

®Mowiol / Kuraray Poval® - Photosensitive coatings

Offset Printing Plate Coatings / Printing Screen Lacquers / Color Television Screens (CRT)

Photosensitive coatings consists of a film-forming agent and a sensitizer. The film-forming agent determines:

- The mechanical and physical properties of the coating (adhesion to the substrate, strength and stability)
- The nature and quantity of the stabilizer
- The treatment of the system in exposure and development
- The gradation of the print

The original film-forming agents used were colloids of animal or vegetable origin (albumen, gelatin, fish glue, polysaccharides). Modern systems are based on polyvinyl alcohol.

The question of whether a high- or low-viscosity Mowiol / Kuraray Poval is used depends on the requirements arising from the various applications. PVOH from the low-viscosity range is used if thick coatings are to be produced economically. If good gradation takes priority, it is advisable to use higher-viscosity grade. Medium-viscosity Mowiol / Kuraray Poval represents a good compromise.

The sensitizer is normally produced as a separate solution, which is added to the film-forming agent shortly before application of the system to the substrate. In other words, after the film-forming agent and sensitizer are intermixed there is a limited processing time, which can be varied by adjusting the pH. In practice there are also one-pot systems in which the film-forming agent and sensitizer are ready-mixed. Preference is given in this case to Mowiol 20-98, as the set pH is not affected by subsequent saponification of the residual acetyl groups present in the polymer molecule.

The finished mixture is applied to the substrate by centrifuging, doctor coating or other methods. Ammonium dichromate or special diazonium compounds are used as photo-sensitizers for Mowiol / Kuraray Poval.

The mechanism for photo-curing Mowiol / Kuraray Poval by dichromate is based on the light-induced oxidation effect of CR^{+6} .

The CR^{+3} which is produced forms complexes by way of OH groups of the film-forming agent PVOH. This reaction causes a reduction in the water-solubility of the exposed areas of the coating.

Slight reduction of the dichromate is also possible by infrared radiation (heat). Sensitized solutions of Mowiol / Kuraray Poval or plates coated with it must therefore be stored in a cool place to prevent a "reaction in darkness". Diazo-sensitized coatings are easier to handle in this respect, but here again it is advisable to observe certain storage conditions.

The commercially available special diazonium compounds are stable for long periods at room temperature. Only when exposed to short-wave light (maximum absorption between 300 and 450 nm) does photolytic cleavage of the N-N arrangement take place in the molecule, followed by the substitution of hydroxyl groups. As a result, the decomposition products manufactured in this way are able to form water-insoluble complexes with PVOH.

The mixture whose composition and action have been described are used for the production of printing plates, screens for screen printing, scanned-image screens (e.g. color television tubes) and boards for printed circuits.

An effective means of exposing the coating through a negative or rather negative is to use carbon arc, xenon or high-pressure mercury vapor lamps.

Development is then carried out by spraying with hand-hot water, which washes off the unexposed areas. After drying, the stencil is used without further treatment as a screen printing master.

In many cases it is advisable to increase the water-resistance of cured coating by incorporating a polymer emulsion, e.g. Mowilith D approx 50%, DM 1 and DM 2 or DM 2 HB approx 53%, into the photosensitive mixture.

As a printing form for offset printing, the stencil needs further treatment. This involves first applying PVC lacquer and then removing the coating, etching, etc.

Given the extraordinary precision required in the production of color television screens (CRT), Mowiol / Kuraray Poval is needed not only as a photo-sensitive binder for luminescent pigments, but also as a protective colloid for the pigment particles. The very low extraneous ion (ash) content of the polymer is a crucial factor. The preferred grade of PVOH is Mowiol 40-88 low ash.

Solutions of low-viscosity Mowiol / Kuraray Poval grades are recommended as a retouching medium for repairing faults in printing screens. The use of such products allows a high solids content in the retouching media and thus rapid drying of the repaired area.