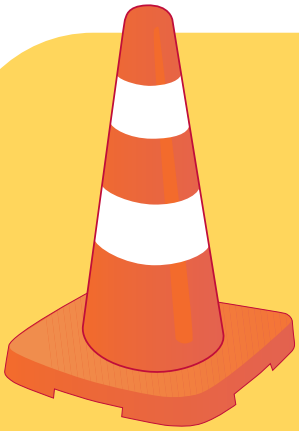
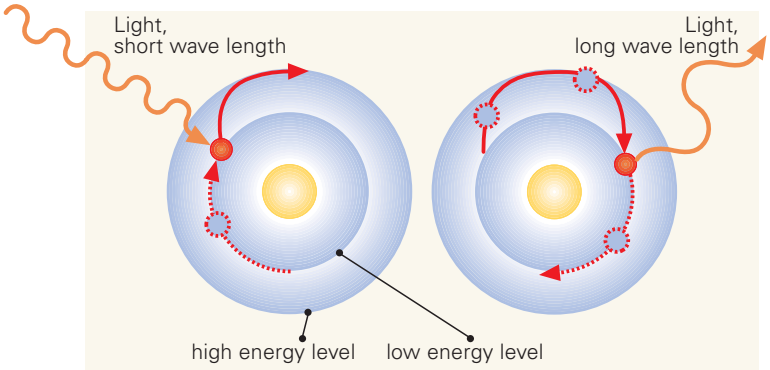


FLUORESCENT INKS

The bright signal effect of fluorescent inks is the reason these types of inks are mainly used for warning signs and safety information such as automobile finishes of ambulances, fire engines or breakdown services. Another common application is warning signs and danger symbols. In addition fluorescent colours, also known as luminous colours, play an important role for advertising purposes. They have more colour strength and brilliance than other colour shades thus resulting in a drastic contrast compared to less intensive ambient matter. Best known daily application is the use of highlighter pens. In turn, the screen process is the ideal application for printing of fluorescent inks.

Luminous colours are fluorescent colours, fluorescence of which is already initiated by regular daylight. The non-visible UV share of the daylight is converted into visible light thus increasing the "yield of light". This effect is due to the special pigment molecules contained. If a light beam of a certain wavelength falls onto this pigment molecule the light beam is absorbed resulting in a stimulation of the electron. In this process the electron will have higher energy level for a short interim period of time before the electron will return to its original energy level and emit the released energy as light

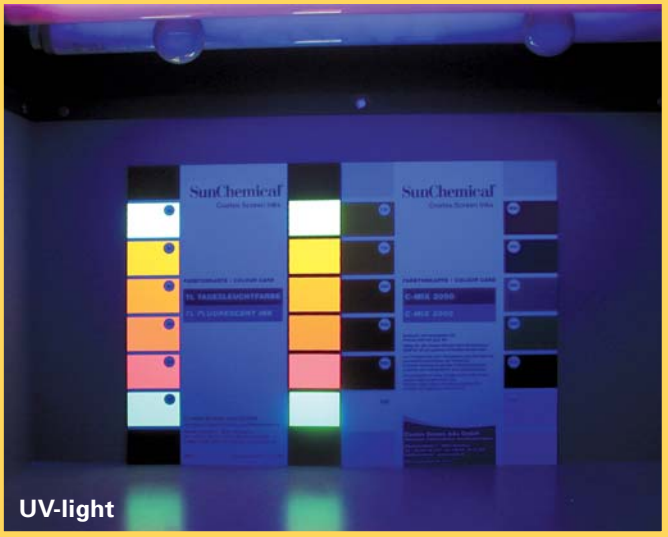


again. However, there are slight losses and the emitted light has less energy than the incident light. Therefore light yield of fluorescent colours is much higher than that of regular colours and that is the reason for the characteristic luminous effect of these ink types.

