

RADGLO®

CFS-0-06 YELLOW

FLUORESCENT TRACER DYE

Technical information

Product description

RADGLO® CFS-0-06 Yellow is a unique fluorescent tracer dye, developed and manufactured at Radiant Color N.V. The detection limit of fluorescent preparations is always immensely higher than their non-fluorescent counterparts (Analytical instruments can detect some fluorescent dyes at concentrations as low as 10^{-14}). This makes RADGLO® CFS-0-06 Yellow a very cost effective dye in tracer applications, especially in replacing alternative non-fluorescent tracer dyes.

RADGLO® CFS-0-06 Yellow is an easily soluble dye in powder form intended to be used for leak detection, refrigerators, non-destructive crack detection, colouring of petroleum derivatives, paraffin oils & waxes, lubricating oils, varnishes, wood preservatives and smart functional coatings.

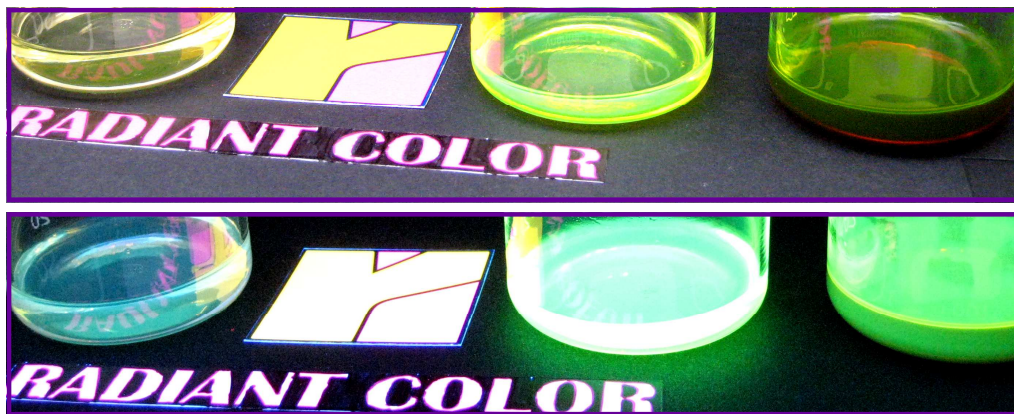


Photo above under day light illumination:

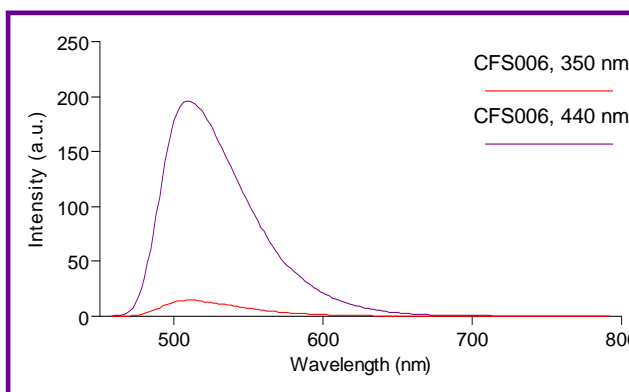
Left: Solution of 10 ppm RADGLO® CFS-0-06 Yellow in castor oil.
Middle: Solution of 0.01 % RADGLO® CFS-0-06 Yellow in castor oil.
Right: Solution of 10 % RADGLO® CFS-0-06 Yellow in castor oil.

Photo beneath under UV light (black light) illumination:

Left: Solution of 10 ppm RADGLO® CFS-0-06 Yellow in castor oil.
Middle: Solution of 0.01 % RADGLO® CFS-0-06 Yellow in castor oil.
Right: Solution of 10 % RADGLO® CFS-0-06 Yellow in castor oil.

