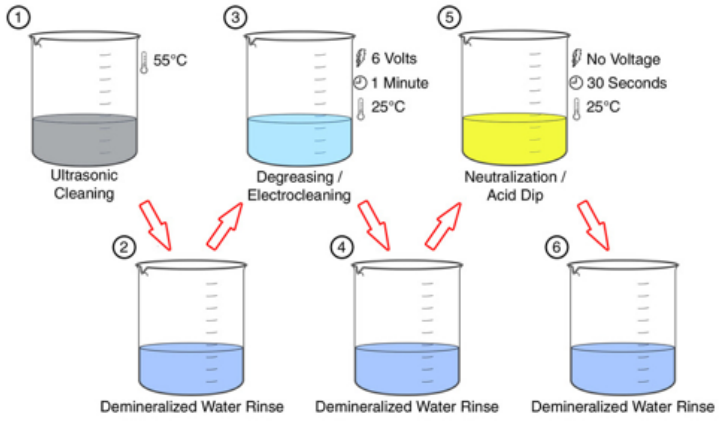
Anode Type Platinized Titanium [1.5-2.5 µm].

For larger bath volumes:

Magnetic driven filter pumps with 5-15 µm cartridge (before use, boil and wash the cartridges with demineralized water for 3 hours to prevent organic contamination).

Amp/min counter.

Pre treatment Cleansing procedure



Bath maintenance

Small-sized RH2W (until 5 liters) can be used until the rhodium solution is completely exhausted without adding any rhodium concentrate replenisher solution. For larger volumes add RH5RW replenisher solution to restore the optimal rhodium concentration. For perfect electrolyte performance it is advisable to maintain the rhodium concentration at values not lower than 80% of the initial concentration; for example, with a bath operating at a concentration of 2 g/l, additions should be done after a consumption of 0.4 g/l of rhodium. Keep in mind that at optimum conditions a bath working at 2 g/l deposits about 8-10 mg of Rh per ampereminute. Given the cost of rhodium and to have a precise evaluation of the metal consumption it is advisable to perform periodic analytical checks.

Post treatment

The electrolyte should be removed from the surface as quick as possible. Wash off the bath residual in a recovery rinse (still rinse). Rinse the parts in circulating deionized water and dry.

Water purity

To prevent contamination of the bath both during its preparation and any subsequent replenishing operations, use demineralized water with a conductivity of less than 3 µS/cm (containing no traces of organic compounds, Chlorine, Silicon, or Boron).

Safety information

Being an acidic solution, the electrolyte is corrosive therefore is an irritant to the skin, eyes and mucous membranes. Caution should be exercised when using the product, avoiding contact with the eyes and skin. Use gloves and safety goggles. Keep away from cyanide based chemicals. For further information please refer to the relative MSDS.

Disclaimer

All recommendations and suggestions in this bulletin concerning the use of our products are based upon tests and data believed to be reliable. Since the actual use by others is beyond our control, no guarantee expressed or implied, is made by Legor Group, its subsidiaries of distributors, as to the effects of such use or results to be obtained, nor is any information to be construed as a recommendation to infringe any patent.

Technical data sheet and product guideline

RH2FM

White rhodium for bath plating 2 g/250 ml make-up

BATH

Color coordinates

L	**90.5**
a	**0.8**
b	**1.4**
c	**1.8**

Product form

Metal concentration	**2 g/250 ml (Rh)**
Form	**Liquid**
Material color	**Dark orange**
Storage time	**2 years**
Volume	**250 ml**

Operating data

	Range	Optimal
Voltage (V)	**2-6**	**3-4.5**
Current density (A/dm2)	**0.5-10**	**3**
Working temperature (°C)	**20-60**	**40-60**
Exposure time (sec)	**20-120**	**30-50**
pH	**<1**	**<1**
Cathode efficiency (mg/Amin)	**4-12**	**8**
Anode/cathode ratio	**1:1-4:1**	**2:1**
Anode type	**Platonized titanium**	
Agitation	**Moderate**	

Metal concentration

Metal	Range (g/l)	Optimal (g/l)
Rhodium	**0.6 - 5.0**	**2.0**

Deposit data

Purity (%)	**99.9**
Hardness (HV 0,01)	**800-900**
Density (g/cm3)	**12.4**
Thickness (um)	**0.02-0.5**
Appearance	**Shiny**
Color	**White**

Preparation

RH2FM is a rhodium electrolytic make-up at the concentration of 2 g/250 ml.
In order to prepare 1 liter of the ready-to-use solution follow the following steps:

- Fill half tank with DI water
- Add all the make-up in the tank
- Wash the bottle of rhodium make-up with DI water
- Add further DI water until reach 1 liter final volume
- Stir all the solution for few seconds

Equipment

Working vessel: Pyrex glass / PVC / polypropylene.

