Product Information

Substance WR1 Patinal®

GENERAL INFORMATION

Substance WR1 Patinal® was developed for the deposition of hydrophobic layers by vacuum evaporation. Top coatings made of Substance WR1 Patinal® on AR coated glass or plastic lenses exhibit a very low wettability by water and therefore a lowered tendency to be contaminated by grease and finger prints.

Substance WR1 Patinal® consists of carrier tablets made of an oxide mixture doped with a perfluorinated silane. The substance is provided in three tablet sizes with different silane doping levels.

No indication for a limitation of shelf life has been observed. Nevertheless, the maximum storage time should not exceed 5 years because of the organic nature of the hydrophobic ingredient. We recommend to store the substance in a cool and dry location at temperatures well below 30°C.

AREAS OF APPLICATION

- Hydrophobic & oleophobic Topcoat for ophthalmic lenses and AR coated glasses

THIN FILM PROPERTIES

Contact angle	
• with water	~ 112°
• with hexadecane	~ 67°
After abrasion	
• with cotton cloth @ 4000 cycles	> 100°
Free surface energy	Total: 19.8 mN/m Dispers: 19.3 mN/m Polar: 0.5 mN/m

The typical water contact angle of Substance WR1® Patinal should be larger than 110°.

The refractive index is about 1.4 in the visible spectral range. The change in AR-functionality can be considerable if the AR-coating design has not been compensated for this additional layer. We advise to compensate (reduce) the original top layer of the AR stack by the same thickness as the deposited WR1 layer in order to keep the spectral performance unchanged.

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No major deterioration occurs by wiping with cloth or after boiling in salt solution (5% of sodium chloride in water) for 10 minutes. Furthermore no delamination occurs after tape testing.

NOTES FOR EVAPORATION

Evaporator source	Resistance heated thermal evaporator Electron beam evaporator (indirect)
Boat / liner	Box type Ta or W boat Mo or Ta-Liner with perforated cover
Evaporation temperature	350 – 750 °C recommended 450 – 750°C
Chamber pressure	< $4 \cdot 10^{-5}$ mbar
Substrate temperature	from RT up to < 300 °C recommended < 150 °C
QCR-settings	Density 1.5 g/cm³, z-ratio 1.0
Thickness (QCR)	15 – 25 nm (depending on tooling factor)

Substance WR1 Patinal® can be evaporated from a thermal boat. A box type Mo- or Ta-boat is recommended. The active substance (silane) starts evaporation in a temperature range of about 350 - 450°C. For shorter process time a boat temperature of up to 750 °C can be chosen for evaporation. For evaporation with an electron beam, indirect heating in a Mo- or Ta-liner with perforated cover should be used.

After opening the shutter, the boat current should be set to a low and constant value. Onset of evaporation usually occurs after approximately 60 - 90 sec. The evaporated Substance WR1 Patinal® will form a thin fluorinated siloxane layer on the substrate. The thickness of the film is self limited at a physical layer thickness of about 7 – 8 nm. Excess material can be wiped off. For optimum spectral stability the spectral measurement of the coating should be performed after wiping off surplus material. Maximum durability is achieved for approximately 20 nm thickness quartz crystal reading at 1.5 g/cm³ density setting.

Durable films with good adhesion can be deposited onto oxide films, especially onto silicon dioxide films (top layer of an AR coating) on mineral glass or plastic lenses.

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PRODUCTS

Product Code	Description	Active Substance
1.15195	Substance WR1 Tablets 0.03 Patinal®	0.03 g per tablet
1.07669	Substance WR1 Tablets 0.06 Patinal®	0.06 g per tablet
1.07683	Substance WR1 Tablets 0.13 Patinal®	0.13 g per tablet

SPECIFICATION

RoHS information

The RoHS compliance information is part of the Certificate of Analysis (CoA) for each batch of Patinal® material.

Contact Angle	≥ 110°

Application test

Each batch has to pass a specific application test assessing its evaporation behaviour.

Sizes

1.15195	Active substance ≥ 0.03 g/tabl. h = 4.5 – 5.5 mm Ø = 6.5 – 7.5 mm
1.07669	Active substance ≥ 0.06 g/tabl. h = 4.7 – 5.5 mm Ø = 10.8 – 11.6 mm
1.07683	Active substance ≥ 0.13 g/tabl. h = 9.5 – 10.5 mm Ø = 10.5 – 11.5 mm

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Quality assurance

Research, production and sales of our Patinal® evaporation materials take place under a certified DIN EN ISO 9001:2000 quality management system and DIN EN ISO 14001 environmental management system. The quality of the materials is assured by our manufacturing processes, in-process controls and quality tests. Each batch is released only after passing our chemical analysis and application tests designed to confirm the suitability of the material for the evaporation process.

Handling precautions

Product safety information required for safe use is not included in this document. Before handling, read product and safety sheets and container labels for safe use, physical and health hazard information. The material safety data sheet is available online at www.patinal.com, from your EMD representative or distributor, or by calling your global Merck KGaA, Darmstadt, Germany, contact.

Disclaimer

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