Characterization & fluorescence

| | |
|---|--------------------------------|
| Product code | RADGLO® CFS-0-06 Yellow |
| Hue | Bright greenish yellow |
| Appearance | Yellow brownish powder |
| Melting point | 76 –79°C |
| Hiding power | Transparent |
| Best illuminating light | 440 nm |
| Best illuminating lamp | Broad spectrum lamp |
| λ_{max} (0.1% in ricinoleic acid) | 510 nm (Excitation @ 350 nm) |



Fluorescence hue

Depending on the medium, in which RADGLO® CFS-0-06 Yellow is dissolved, the hue of fluorescence will shift slightly between 480 nm (bluish green) to 520 nm (yellowish green). As an example the maximum fluorescence is at a wavelength of 488 nm in polystyrene at 0.02%.

Production of stock solutions of dyes

In order to reach the highest solvent concentration the solvents might be heated without decomposition problems, where RADGLO® CFS-0-06 Yellow remains in solution as the carrier (oil, solvent, wax, etc.) cools back to ambient temperatures. Depending on the carrier purity, values might differ. Keep stock solutions in dark containers.

Heatstability

Although RADGLO® CFS-0-06 Yellow is basically not developed to colour plastics, it might be a good tool to test heat stability.

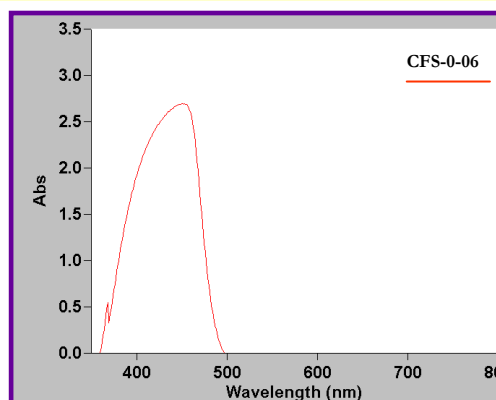
In order to evaluate this property, we moulded RADGLO® CFS-0-06 Yellow at 0.2% load in polyamide and HDPE. Chips showed no considerable colour or fluorescence change over 5 minutes at 300 °C.

Recommended illumination source

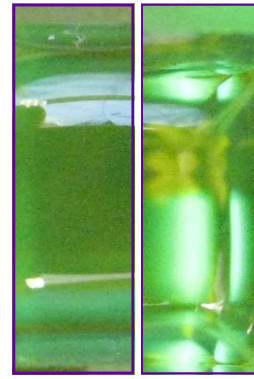
As the fluorescence intensity depends on the used lamp, we recommend broad spectrum lamps, which provide visible violet and blue light as well as long wave UV light. This is due to the absorbing areas of RADGLO® CFS-0-06 Yellow, which is highest in the mentioned light sources as can be seen in the absorption curve on the right side of this text.

Solubility

| | @ | (g/100ml) |
|----------------------------|--------|-----------|
| Polymerised castor oil | 25 °C | > 20 |
| Ricinoleic acid | 25 °C | >20 |
| Mineral oil (Marcol 152) | 25 °C | >20 |
| Acetone | 20 °C | >20 |
| | 50 °C | >20 |
| Ethylacetate | 20 °C | >20 |
| | 50 °C | >20 |
| MMA | 20 °C | >20 |
| | 50 °C | >20 |
| DIDP | 20 °C | >20 |
| | 100 °C | >20 |
| DMF | 20 °C | >20 |
| | 100 °C | >20 |
| White Spirit | 0 °C | >20 |
| | 20 °C | >20 |
| | 50 °C | >20 |
| Alkyd or acrylic resins | | Soluble |
| Olefins and other plastics | | Soluble |



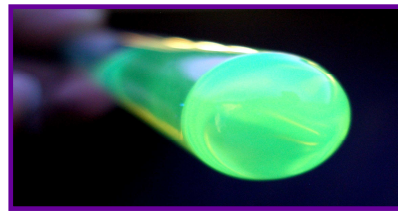
In order to emphasize the role of illuminating light in gaining the highest fluorescence intensity, a 0.1 % solution of RADGLO® CFS-0-06 Yellow in Ricinoleic acid has been illuminated once with UV light of 350 nm and once with blue light of 440 nm. The intensity in fluorescence has been about 10 time higher (see fluorescence curves on the previous page) when 440 nm blue light source has been used. This fact is documented also on the given photos. On the left side, the solution fluoresces after illuminating with UV light (350 nm), on the right side, the solution fluoresces after illuminating with blue light (440 nm).



