

**DESCRIPTION**

GT4A2N is a mildly acidic gold plating electrolyte that deposits a color which precisely corresponds to the normalized NIHS standard 2N-18 gold. 2N-18 can be described as a pale yellow color in 18 kt. The additional metals which are co-deposited with the gold as an alloy allow for an achievable thickness of 3 micron in a deposit which remains 99.7% gold by weight. The wider range of obtainable thicknesses combined with the ability to solder the plating deposit, allow for this electrolyte to be used in both technical and decorative applications.

- 2N or 18 kt yellow gold color
- Thickness up to 3  $\mu\text{m}$
- No free cyanide
- Lead and Cadmium free

**DEPOSIT DATA**

Hardness [HV 0.01]	155 - 220
Density [g/cm <sup>3</sup> ]	17.0
Aspect	Shiny
Thickness from-to [ $\mu\text{m}$ ]	0.02 - 3
Color	Yellow 2N

**PRODUCT FORM**

Metal concentration	4 g Au/l
Product pH	Acidic
Format	Ready to use liquid
Color of the product	Green
Storage time	2 years
Volume	1 L

**PRODUCT USAGE**

	RANGE	OPTIMAL
Voltage [V]	2.8 - 4.0	3.2
Current density [A/dm <sup>2</sup> ]	0.5 - 10	4
Working temperature [°C]	35 - 45	40
Deposition time [ $\mu\text{m}/\text{min}$ ]	0.5 - 5 A/dm <sup>2</sup>	
Cathodic efficiency [mg/Amin]	20 - 35	
pH	3.0 - 4.0	3.5
Solution density [°Bé]	> 12	
Anode/cathode ratio	2:1 - 4:1	2:1
Anode type	Ti/Pt or Mixed oxides	
Stirring	Moderate	

**GT4A2N**

READY TO USE THICK PLATING BATH 4G/L GOLD 2N COLOR

**METAL CONCENTRATION**

METAL (g/l)	RANGE	OPTIMAL
Au	2.0 - 4.0	4.0
In	1.0 - 2.0	1.5
Ni	2.0 - 3.0	2.5

**COLOR COORDINATES**

L *	84.0
a*	2.5
b*	27.6
c*	31.2

**Note** The color coordinates shown here have been recorded on a white substrate and are intended as PURELY INDICATIVE being highly dependent on the color of the starting substrate, the deposited thickness as well as the type of surface (design) on which they are measured

**RELATED PRODUCTS - MAINTAINING**

AUS683.100G*	Replenisher salt for gold plating 68.3 g Au/100 g
GT4NIR.100ML*	Nickel replenisher for GT gold plating series 4 g/100 ml - 100 ml
GT4INR.100ML	Indium replenisher for GT gold plating series 4 g/100 ml - 100 ml
GTADR.100ML	Replenisher additive for GT gold plating series - 100 ml
GTSC.1KG	Conducting salts for GT gold plating series - 1 kg
KSCA.5KG	Acidic conducting salts for thick plating - 5 kg
KSCB.5KG	Alkaline conducting salts for thick plating - 5 kg

\* Product which is subject to the international regulations concerning transportation of dangerous goods

**USER GUIDE****READY TO USE SOLUTION PREPARATION**

GT4A2N is a ready-to-use plating solution at the concentration of 4 g/l of gold. No preparation is required. Pour it directly into working tank, heat it up to the preset temperature and once reached start to plate.

**ANODES**

Use Titanium Platinized anodes with a layer in platinum not lower than 1.5 µm. Alternatively, it also possible to use Mixed oxides anodes.

**WORKING TANK MATERIALS**

For small volume amount solutions - in beaker scale - use Pyrex glass; vice versa use PP/PVC/HDPE tanks for larger volumes and equipped with an efficient exhaust fume/suction or aspiration system (the gold plating solution might develop potentially toxic or harmful fumes that can also be irritant if inhaled or with allergenic effects).

**DC POWER - RECTIFIER**

Use a current DC rectifier having an alternate current residue –ripple– less than 5% and having an output amperage enough to obtain a proper electroplating process. The rectifier should be equipped with:

- Amperemeter
- Voltmeter
- Ampere/minutes counter (for bigger installations only).

**HEATING SYSTEM**

The admitted materials for heaters are: Pyrex, quartz or PTFE.

**FILTRATION AND MOVEMENT**

For bigger plating installations (> 5 liters) it is advisable to keep the plating solution continuously filtered and in movement through a magnetic driven filter pump with 5-15 µm cartridges in PP that must have been previously conditioned by boiling them for at least 3 hours and then washed with DI water in order to prevent any possible organic contamination. The rate speed of the feed for the pump must not be too much high in order to realize a moderate movement for the liquid.