Power supply: DC current rectifier with low residual AC (<5%).

Heating element.

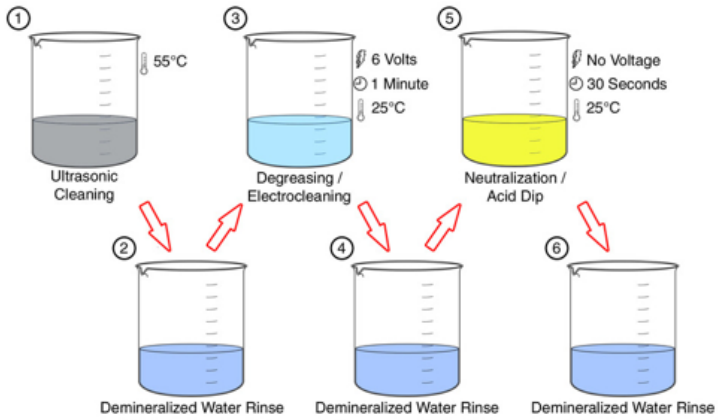
Anode Type Platinized Titanium [1.5-2.5 µm].

For larger bath volumes:

Magnetic driven filter pumps with 5-15 µm cartridge (before use, boil and wash the cartridges with demineralized water for 3 hours to prevent organic contamination).

Amp/min counter.

Pre treatment Cleansing procedure



Bath maintenance

Small-sized RH2M (until 5 liters) can be used until the rhodium solution is completely exhausted without adding any rhodium concentrate replenisher solution. For larger volumes add RH5RM replenisher solution to restore the optimal rhodium concentration. For perfect electrolyte performance it is advisable to maintain the rhodium concentration at values not lower than 80% of the initial concentration; for example, with a bath operating at a concentration of 2 g/l, additions should be done after a consumption of 0.4 g/l of rhodium. Keep in mind that at optimum conditions a bath working at 2 g/l deposits about 8-10 mg of Rh per ampereminute. Given the cost of rhodium and to have a precise evaluation of the metal consumption it is advisable to perform periodic analytical checks.

ALWAYS USE RH5RM REPLENISHER SOLUTION TO RESOTRE THE RHODIUM CONTENT.

The important organic components withdrawn from the rhodium electrolyte after an active carbon treatment or even after several drag-out steps can be easily restored by addition of RH2RM-C replenisher (see related technical chart).

Post treatment

The electrolyte should be removed from the surface as quick as possible. Wash off the bath residual in a recovery rinse (still rinse). Rinse the parts in circulating deionized water and dry.

Water purity

To prevent contamination of the bath both during its preparation and any subsequent replenishing operations, use demineralized water with a conductivity of less than 3 µS/cm (containing no traces of organic compounds, Chlorine, Silicon, or Boron).

Safety information

Being an acidic solution, the electrolyte is corrosive therefore is an irritant to the skin, eyes and mucous membranes. Caution should be exercised when using the product, avoiding contact with the eyes and skin. Use gloves and safety goggles. Keep away from cyanide based chemicals. For further information please refer to the relative MSDS.

Supplementary Information

An initial rhodium concentration of 2.5 g/l is recommended to get thickness higher than 0.4 microns.

For maximum performances, particularly in terms of color, do not use excessive agitation. Gentle agitation wil lbe sufficient to remove the gaseous hydrogen developed closed to the pieces to be plated. so that, for processes which involve large volumes, agitation of the soution using a magnetic filter pump with not too high capacity is recommenedd; while for smaller tanks a moderate agitation of the pieces is adequate.

Higher current density and voltage is advantageous to achieve the best brghtness and luminosity. For excellent results with a very short plating time we recommend the following operating data:

- VOLTAGE: 4 V
- TEMEPRATURE: 60°C
- PLATING TIME: 15 - 20 seconds.

Disclaimer

Related products

RH2M	Ready-to-use solution 2 g/l	**RH5RM**	Replenisher

Packaging

BLACK RHODIUM PLATING

1. Pre-plating surface cleaning as above – all steps.
2. Follow all steps for Rhodium above except for 3and 4 below.
3. Voltage can affect colour finish: 4V provides shiny grey, 5V a shiny reddish grey and 6V dark shiny grey, red and purple.
4. Rinse under hot water tap and dry thoroughly.

