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REGAL VARNISH

The new varnishes based on Regalrez 1094[®] resin

*** Reference Publications:**

- Lo Stato dell'Arte 2 – Congresso Nazionale IGIC, Genova (2004)
- Lo Stato dell'Arte 5 – Congresso Nazionale IGIC, Cremona (2007)
- Lo Stato dell'Arte 6 – Congresso Nazionale IGIC, Spoleto (2008)
- L'attenzione alle superfici pittoriche – Congresso Cesmar7, Milano (2008)
- Le fasi finali nel restauro delle opere mobili policrome - Congresso Cesmar7, Trento (2010)

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Introduction

Varnishes applied on the surfaces of paintings supply an optical function, (of the saturation of color), in addition to a protective function to external agents.

All varnishes, whether they are natural or synthetic, precisely for their function and for the fact that they are applied in thin films, will be subject to in a more or less pronounced manner the combined action of light, humidity and pollutants contained in the atmosphere, and aging due to the mechanisms that depend on their chemical structure.

The rapid yellowing of the natural resins (dammar, mastic), has required a frequent repetition of the procedure involving removal and reapplication of the varnish, coupled with an intrinsic risk for the pictorial film below.

Therefore, there has been a search for alternative materials in the field of synthetic polymers, not always with satisfactory results. In terms of reversibility for example, problems with **acrylic resins** were found, as they are intrinsically subject to cross-linking.

Varnishes based on **polyvinylacetate** (PVA) are very stable to light, but instead presented a problem of “capturing” atmospheric particles, due to their low transition temperatures, and caused an overall graying effect, which does not occur in natural resins. For this reason, PVA resins have found a particular use as isolating varnishes and as binders for retouching colors (for example “Gustav Berger’s O.F. Isolating PVA Spray Varnish” and “Gustav Berger’s O.F. PVA Inpainting Medium”).

Presently, the spectrum of commercial varnishes are based principally on four different base resins: two natural (dammar, mastic) and two synthetic (acrylic and ketonic).

For the ketonic resins currently used, however, questions arise about the actual stability, after the most famous and studied resin, Laropal K80, has gone out of production.

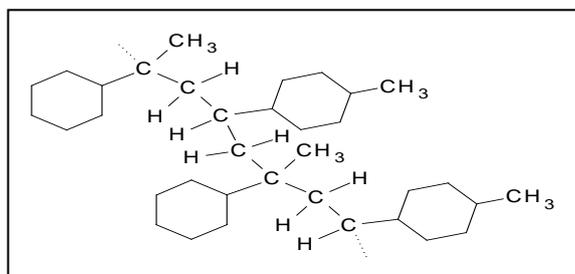
Studies aimed at individualizing more resistant polymers, and with less inconveniences in reversibility, have been done in particular at the Scientific Laboratory of the National Gallery of Art in Washington, and there they have determined the exceptional behavior of some aliphatic resins, among which stood out **Regalrez 1094**.

These polymers of low molecular weight result from the hydrogenation of *oligomers* (polymers constituted by few monomeric units), obtained from vinyl-toluene and alpha-methyl-styrene. It is with the hydrogenation that the polymer stabilizes, reducing the double bonds which are the “weak points”, where aging begins.

Other performance properties of these resins for varnishes have been improved through the addition of elastomers called **Kraton**.

At the same time, studies made to improve the performance of the resins have led to the introduction of *stabilizers*, the most promising of which are **Tinuvin products**.

Regalrez 1094
structure



C.T.S. S.r.l. was the first to have introduced in Italy the components of this new generation of varnishes, and has been offering two ready-to-use varnishes since 2005: **Regal Varnish Gloss** and **Regal Varnish Matt**, perfectly miscible to obtain all the semi-matt gradations desired.



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REGAL VARNISH GLOSS

Due to the small dimensions of its chains, **Regalrez 1094** (whose molecular weight is around 900 uma) forms solutions of low viscosity, permitting an optimal smoothing out of irregularities in the pictorial layer, just as it occurs with natural resins.

Moreover, the optical properties are similar to those of traditional resins since the refractive index is high (1.519).

Another positive characteristic of Regalrez 1094 is its glass transition temperature ($T_g = 33^\circ\text{C}$), and a softening temperature of 94°C . In fact at room temperature the resin remains hard and does not absorb particles.