**PLATING SOLUTION MAINTENANCE**

This process is rather easy to maintain, but it initially will require frequent analytical controls in order to obtain a correct concentration level of all the metals present as well as all other additives. Metal concentrations greatly influence the final deposited color; therefore, an incorrect management of these parameters shall inevitably lead to unwanted colors or tones. Gold additions: gold plated and consumed from the electrolytic solution must be reintegrated with high quality, stable in acidic electrolytes, Gold Potassium Cyanide at 68,3% concentration (Code: AUS683). The gold metal concentration shall not be lower than 75% of the nominal value, therefore the quality of additions shall be decided on the basis of the plating solution volume. Brighteners and other additives

addition: With every gold addition it is necessary to add also the brighteners and the other additives in order to keep constant the desired color as well as the electrolytic solution performances. When 100 g of fine gold is added (equal to 146.4 g of AUS683), the following additions needs to be performed:

- 100 ml of GT4INR 4 g/100 ml (Indio replenisher) or 200 ml di GT20INR 20g/l (Indio)
- 100 ml of GT4NIR 4 g/100 ml (Nickel replenisher) or 80 ml di GT50NIR 50g/l (Nickel)
- 100 ml of GTADR1 (replenisher of organic component)

In case there should be an incorrect equilibrium of any of these additions, our Technical Customer Service shall advise the proper modifications or corrections.

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### PRETREATMENTS

This gold plating solution for micron application can be directly deposited directly on Gold, Silver, Palladium, other precious metal substrates and Nickel. For other metals (i.e. Copper and its alloys or Silver) it is necessary to make an intermediate deposit of Palladium or Nickel to prevent copper migration. An intermediate deposit or precious metal plating strike is necessary before depositing onto Tin, Lead, Zinc, Aluminum and Iron-based materials in general.

As pre-treatment it is suggested to run a preliminary degreasing through a cycle of ultrasonic degreasing treatment -solution followed by a wash step into running water. Then proceed with the electrolytic degreasing step by using the alkaline degreasing solution SGR1. Once the items has been washed again in demineralized water, then proceed in activate and neutralize the surface of the same by dipping them into the slightly acidic solution NEUT1 for 3 – 4 times subsequently at room temperature, in order to be sure that no any alkaline residues coming from the degreasing previous steps are dragged into the rhodium solution together with the same items to be treated (which would lead to a reduction of its life). After the neutralization, wash in demineralized running water and immerse the pieces in the gold plating solution for the plating treatment.

### POST TREATMENTS

The electrolyte should be removed from the surface as quick as possible. Wash off the plating solution residues in a recovery rinse (static rinse). Rinse the parts in circulating deionized water and dry. A possible last rinse in hot static water before dry can help in gain more brightness and luminosity.

### WATER PURITY

To prevent contamination of the plating solution during any replenishing operations, use demineralized water with a conductivity of less than 3  $\mu\text{S}/\text{cm}$  (containing no traces of organic compounds, Chlorine, Silicon, or Boron). To achieve maximum deposit quality we suggest to use our high-grade purity WATER.

### ITEMS AND PLATING SOLUTION MOVEMENT

Being this micron gold plating an acidic solution, hydrogen bubbles tend to adhere to the items and must be removed by agitating the solution, by moving the rack or by tapping or knocking on the rack. Otherwise, darker stains on the parts may occur. The movement of the rack can be provided by a cathodic bar movement system at a speed of 5-10 cm/s. 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.

### ABOUT WORKING TEMPERATURE

Temperature is a paramete that might influece the final gold deposition color. GT4A2N gives excellent performance in a temperature range between 35°C and 45°C.

### ABOUT pH

The solution pH should be held at the nominal value as it can have strong influence on the final deposit color. It is possible to correct it by adding acidic conducting salts KSCA to lower it or of alkaline conducting salts KSCB to raise it .

### ABOUT SOLUTION DENSITY

In case a strong drag-out is present, the solution density should be brought back to its initial value by adding GT-SC conductive salts, knowing that 20 g/l raise the density of + 1 Bè.

### SUPPLEMENTARY INFORMATION

As reported on the previous paragraph all the operating parameters will influence the deposited color, especially temperature and pH. For this reason it is strongly recommended to consult our Technical Customer Service before modifying the nominal operative conditions.

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### **SAFETY INFORMATION**

Being an acidic 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. 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 or 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.