TECHNICAL DATA SHEETS

For specific guides to stocked LEGOR products please refer to the plating technical sheets in the following pages for Black Rhodium Bath

Technical data sheet and product guideline

RH2B

Black rhodium for bath plating 2 g/l ready-to-use

BATH

Color coordinates

L	**57.9**
a	**0.4**
b	**1.3**
c	**1.3**

Product form

Metal concentration	**2g/l (Rh)**
Form	**Liquid**
Material color	**Black**
Storage time	**2 years**
Volume	**1 liter**

Operating data

	Range	Optimal
Voltage (V)	**1.8-3**	**2.5**
Current density (A/dm2)	**1-1.5**	**1.2**
Working temperature (°C)	**20-35**	**25-30**
Exposure time (sec)	**60-180**	**120**
Cathode efficiency (mg/Amin)	**15**	**15**
Anode/cathode ratio	**1:1-4:1**	**2:1**
Anode type	**Platonized titanium**	
Agitation	**Moderate**	

Metal concentration

Metal	Range (g/l)	Optimal (g/l)
Rhodium	**0.6-5.0**	**2.0**

Deposit data

Hardness (HV 0,01)	**700**
Density (g/cm3)	**11.2**
Thickness (um)	**0.02-0.4**
Appearance	**Shiny**
Color	**Black**

Preparation

RH2B is a ready-to-use galvanic bath at the concentration of 2 g/l. No preparation is required.

Equipment

Working vessel: Pyrex glass / PVC / polypropylene.

Power supply: DC current rectifier with low residual AC (<5%).

Heating element.

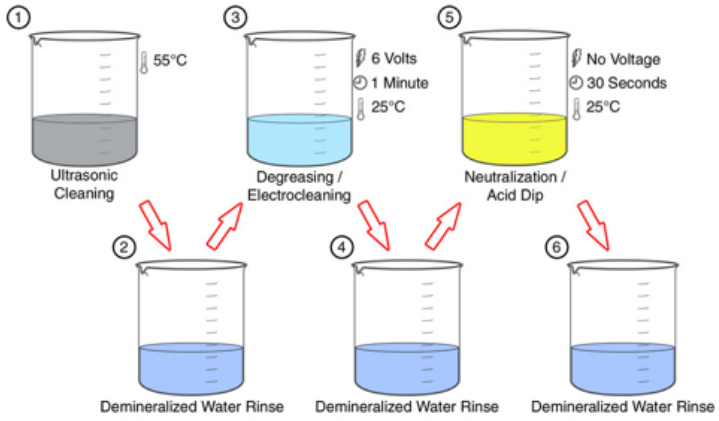
Anode Type Platinized Titanium [1.5-2.5 µm].

For larger bath volumes:

Magnetic driven filter pumps with 5-15 µm cartridge (before use, boil and wash the cartridges with demineralized water for 3 hours to prevent organic contamination).

Amp/min counter.

Pre treatment Cleansing procedure



Bath maintenance

Small-sized RH2B (until 5 liters) can be used until the rhodium solution is completely exhausted without adding any rhodium concentrate replenisher solution. For larger volumes add RH2RB replenisher solution to restore the optimal rhodium concentration. For perfect electrolyte performance it is advisable to maintain the rhodium concentration at values not lower than 80% of the initial concentration; for example, with a bath operating at a concentration of 2 g/l, additions should be done after a consumption of 0.4 g/l of rhodium. Keep in mind that at optimum conditions a bath working at 2 g/l deposits about 10-15 mg of Rh per ampereminute. Given the cost of rhodium and to have a precise evaluation of the metal consumption it is advisable to perform periodic analytical checks.

Post treatment

The electrolyte should be removed from the surface as quick as possible. Wash off the bath residual in a recovery rinse (still rinse). Rinse the parts in circulating deionized water and dry.

Water purity

To prevent contamination of the bath both during its preparation and any subsequent replenishing operations, use demineralized water with a conductivity of less than 3 µS/cm (containing no traces of organic compounds, Chlorine, Silicon, or Boron).

Safety information

Being an acidic solution, the electrolyte is corrosive therefore is an irritant to the skin, eyes and mucous membranes. Caution should be exercised when using the product, avoiding contact with the eyes and skin. Use gloves and safety goggles. Keep away from cyanide based chemicals. For further information please refer to the relative MSDS.

Supplementary Information

Free sulfuric acid concentration has to stay close to 20 g/l.