Regal Varnish Gloss is a colorless and stable finishing varnish, easily reversible in aliphatic hydrocarbons, such as *white spirit D40* or petroleum oil, which may also be used as diluents.

It is prepared by dissolving Regalrez 1094 in a dearomatized petroleum oil, with low levels of toxicity and a boiling point of $140\text{-}160^\circ\text{C}$.

Regal Varnish Gloss also contains a small quantity of the plastifying agent Kraton G-1650, a copolymer in blocks of styrene-ethylene-butylene-styrene (SEBS), and of the stabilizer Tinuvin 292, in the percentages indicated in literature, in the percentages of 1% and 0.5% by weight respectively, while the resin is 23.5% of the total.

Tinuvin 292 is a liquid stabilizer soluble in organic solvents. This class of products therefore does not block ultraviolet radiation, but reduces its damaging effects, binding to peroxides and free radicals resulting from the photodegradation of the polymers.

Regal Varnish Gloss is inflammable.

REGAL VARNISH MATT

Regal Varnish Matt is opalescent and creates a colorless and stable film, with an opaque effect obtained through the presence of microcrystalline wax. Similar to Regal Varnish Gloss, it is easily reversible in aliphatic hydrocarbons, and in addition to Regalrez 1094 it contains Kraton G-1650 and the stabilizer Tinuvin 292.

A dearomatized petroleum oil with a boiling point of $140\text{-}160^\circ\text{C}$ is the recommended solvent for its dilution, especially for its application in spray form. More opaque effects may be obtained with solvents of lower boiling points, like ligroin $80\text{-}120^\circ\text{C}$.

The microcrystalline wax can separate and deposit itself at the base. To re-melt, shake well eventually heating by bain-marie, far from open flames.

Regal Varnish Matt is inflammable.

Regal varnishes can be mixed together to obtain semi-matt effects.

They can be applied even in spray form, after further dilution, and can be used both on oil and acrylic colours.

Due to their low viscosity, **Regal** varnishes cannot be applied on very porous paintings; they must be first varnished preventively with an isolating varnish such as Gustav Berger's O.F. Isolating PVA Spray Varnish.

The low polarity of their constituents ensures that the solvent action against the paint layer and the materials used for retouching is minimal.

Regal varnishes can be applied on paintings already varnished with natural or synthetic varnishes, giving an increased protection. It is important to remember that due to their reversibility, **Regal** varnishes are not recommended as retouching varnishes, and must be applied once the solvent used in previous operations (varnishing, retouching, cleaning) has completely evaporated. In particular, the application of **Regal** varnishes is problematic after the use of turpentine essence, a solvent which, as is known, never completely evaporates from the paint layers.

The components of **Regal** varnishes are also sold individually.



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Packages:

Regal Varnish Gloss	1 l
Regal Varnish Matt	1 l
Regalrez 1094	1 kg
Kraton G-1650	250 g
Tinuvin 292	250 g
Denatured petroleum oil	5 l - 25 l

N.B.

For packaging of our Varnish Spray line, we used high quality cylinders, with a safety cap that guarantees no accidental opening (for exemple during the transport).

For easy opening it is recommended to use a slotted screwdriver, inserting it into the slot in the cap and turning it slightly until the cap is released.

References

- de la Rie E.R.; McGlinchey C.W.; "New synthetic resins for picture varnishes" in *Cleaning, retouching and coatings*, Ed. Mills & Smith, Londra (1990).
- Whitten J.; "Regalrez 1094: properties and uses", WAAC Newsletter, 17,1 (1995).
- de la Rie E.R.; "Why use a synthetic picture varnish?", in *Art et Chimie: les polymères*, Parigi (2002).
- Borgioli L., Mariotti P.; "Applicazione di nuove vernici ad alta stabilità", Il Congresso IGIIIC, Genova (2004)
- Borgioli L., Cremonesi P.; "Le resine sintetiche usate nel trattamento di opere policrome", Il Prato, Padova, 2005.
- Borgioli L., Dori L., Piacenti D.; "Effetti della temperatura e dei solventi su vernici sintetiche e naturali" e Borgioli L., Mariotti P., Baldan M.; "Verifica della rimovibilità di vernici sintetiche e naturali"; Lo stato dell'arte 5, Cremona, 11-13 Ottobre 2007
- Borgioli L., Camaiti M., Rosi L.; "Comportamento all'irraggiamento UV di nuovi formulati polimerici per il restauro", Atti del Congresso "Lo stato dell'arte 6", Spoleto, 2-4 Ottobre 2008.
- Baldò J.M.J. et al. "Ricerca sull'uso delle vernici nel restauro dei dipinti su tela", e Marra A.; "La verniciatura dei dipinti ad olio su tela: le resine sintetiche", Atti del Congresso "Le fasi finali nel restauro delle opere mobili policrome", Trento, 19-20 Novembre 2010.

