

## Photochromic Dyes Technical Data Sheet

**Photochromic Dyes** are reversible raw dyes in crystalline powder form. Photochromic dyes reversibly change color upon exposure to ultraviolet light in the range of 300 to 360 nanometers.

Full color change occurs in just seconds when using a flash gun to 20-60 seconds in the sunlight. The dyes change back to colorless when removed from the UV light source. Some colors may take longer to fade back to completely clear than others.

**Photochromic dyes** are compatible with one another and can be mixed together to produce a wider range of colors.

**Photochromic Dyes** can be extruded, injection molded, cast, or dissolved into an ink. Photochromic dyes can be used in various paints, inks and plastics (PVC, PVB, PP, CAB, EVA, urethanes, and acrylics). The dyes are soluble in most organic solvents.

Due to the wide variations in substrates, product development is solely the responsibility of the customer. Colors include Red, Yellow, Blue, Green, Orange, Sky Blue, Violet.

### Storage and Handling

**Photochromic Dyes** have excellent stability when stored away from heat and light. A shelf life of excess of 12 months provided that the material is stored in a cool and dark environment.

### Sensitivity

The dyes are EXTREMELY affected by the matrix in which they are incorporated. Matrix effects may drastically change the performance of the dyes or even destroy the dye. Because of these effects the same dye in multiple ink systems may result in slightly different colors upon activation by UV light.

### Mixing

**Photochromic dyes** can withstand most standard mixing procedures.

### Light

**Photochromic dyes** are sensitive to UV degradation over time.

The life expectancy of the dyes depends greatly on the matrix into which they are dissolved, the additives used to stabilize them, and the intensity and duration of UV exposure.

### Heat

**Photochromic dyes** can be subjected to processing temperatures of 180°C to 240°C without degradation, for a short period of time. Thermal degradation is a function of the combination of time and temperature. The shorter the time and the lower the temperature, the less thermal degradation will occur.

### Chemicals

**Photochromic Dyes** can be incorporated into many types of solvents based inks.

All Applications using any **SMAROL** products should be thoroughly tested prior to approval for production.

## Photochromic Pigment Technical Data Sheet

### Storage and Handling

**Photochromic Pigments** are more sensitive to the influences of solvents, pH, and shear than many other types of pigment. It should be noted that there are differences in performance of the various colors so that each should be thoroughly tested before commercial application.

**Photochromic pigments** have excellent stability when stored away from heat and light. Store below 25°C. Do not allow it to freeze, as this will damage the photochromic capsules. Longterm exposure to UV light will degrade the photochromic capsules ability to change color. A shelf life of 12 months is guaranteed provided that the material is stored in a cool and dark environment. Storage longer than 12 months is not recommended. Consult product MSDS prior to use.

### Sensitivity

**Photochromic microcapsules** are sensitive to adverse environmental conditions. These are listed below, along with a description of the nature of the sensitivity, and recommendations with regards to them.

### Mixing

**Photochromic pigments** can withstand most standard mixing procedures. Some shear is necessary as the microcapsules agglomerate slightly when in powder form. To disperse the powder we recommend the use of a three-roll mill. If too much shear energy is used (e.g. bead mills) then the microcapsules can be crushed and the photochromic function destroyed.

### Light

**Photochromic pigments** will degrade from UV exposure over Time. Exact life expectancies depend on the intensity and duration of the UV exposure. Some colors will degrade faster than others. Do not use UV inhibitors over the photochromic powders as it will interfere with the color change properties.

### Heat

Some colors may degrade quicker over time when held at elevated temperatures.

### Chemicals

**Photochromic pigments** can be incorporated into many types of aqueous inks. However, photochromic materials are sensitive to chemical exposure. Care must be taken to avoid the use of polar solvents such as alcohols, acetates, etc. as these can damage the microcapsule walls.

All Applications using any **SMAROL** products should be thoroughly tested prior to approval for production.