Disclaimer

Packaging


Ultrablack

RUTHENIUM PLATING

Ruthenium is used to create a deeper, darker real black finish beyond black Rhodium.

1. Pre-plating surface cleaning as above – all steps.
2. Bath Temperature: 55 - 65°C (65°Optimum) Must be heated 24hrs before use
3. Voltage: 2 - 3 V (Voltage is varied over treatment)
4. Anode: Platinized Titanium (Anode to Work Ratio 4:1)
5. Agitation: Moderate (Solution stirring is highly recommended)
6. Treatment Time: 5 - 10 Minutes
7. Connection: +ve to anode/ -ve to jewellery through copper wire.
8. Rinse under cold water tap and dry thoroughly.
9. Mix entire solution and activator as it will not work partially mixed and store in airtight container.
10. Click here to watch video before attempting Ruthenium plating.
    a. Note: Ruthenium plating is a complicated process and all preparation and application must be adhered to very strictly.

TECHNICAL DATA SHEETS

For specific guides to stocked LEGOR products please refer to the plating technical sheets in the following pages for Ruthenium Bath

Technical data sheet and product guideline

RU5BLACK-X

Extra black ruthenium for bath plating 5g/l (ready-to-use)

BATH

Color coordinates

L	**42**
a	**0.5**
b	**2.2**
c	**2.3**

Product form

Metal concentration	**5 g/l (Ru)**
Form	**Liquid**
Material color	**Black**
Storage time	**2 years**
Format	**Ready to use**
Chemical type	**Acidic**
Volume	**1 liter**

Operating data

	Range	Optimal
Voltage (V)	**2,0-5,0**	**3,5**
Current density (A/dm2)	**3-5**	**3,5**
Working temperature (°C)	**65-70**	**65**
Exposure time (sec)	**300-900**	**420-600**
pH	**0.8-1.2**	**1.2**
Cathode efficiency (mg/Amin)	**1-3**	**2**
Anode/cathode ratio	**2:1-4:1**	**3:1**
Anode type	**Platonized titanium**	
Agitation	**Strong**	

Metal concentration

Metal	Range (g/l)	Optimal (g/l)
Ruthenium	**3-10**	**5**

Deposit data

Purity (%)	**99.9**
Hardness (HV 0,01)	**600-800**
Density (g/cm3)	**10.5**
Appearance	**Shiny**
Color	**Black**

Preparation

This product comes in a KIT form made of two parts:

- **RU5BLACK-XA**: 1 L solution of 5 g of Ru in high density polyethylene bottle, base solution for RU5BLACK-X;
- **RU5BLACK-XB**: 50 ml high density polyethylene bottle containing the blackening agent salts for RU5BLACK-X.

To prepare the ready-to-use product please follow the procedure reported here below. In doing so be aware that mixing the solution, while very easy, takes time. Plan the time in order to not be in a rush is of fundamental importance to make the system work. Also, because of the extensive stirring that is required, we highly recommend to use a magnetic stirring system or a magnetic driven pump with heat

- Pour the RU5BLACK-X**A** into the working tank and turn on the heater to begin warming at 45-50°C and the stirring while preparing the blackening agent solution by dissolution of the RU5BLACK-X**B** salts.
- In a separate small becker or vessel, at room temperature, place 100 – 300 ml of DI water and then, gradually, add all he RU5BLACK-X**B** salts, mixing each addition thoroughly with a glass rod or other inert object. Make sure that each addition is completely dissolved prior to adding the next addition. After the final addition allow the so obtained solution become completely homogeneous with no any crystals residual visible. In order to do that it might be helpful to heat up slightly this solution as the system absorb heat from the external to promote the dissolution process thus making the becker cooling down.
- Once the solution so prepared is completely homogeneous and ready, pour it inside the RU5BLACK-X**A** solution slowly, 20 – 30 ml at a time while stirring constantly. At the end raise the whole system temperature at 65°C and keep the solution heated for 3-4 hours. At the end of this time turn the heater and the stirrer off and let the solution rest overnight by covering the tank to prevent water evaporation.
- Then over the next 24-48 hours heat daily again for 2-3 hours and then let the solution cool. This will help the solution continue to gain the appropriate equilibrium (in doing so be aware about the water evaporation due to the high working temperature. In fact it is important o add further DI water to compensate the evaporated one and bring back the level of the solution to the starting one in order to not concentrate too much the system or to not move too much from the equilibrium situation. Moreover most operators found that the longer the wait after mixing the two components, the better and more consistent the results will be).
- Start finally to plate by following the operating condition reported on the Table of the present document.