The information contained in this sheet is based on our knowledge and laboratory tests at the date of the last version. Users must verify the suitability of the product for the specific use by preliminary tests, and is required to comply with the laws and regulations in force concerning safety and hygiene.

C.T.S. S.r.l. guarantees the constant quality of the product but is not liable for any damage caused by improper use of the material, since it is designed for professional use. Moreover, they can change at any time components and packaging without prior notice at any time.



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Here are some references on varnishings made with **REGALREZ 1094** and **REGAL VARNISH**

Name of the painting / Type / Author / Museum (reference publication)
" Incoronazione di Spine " del Cerano. Olio su tela. Collezione Borromeo – Stresa (Atti del III Congresso Nazionale IGIC, Palermo (2005))
"La fuga di Clelia e le vergini romane" di Giorgio di Giovanni. Olio su tavola. Galleria degli Uffizi, Firenze
" Le tre Grazie " di Francesco Morandini detto il Poppi. Olio su rame. Galleria degli Uffizi, Firenze
" L'alchimista " di Giovanni Domenico Valentino. Olio su tela. Galleria degli Uffizi, Firenze
" Sant'Agata e San Ludovico d'Angiò " di Jacopo da Empoli. Olio su tela. Museo dell'Opera di Santa Croce, Firenze.
" Santa Margherita ritrova il corpo dell'amante morto " di Marco Benefial. Olio su tela. Galleria Nazionale d'arte Antica, Palazzo Barberini, Roma
" La Madonna delle cilegie " di Ambrogio Lorenzetti. Olio su tavola. Chiesa di SS. Pietro e Paolo, Roccalbegna, Grosseto
La Deposizione di Raffaello (1507). Olio su tavola. Galleria Borghese, Roma.
" Vergine leggente " di Antonello da Messina. Olio su tavola. Collezione Forti, Venezia
Cornici dorate monumentali della " Discesa di Cristo al limbo " Museo di Santa Croce, Firenze e della " Pala di S.Zeno "
" Autoritratto " di Durer. Olio su tavola. Galleria degli Uffizi, Firenze
" Sant'Anna con la Vergine " di Gennaro Vassallo, San Giovanni Maggiore, Napoli
" Incoronazione della Vergine ", del Brescianino. Olio su tavola. Chiesa SS. Pietro e Paolo, Siena
" San Sebastiano " Bottega di Silvestro dell'Aquila (inizi XVI sec). Statua lignea policroma.
Soffitto ligneo decorato della casa di Sigismondo Muzzarelli. Ferrara
" Trittico di Benedetto Portinari " di Hans Memling (1487). Olio su tavola. Galleria degli Uffizi. Firenze. (Kermes n°72, 2008)
Globo terrestre della Biblioteca Braidense, Milano (Atti del Congresso "Lo stato dell'arte 6", Spoleto, 2-4 Ottobre 2008)
" Madonna di Fiesole " attribuita al Brunelleschi (XV secolo). Terracotta policroma.
" Ritratto di Gerolamo Casio " di Giovanni Antonio Boltraffio, (1490) Tempera all'uovo/olio su tavola. Pinacoteca di Brera, Milano (Progetto Restauro n°56, 2010)
Quadreria Sabauda della Venaria, Torino.
" L'ultima cena ". Olio su tela. Collegiata di San Rocco, Montorio al Vomano (TE)
" Assunzione della Vergine ", G.B. Ragazzini (1580), olio su tela, Chiesa di San Domenico, Penne (PE)
" Polittico Serristori ", Mariotto di Nardo (1424). Tempera, oro su tavola. Fondazione Cassa di Risparmio di Prato, Prato
" Memento mori " di Grinling Gibbons, Galleria Estense di Modena
" Natività della Vergine " di Sebastiano del Piombo (1532). Olio su muro. Cappella Chigi, Santa Maria del Popolo, Roma.