RU5BLACK-X

RUTHENIUM READY TO USE PLATING BATH 5G/L BLACK-RIFLE BARREL COLOR

DESCRIPTION

RU5BLACK-X is an extra black ruthenium plating electrolyte which deposits a glossy layer of ruthenium metal in ultrablack 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 thechemical itself and falls within REACH compliance.

- Deep black color
- Arsenic free
- REACH Compliant
- 5 grams per liter
- Economical precious metal deposit

DEPOSIT DATA

Purity (%)	99.0
Hardness [HV 0.01]	600 - 800
Density [g/cm³]	10.5
Thickness from-to [µm]	0.02 - 0.10
Aspect	Shiny
Color	Extra black

PRODUCT FORM

Metal concentration	5 g Ru/l
Product pH	Acidic
Format	Ready to use liquid
Color of the product	Dark red
Storage time	2 years
Volume	Ru/l+part B: 20 g blackening salts

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LEGOR GROUP S.P.A. - Via del Lavoro, 1 - 36050 (VI) - Italy - Tel. +39 0444 467911 - Fax +39 0444 660677 - info@legor.com - www.legor.com

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PRODUCT USAGE	RANGE	OPTIMAL
Voltage [V]	2.0 - 5.0	3.5
Current density [A/dm²]	3.0 -5.0	3.5
Working temperature [°C]	65 - 70	65
Treatment time [min]	5 - 15	7 - 8
Cathodic efficiency [mg/Amin]	1 - 3	2
pH	0.8 - 1.2	1.0
Anode/cathode ratio	1:1 - 4:1	2:1
Anode type	Ti/Pr or graphite	
Stirring	Strong	

METAL CONCENTRATION

METAL	RANGE	OPTIMAL
Ru	3.0 - 5.0	5 g Ru/l

COLOR COORDINATES

L *	42.0
a*	0.5
b*	2.2
C	2.3

Note: Color coordinates here reported have been measured on a white underlayer and they are to be intended as PURELYINDICATIVE being strongly dependent on underlayer color, on thickness of the deposit and on specific design(shape)of the surface.

RELATED PRODUCTS - MAINTAINING

RU5R.100ML*	Ruthenium sulfamate 5 g Ru/100ml - 100 ml
RU5S.1KG*	Conducting salts for ruthenium plating solution - 1 kg
RU5RB-X.50G*	Blackening agent for RU5BLACK-X - 50 g
RU5RBS-X.1KG*	Solid blackening additive for extra black ruthenium - 1 kg

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

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USER GUIDE

READY TO USE SOLUTION PREPARATION

This product comes in a KIT form made of two parts: RU5BLACK-XA: 1 liter solution of 5 g of Ru in high density polyethylene bottle, base solution for RU5BLACK-X and RU5BLACK-XB: 50 ml high density polyethylene bottle containing the 20 grams of blackening agent salts for RU5BLACK-X and calibrated for 1 final liter solution.
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 heating system.

A) 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.

B) 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 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.

C) 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.

D) 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).

E) Start finally to plate by following the operating condition reported on the Table of the present document.

ANODES

Use Titanium Platinized anodes with a layer in platinum not lower than 1.5 µm.

WORKING TANK MATERIALS

For small volume amount solutions - in beacker 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.

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).

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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.

PLATING SOLUTION MAINTENANCE

For small-size ruthenium baths (up to 5 liters) we advise to work until the ruthenium solution is completely exhausted without adding any replenisher solution. For larger -sized plating solutions add RU5R which is a pre calibrated replenisher containing ruthenium in concentrate form 5 g/100 ml to restore the optimal ruthenium concentration. For perfect plating solution performance, it is advisable to maintain the ruthenium concentration at a minimum of 80% of the initial concentration: for example, with a plating solution operating at a concentration of 5 g/l in Ru, additions should be made after a maximum consumption of 1 g/l of ruthenium. When introducing additional metal, keep in mind that in optimum working conditions a bath working at 5 g/l normally deposits about 3 mg of ruthenium per Ampere/minute.
The dark-black color of the deposit, on the other side, is maintained thanks to the frequent additions of the blackening salts : RU5RB-X. Basically its restoring will be a function of both the plating solution workload and the type of dark shade desired by the operator. It is just an experienced operation: when the L* parameter starts to raise too much with respect to its tolerance, proceed with small portions addition of the related blackening agent salts. However, it is up to the operators sensibility to understand how to properly dose the blackening agent solution into the plating solution, according to their own experience and working methodology. In general better to not do additions higher than 3 g/l at a time that often take to deposit problems.

PRETREATMENTS

The plating solution RU5BLACK-X can be directly deposited on Gold, Palladium, Nickel and its alloys. For Silver, Copper and Copper alloys a flash of Pd will act in prevent copper migration to the external surface for the treated items.
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 Pd plating solution for the platingtreatment.

POST TREATMENTS

The electrolyte should be removed from the surface as quick as possible. For optimum results follow this step: A) wash off the plating solution residues in a recovery rinse (static rinse); B) wash the treated items in hot deionized water (80°C): this will help in gain more brightness and luminosity; C) rinse the parts in circulating deionized water; D) dry.
In the case a problem is observed, replace step B) with a rinse in concentrated ammonium hydroxide (ammonia) solutionfor 5 minutes. This action should be preformed under an exhaust - hood.

WATER PURITY

To prevent contamination of the plating solution during any replenishing operations, use demineralized water with a conductivity of less than 3 µS/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.

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ABOUT pH

pH is a very important parameter. The pH value must be frequently controlled and held under optimal values reported on theoperating data Table. In the case corrections are needed, use Ammonium hydroxide to raise the pH, and RU 5S conductive salts to lower it.

ABOUT SOLUTION DENSITY

Solution density is not a critical parameter. In the case of heavy productions, it is advised to check the density periodically. As the density lowers in value, restore to its optimum working range by using RU 5S 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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