Equipment

Working vessel: Pyrex glass / PVC / polypropylene.

Power supply: DC current rectifier with low residual AC (<5%).

Heating element.

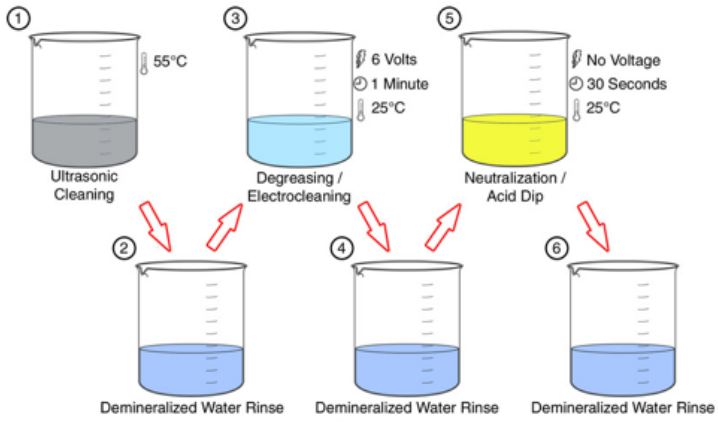
Anode Type Platinized Titanium [1.5-2.5 µm].

For larger bath volumes:

Magnetic driven filter pumps with 5-15 µm cartridge (before use, boil and wash the cartridges with demineralized water for 3 hours to prevent organic contamination).

Amp/min counter.

Pre treatment Cleansing procedure



Bath maintenance

Metallic additions

For small-size ruthenium baths (up to 3 liters) we advise to use until the ruthenium solution is completely exhausted and dispose without incorporating replenishment. For larger-sized baths add **RU5R** which is a pre calibrated replenisher containing additional ruthenium in concentrate to restore the optimal ruthenium concentration. For perfect galvanic bath performance it is advisable to maintain the ruthenium concentration at a minimum of 80% of the initial concentration; for example, with a bath operating at a concentration of 5 g/l, additions should be made after a maximum consumption of 1 g/l of ruthenium. When introducing additional metal bare in mind that in optimum working conditions a bath working at 5 g/l normally deposits about 3 mg of ruthenium per Ampere/minute.

pH control

pH is a very important parameter especially when working on high thickness layers. The pH value must be frequently controlled and held under optimal values numerically described in the operating data table.
In the case corrections are needed use Ammonium hydroxide to raise the pH, and **RU5S** conductive salts to lower it.

Density control

Solution density is not a critical parameter. In the case of heavy productions, it is advised to control the density periodically. As the density lowers in value, restore to it's optimum working health using **RU5S** conductive salts. Adding 10 g/l of **RU5S** will raise the solution density of about 1° Bé.

Post treatment

The electrolyte should be removed from the surface as quick as possible.

1. Wash off the bath residual in a recovery rinse (still rinse) followed by

2. Wash the article in hot distilled water (80°C).

3. Rinse the parts in circulating or running water.

4. Dry

In the case a problem is observed, replace step #2 with a 50% cold ammonia solution rinse for 5 minutes. This action should be preformed under an exhaust hood.

In case of items bringing stones if the latter stain slightly, remove this staining with a pressurized water blast immediately after the last rinse. Steam cleaning also help.

Water purity

To prevent contamination of the bath both during its preparation and any subsequent replenishing operations, use demineralized water with a conductivity of less than 3 µS/cm (containing no traces of organic compounds, Chlorine, Silicon, or Boron).

Safety information

Being an acidic solution, the electrolyte is corrosive therefore is an irritant to the skin, eyes and mucous membranes. Caution should be exercised when using the product, avoiding contact with the eyes and skin. Use gloves and safety goggles. Keep away from cyanide based chemicals. For further information please refer to the relative MSDS.

Disclaimer

Packaging

PEN PLATING

Standard plating chemicals are not suitable for pen plating which requires special solution formulated differently for the purpose. Be sure to use the correct solutions.

