LEGOR JEWELRY PLATING

TECHNICAL SHEET

RU5BLACK-X

EXTRA BLACK RUTHENIUM FOR BATH PLATING 5G/L (READY-TO-USE)

GENERAL INFORMATION

Deep black colorArsenic free REACH Compliant 5 grams per liter Economical precious metal deposit RU5BLACK-X is an extra black ruthenium plating electrolyte which deposits a glossy layer of ruthenium metal in a jet black color. The solution is sold as a kit with the ruthenium solution as part A and the blackening agent in powder form separately as part B. The black color produced is developed with additions of heavy organic additives that oxidize the ruthenium metal as it is deposited. Precise mixing instructions must be followed to obtain optimum results. This acidic based compound is primarily used in decorative plating applications for a deep black color option in the case where corrosion resistance is also a requirement. Due to the fact ruthenium has a lower conductivity than other precious metals, the electrolyte requires a greater metal concentration to function optimally. The formulation is 100% arsenic free both in the metal deposited and in the chemical itself and falls within REACH compliance.

Product form	
Metal concentration	5 g/l (Ru)
Product's pH	Acidic
Solution form	Liquid
Solution form	Ready-to-use
Plating solution color	Black
Storage time	2 years
Volume	1 liter
Deposit data	
Purity (%)	99.9
Solution appearance	Shiny
Hardness [HV 0.01]	600-800
Density [g/cm³]	10.5
Plating solution color	Black

Operating data	**RANGE**	**OPTIMAL**
pH	0.8-1.2	1.0
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	550.0
Cathode efficiency [mg/Amin]	1-3	2.0
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	5.0

Color coordinates	
L*	42.0
a*	0.5
b*	2.2
c*	2.3

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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-XA** 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-XB** salts.

·In a separate small becker or vessel, at room temperature, place 100 – 300 ml of DI water and then, gradually, add all the **RU5BLACK-XB** 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-XA** 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

RU5BLACK-X can be deposited directly onto Palladium, Gold, Nickel and its alloys. An intermediate deposit or precious metal plating strike is necessary before depositing onto Tin, Lead, Zinc, Cadmium, Aluminum and Iron.

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.

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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).

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.

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

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