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Rh
Rhodium

METAKEM
Precious metals & anodes

Rhodium-Decor-S4

Rhodium electrolyte for white, brilliant, decorative coatings

www.metakem.de

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Rh
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Precious metal baths

Rhodium-Decor-S4

Properties and Application

Rh content of make-up:	4 g Rh pro 100 ml
Color of bath:	red brown liquid
Rh content of electrolyte:	2 g Rh / L (range: 1 g - 2 g / L)
Voltage:	1.5 - 2.2 V
Operating temperature:	40 °C (range: 20 - 45 °C)
Anodes:	MoxTi, PtTi or PtNb
Surface Ratio (anode / cathode):	1:1 (range: 0.5:1 to 2:1)
Current density at the cathode:	1.0 A / dm^2 (range: 0.5 to 3 A / dm^2)
Agitation:	200 cm / min
Whiteness and Colour:	L ≥ 91; a ~ 0.8; b ~ 5.6 referring to DIN 5033
Thickness of deposits:	up to 0.5 µm brilliant white Preferred for coatings ≤0,3 µm
Stains or pits:	no stains due to H_2-bubbles

Please note:

- Make-Up contains 4 g Rh in 100 ml, to be diluted to 2 L with de-ionised water
- Bath can be used between 2 g and 1 g Rh / L
- Operating temperature from 20 °C to 45 °C, preferred temperature 40 °C
- Excellent throwing
- To be replenished with **Rhodium-Decor-S4-R**

Request product:
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Rhodium-Decor-S4 is a rhodium bath for extraordinary white, brilliant coatings – preferably for decorative use in the production of jewellery, spectacle frames and watches with following properties.

Bath Properties

A bath with **Rhodium-Decor-S4** produces brilliant white, bright, shiny coatings, preferred for rhodium plating of jewellery, fashion jewellery, watches, spectacles frames and decorative silver-consumables, generally refined with coatings 0.1 – 0.3 µm thick.
The coatings are free of stains and gas pits.

The Bath

Rhodium content: 2 g / L

pH value: <1

Plating speed: 0.08 – 0.05 µm / min, depending on temperature and Rh-content

The Coatings of Rhodium

Colour: brilliant white

Hardness: 800 – 900 HV

Thickness: max. 0.5 µm

Further Properties

Rhodium baths usually show low wetting ability causing bubbles of hydrogen adhering to the work-piece.
The use of **Rhodium-Decor-S4** will avoid this.
Hydrogen bubbles stay very small and readily separate from the surface.

Delivery Form

Make-Up: Rhodium-Decor-S4 is delivered as Make-up-concentrate with 4 g Rh / 100 ml for a 2 L bath with a stability of at least 2 years.

Replenisher: Rhodium-Decor-S4-R is a concentrate with 5 g Rh / 100 ml, with a stability of at least 2 years.

Bath Formula

Procedure: 100 ml Make-Up with 4 g Rh of **Rhodium-Decor-S4** is stirred into 1900 ml of de-ionised water.

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Operating Conditions

Rhodium content: 2 g / L standard version

H_2SO_4 content: increases slightly with the bath use

Temperature: preferably 40 °C

pH: <1, monitoring not necessary

Work-piece agitation: recommended rate 5 – 10 cm / sec

Bath agitation: recommended bath agitation by air bubbles not suitable

Current density: ~ 0.5 – 3.0 A / dm^2, preferably 1 A / dm^2

Voltage: 1.5 – 2.2 V from anode to cathode. If the surface of the work-piece and the current demand can not be calculated, the bath voltage is adjusted to be just strong enough to develop little hydrogen bubbles.

Deposit rate: 10.0 mg / Amin at 40 °C, 1 A / dm^2, and 2.0 g Rh / L (approx. 0.08 µm / min)

Current yield: ca. 47 % at 40 °C and 1 A / dm^2

Please notice:
- a temperature ≤ 40 °C decreases the deposit rate
- a temperature ≥ 40 °C increases the deposit rate

Coating density: ~12.4 g / cm^3

Exposition time: at least 2 min (= 0.16 µm)

Longevity: The bath should be replaced after a turnover of 20 g Rh / L. But in the end the bath can be worked out to 0.4 g Rh / L (with decreasing current efficiency) but with constant coating quality.

Replenishment

After Rh depletion of 50 % (1.0 g residual Rh / L), add **Rhodium-Decor-S4-R** to the bath (20 ml for each g Rh to be added).

Monitoring and Adjustments

Keep clean. When not in use, remove platinised titanium anodes and cover the bath. Avoid metallic contamination of especially copper, zinc, iron and silver and the drag-in of cyanide.

Filtration: If filtration with activated carbon is necessary additives may be removed.
Thus this treatment is recommended just before the bath is to be replenished. In case the additives are lost during the treatment 10 ml of the **Rh-Decor-S4-Special-Starter** / L bath are added.

Analytic control: Monitoring of Rh-content and, if necessary, content of sulphuric acid.

The bath has to be replaced when 20 g Rh / L are turned through the bath and the content of sulphuric acid has increased to 80 g / L.

Special Notes on Procedure

Barrel Plating: The bath does not foam and is also suitable for barrel-electroplating.

Pre-treatment: Achieve the desired starting condition of the good by acid-cleaning / grinding / polishing. Then the goods must be degreased thoroughly before plating.

Intermediate layer: Rhodium can be plated directly onto silver, gold, palladium, copper and copper alloys, nickel and nickel alloys. For other metals use a final gold-strike after a strike with nickel.

Immersion in acid: After degreasing or pre-striking dip the good into (chemically pure) 5 % sulphuric acid at room temperature to avoid any drag-in into the bath.

Important: The immersion in acid shall be the last step before Rh-plating. Let the work-piece drip and put it under current into the rhodium bath without rinsing.

After-treatment: Let residual bath solution drip. Rinse in deionised water, then in flowing water, and once again in deionised water. Dry immediately. The water used first for rinsing can be used to fill up the rhodium bath in order to compensate evaporation.

Equipment: Tank made of polypropylene, PVDF, glass or porcelain.

Fittings: All plastic in contact with the bath, i.e. tank, rack insulation, barrels, pumps and hoses shall be acidified in cold sulphuric acid (5 – 10 %) ca. 24 hours before being used.

Attention: Very important before filtering, cartridges must boil in 10 % sulphuric acid for ca 3 hours.
They are subsequently placed into the pump and rinsed with water, which is to be replaced several times.

Heater: Dip heater cased in porcelain, quartz or PTFE, equipped with temperature controller

Work-piece agitation: recommended

Anodes: Platinum or platinised niobium, platinised titanium.

Contact **METAKEM** – a producer of a broad range of insoluble anodes - for consult in case of a need.

The surface ratio between anode and work piece should be at least 1:1. The distance from work-piece to anodes: at least 5 cm. If wires, strips, hooks contact the anodes, they are also to be made from titanium or platinised titanium.

Rectifier: Sufficient current capability, adjustable current; with power indicator.

Exhauster: Necessary for large baths (strongly acid mists from the bath due to hydrogen evolution)

Recovery process: METAKEM processes used rhodium baths to recover the rhodium content.
Please concentrate the baths before sending them in.

Please notice: The data concerning storage stability refer to the storage in sealed original containers under the conditions stated on the label.

For further information please contact us:

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