1. Pre-plating surface cleaning as above – all steps.
2. Pour a small amount of pen plating solution into a glass container
3. Use at room temperature
4. Attach work to -ve connector
5. Plug plating pen into the +ve outlet on power supply/rectifier
6. Dip fibre tip pen into solution a leave for 1 – 2 minutes
7. Turn on power supply/rectifier and set to 4-6 volts
8. Plate by moving pen evenly back and forth on work
9. Felt tip should always be moist but not dripping
10. Gas bubbles indicate that the process is working properly
11. When results are satisfactory rinse under very hot tap water

Note:

- Rhodium Pen plating follow steps above
- Black Rhodium plating steps above but change to voltage will alter colour the same as black Rhodium bath above
- Gold Pen Plating follow steps above but slightly lower voltage to 4V

TECHNICAL DATA SHEETS

For specific guides to stocked LEGOR products please refer to the plating technical sheets in the following pages for these products:

- White Rhodium
- Black Rhodium
- Yellow Gold
- Pink Gold

Technical data sheet and product guideline

RH2PS

Super white rhodium for pen plating 2 g/100 ml ready-to-use

PEN

Color coordinates

L	**86.1**
a	**0.6**
b	**2.4**
c	**2.5**

Product form

Metal concentration	**2 g (Rh)**
Form	**Liquid**
Material color	**Dark red**
Storage time	**2 years**
Format	**Ready to use**
Chemical type	**Acidic**
Volume	**100 ml**

Operating data

	Range	Optimal
Voltage (V)	**10.5 - 12.2**	**11**
Working temperature (°C)	**18 - 25**	**20 - 23**
pH	**0 - 1**	**0 - 1**

Metal concentration

Metal	Range (g/l)	Optimal (g/l)
Rhodium	**2**	**2**

Deposit data

Purity (%)	**99.999**
Hardness (HV 0,01)	**800 - 900**
Density (g/cm3)	**11.2**
Thickness (um)	**0.05 - 0.20**
Appearance	**Shiny**
Color	**Super white**

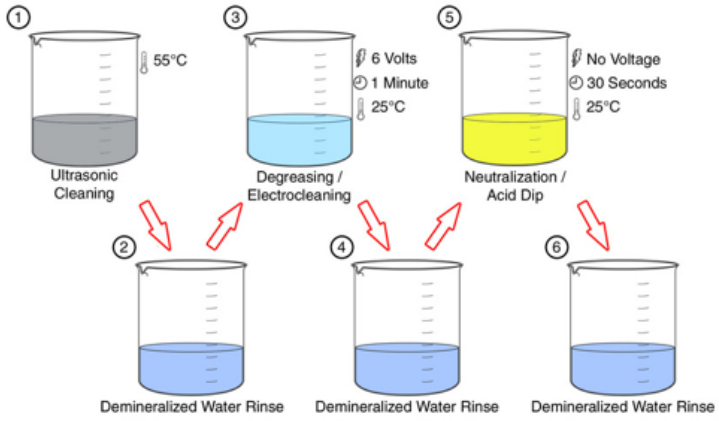
Preparation

RH2PS is a ready-to-use pen plating solution at the concentration of 2g/100ml. No preparation is required.

Equipment

Power supply: Pen plating machine (5 Amp – 12 Volt rectifier)
Anode: A pen with a platinum collar
Tips: Fiber (white or brown)

Pre treatment Cleansing procedure



Bath maintenance

Use until the rhodium solution is completely exhausted without incorporating replenishment or additives.

Post treatment

Electrolyte should be removed from the surface as quick as possible. Rinse off the bath rests in a recovery rinse (still rinse).
Rinse the parts in running water and dry.

Safety information

Being an acidic solution, the electrolyte is corrosive therefore is an irritant to the skin, eyes and mucous membranes. Caution should be exercised when using the product, avoiding contact with the eyes and skin. Use gloves and safety goggles. Keep away from cyanide based chemicals. For further information please refer to the relative MSDS.

Disclaimer

All recommendations and suggestions in this bulletin concerning the use of our products are based upon tests and data believed to be reliable. Since the actual use by others is beyond our control, no guarantee expressed or implied, is made by Legor Group, its subsidiaries of distributors, as to the effects of such use or results to be obtained, nor is any information to be construed as a recommendation to infringe any patent.