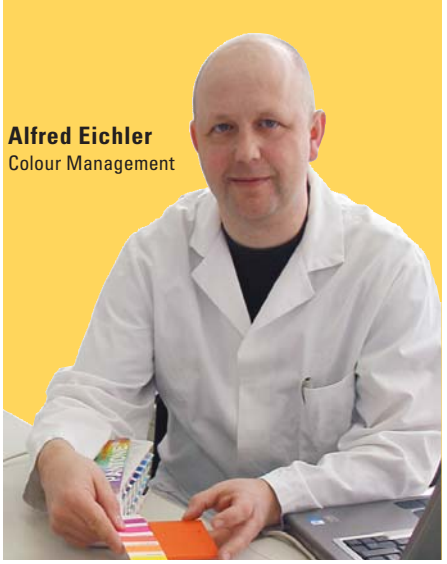
Suitable pigments are required for the production of fluorescent inks. Fluorescent pigments used for screen printing inks are organic fluorescent colorants enwrapped in carrier resins, in other words coloured plastic particles. The properties of the carrier resin will reduce adverse effects such as temperature, water etc.

Due to their chemical composition fluorescent pigments are transparent and have relatively low light and weather fastnesses. There are a few fluorescent pigments with increased solvent or outdoor resistance on the market, however they generally still do not meet the same high resistances than common highly resistance pigments. Light fastness of a

Daylight D65



UV-light



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Colour Management

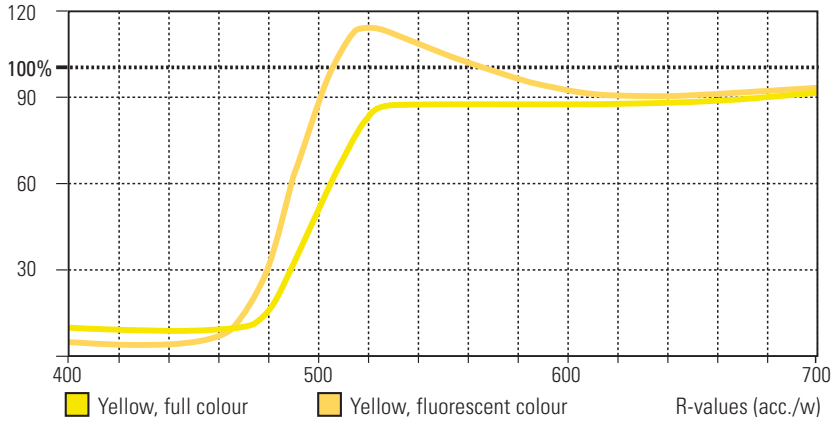
typical fluorescent pigment is approx. 4 on the wool scale (best possible light fastness is 8). Light fastness or light resistance is strongly dependent on binder composition, pigment concentration and layer thickness applied. Subjected to direct sunlight fluorescent pigments will quickly loose their luminous power and the prints will fade within a short period of time.

As this decomposition strongly depends on the intensity of the sunlight an exact prediction of the life cycle of the prints is quite difficult. Light fastness of the fluorescent prints is also strongly determined by pigment concentration and layer thickness; therefore it is advisable to apply thickest possible layers to increase the resistance of the prints. In addition this will result in a stronger luminous effect.

Fluorescent inks require high pigment contents. Therefore the ink film is mat and not glossy. A glossy finish can only be achieved by overprinting. Protective UV-varnishes will increase light fastness, but reduce the luminous effect at the same time. Note: the higher the layer thickness the better the protection.

For printing applications you need to consider that due to the transparency the substrate colour should be light, ideally white. If necessary, an opaque white pre-print should be applied on dark substrates. Fluorescent inks often show a tendency to bleed so care should be taken in choosing the correct ink for overprinting. Colour modifications of fluorescent inks should only be made using transparent colours. Opaque colours will "undermine" the fluorescent effect and reduce brilliance significantly. A positive side-effect of mixing with lightfast colours is the "remaining" colour after the fluorescent pigment has faded.

Reflection curve of a yellow ink with common pigmentation (HG 10/NT-NEU) compared to fluorescent ink (TL 90)



Contrary to common pigments fluorescent pigments do not only convert visible but also UV light to their inherent colour. Therefore we still see colour looking at them under UV light. Common organic and inorganic pigments do not show this property and look only grey under UV light (black light). Thanks to these properties fluorescent inks can be used as so-called "black light effect inks", e.g. ideal for advertising in discotheques.

The versatile screen process is ideal for processing of fluorescent inks. Use of coarse fabrics (e.g. 77-55) will result in layers thick enough to achieve best possible luminous power and long life cycles. Fluorescent pigments can be mixed into various binder systems and are therefore suitable for nearly all types of substrates.

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