Packaging

Technical data sheet and product guideline

RH2PB

Black rhodium for pen plating 2 g/100 ml ready-to-use

PEN

Color coordinates

L	**59.6**
a	**-0.4**
b	**2.2**
c	**2.2**

Product form

Metal concentration	**2 g (Rh)**
Form	**Liquid**
Material color	**Black**
Storage time	**2 years**
Format	**Ready to use**
Chemical type	**Acidic**
Volume	**100 ml**

Operating data

	Range	Optimal
Voltage (V)	**8 - 10**	**9**
Working temperature (°C)	**18 - 25**	**20**
pH	**0 - 1**	**0 - 1**

Metal concentration

Metal	Range (g/l)	Optimal (g/l)
Rhodium	**20**	**20**

Deposit data

Purity (%)	**99.999**
Hardness (HV 0,01)	**800 - 900**
Density (g/cm3)	**12.4**
Thickness (um)	**0.05 - 0.20**
Appearance	**Shiny**
Color	**Black**

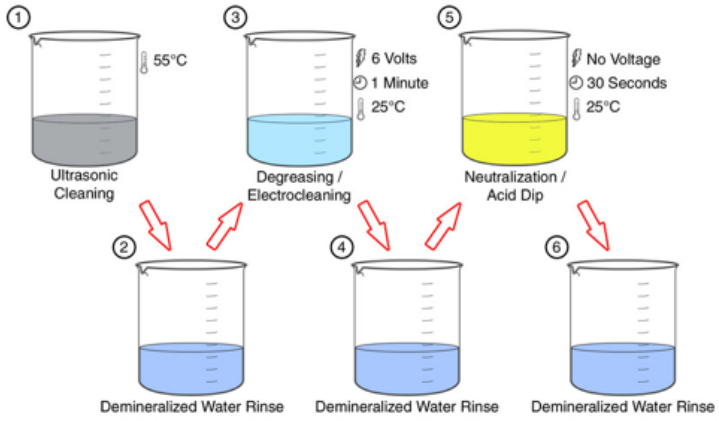
Preparation

RH2PB is a ready-to-use pen plating solution at the concentration of 2g/100ml. No preparation is required.

Equipment

Power supply: Pen plating machine (5 Amp – 12 Volt rectifier)
Anode: A pen with a platinum collar
Tips: Fiber (white or brown)

Pre treatment Cleansing procedure



Bath maintenance

Use until the rhodium solution is completely exhausted without incorporating replenishment or additives.

Post treatment

Electrolyte should be removed from the surface as quick as possible. Rinse off the bath rests in a recovery rinse (still rinse).
Rinse the parts in running water and dry.

Safety information

Being an acidic solution, the electrolyte is corrosive therefore is an irritant to the skin, eyes and mucous membranes. Caution should be exercised when using the product, avoiding contact with the eyes and skin. Use gloves and safety goggles. Keep away from cyanide based chemicals. For further information please refer to the relative MSDS.

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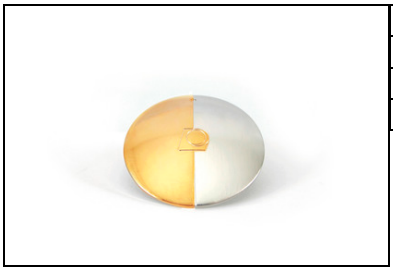
Technical data sheet and product guideline

GY2P

24 kt yellow gold pen plating solution

PEN

Color coordinates



L	**82.2**
a	**3.9**
b	**30.4**
c	**30.7**

Product form

Metal concentration	**2 g/ 100 ml**
Form	**Liquid**
Material color	**Transparent**
Storage time	**2 years**
Format	**Ready to use**
Chemical type	**Cyanide based**
Volume	**100 ml**

Operating data

	Range	Optimal
Voltage (V)	**6 - 10**	**8**
Working temperature (°C)	**18 - 25**	**20**

Metal concentration

Metal	Range (g/l)	Optimal (g/l)
Gold	**20**	

Deposit data

Purity (%)	**99.999**
Hardness (HV 0,01)	**90 - 100**
Density (g/cm3)	**19.6**
Thickness (um)	**0.1 - 0.3**
Appearance	**Shiny**
Color	**24 kt yellow gold**

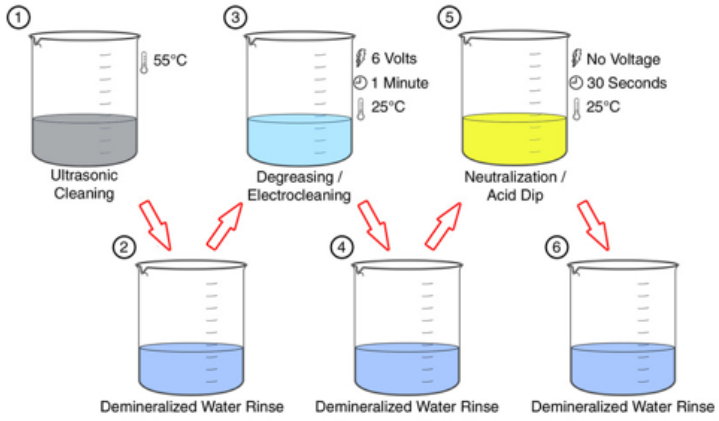
Preparation

GY2P is a ready-to-use pen plating solution at the concentration of 2 g/ 100 ml. No preparation is required.

Equipment

Power supply: Pen plating machine (5 Amp – 12 Volt rectifier)
Anode: A pen with a platinum collar
Tips: Fiber (white or brown)

Pre treatment Cleansing procedure



Bath maintenance

Use until the rhodium solution is completely exhausted without incorporating replenishment or additives.

Post treatment

Electrolyte should be removed from the surface as quick as possible. Rinse off the bath rests in a recovery rinse (still rinse).
Rinse the parts in running water and dry.

Safety information

Being an acidic solution, the electrolyte is corrosive therefore is an irritant to the skin, eyes and mucous membranes. Caution should be exercised when using the product, avoiding contact with the eyes and skin. Use gloves and safety goggles. Keep away from cyanide based chemicals. For further information please refer to the relative MSDS.

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Packaging

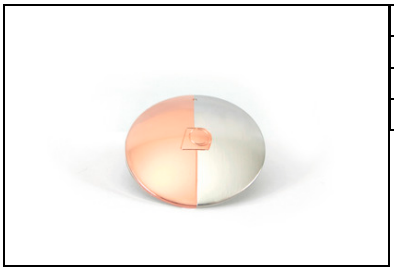
Technical data sheet and product guideline

GP03P

Pink gold pen plating solution

PEN

Color coordinates



L	**83.7**
a	**12.3**
b	**13.7**
c	**18.4**

Product form

Metal concentration	**0.3 g/ 100 ml**
Form	**Liquid**
Material color	**Blue**
Storage time	**2 years**
Format	**Ready to use**
Chemical type	**Cyanide based**
Volume	**100 ml**

Metal concentration

Metal	Range (g/l)	Optimal (g/l)
Gold	**30**	

Deposit data

Purity (%)	**99.999**
Hardness (HV 0,01)	**90 - 100**
Density (g/cm3)	**19.6**
Thickness (um)	**0.1 - 0.3**
Appearance	**Shiny**
Color	**Pink gold**

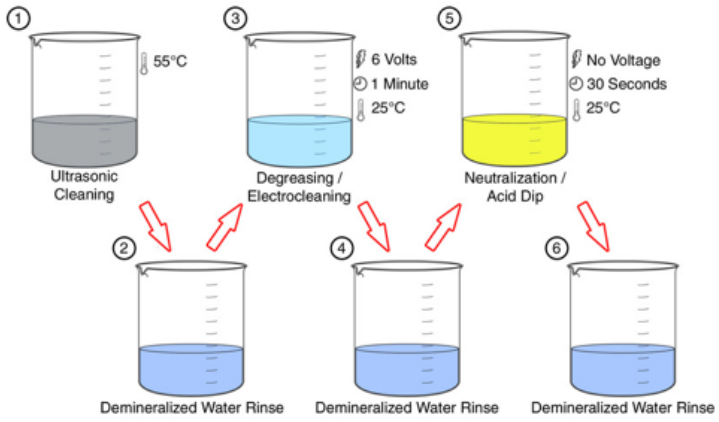
Preparation

GP03P is a ready-to-use pen plating solution at the concentration of 0.3 g/ 100 ml. No preparation is required.

Equipment

Power supply: Pen plating machine (5 Amp – 12 Volt rectifier)
Anode: A pen with a platinum collar
Tips: Fiber (white or brown)

Pre treatment Cleansing procedure



Bath maintenance

Use until the rhodium solution is completely exhausted without incorporating replenishment or additives.

Post treatment

Electrolyte should be removed from the surface as quick as possible. Rinse off the bath rests in a recovery rinse (still rinse).
Rinse the parts in running water and dry.

Safety information

Being an acidic solution, the electrolyte is corrosive therefore is an irritant to the skin, eyes and mucous membranes. Caution should be exercised when using the product, avoiding contact with the eyes and skin. Use gloves and safety goggles. Keep away from cyanide based chemicals. For further information please refer to the relative MSDS.

Product usage

In order to choose the right working voltage, please consider that the optimum range strongly depends about the kind of tips is intended to use with the pen:

- White tips: 9 -11 V
- Brown tips: 8 - 10 V
- PENGRAF: 6 - 8 V

Supplementary Information

TEMPERATURE

GP03P gives excellent performance at room temperature.

Disclaimer

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Packaging