350 nm 440 nm

Concentration in final application

We recommend a final concentration of 5-10 parts per million (weight) for oil marking. Depending on the application, the used illumination light, the background (light or dark) and on the used solutions, this will differ. In the given photo on the right a solution of 10 ppm of RADGLO® CFS-0-06 Yellow in Ricinoleic acid has been illuminated with a UV light of 356 nm.



Applications

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|---|
| Colouring of petroleum derivates |
| Tax, branding, marking |
| Colouring paraffin oils and waxes |
| Colouring industrial & technical vegetable-based oils |
| Colouring lubricating oils & greases |
| Colouring disinfection solutions & gels |
| Smart paints: Visual aid and labelling when applying varnishes, wood preservatives, functional paints etc. wich become visible under UV light (black light) |
| Leak detection |
| Engines, heat exchange systems, airco systems, automotive, airco systems, household, hydrolic fluids, electrical liquid dielectrics, brake fluids, machining oils |
| Refrigerators |
| Error detecting at plastic construction parts / Non destructive crack detection |

Fluorescent leak detection

RADGLO® CFS-0-06 Yellow is soluble in lubricant and refrigerant systems with strong fluorescent response allowing very low final concentrations of the dye in the used oils to pin-point any present leak.

Ultraviolet (UV) leak detection provide the simplest, easiest and most accurate method for visualizing and finding possible refrigerant leaks. RADGLO® CFS-0-06 Yellow or refrigerant oil solutions here from could be added as a contrast medium or as a tracer dye. This might be done at the first refrigerant charge in the air conditioning system or by changing the refrigerant. Having allowed the air-conditioning system to run for a few minutes, the system must be scanned with an UV lamp. Any leak will appear in a bright greenish yellow fluorescence colour as the added contrast medium will remain at the leak site.

Using UV fluorescence provides an excellent preventative maintenance tool. It is quick, save, easy and allow the detection at a distance. As we provide RADGLO® CFS-0-06 Yellow in a solid very easy soluble form, the system manufacturers have the complete freedom to choose their own fluid system and the right concentration, which they like to offer to their customers best possible detecting tools without any influence on lubricity, viscosity and heat transfer.

Leaks can be a significant source of wasted energy and environmental hazards. Leaks shorten the life of almost all system equipment. Proactive leak detection is recommended and required in different states to overcome those hazards.

Fluorescent error detection at plastic construction parts

Smart paints

RADGLO® CFS-0-06 Yellow is soluble in almost all plastics and their coatings, it gives a high recognition of any surface mistakes in the moulded plastic part or in its paint or coating. Mass coloration with RADGLO® CFS-0-06 Yellow or its incorporation into the paint of the moulded plastic or casted resin parts (for example dashboard of trucks) at right low concentration, will not have any impact on the visible colour. It would allow the detection of any holes or bubbles in the surface, as the fluorescent intensity at such a bubble location would be considerably lower compared to other correct areas of the surface. Such an examination would allow the (automatic) identification of error parts and ease their elimination before other expensive coating or processing are applied or carried out.



(Photo taken under UV light)

Left: Coated with epoxy sealer containing RADGLO® CFS-0-06 Yellow

Right: Untreated rusty metal. (!)

Colouring petroleum derivatives, oils, waxes & lubricants

RADGLO® CFS-0-06 Yellow is intended for colouring petroleum derivatives, oils, waxes, industrial & technical vegetable-based oils, lubricating oils & greases and paraffin oils and waxes.

There are multiple reasons behind utilizing RADGLO® CFS-0-06 Yellow in the mentioned media:

- Improve the **product appearance**.
- In most countries, **tax** authorities apply different rules for petroleum derivatives depending on its usage. For example lower taxes are mostly applied to diesel fuel for agriculture, heating and OFF road vehicles. RADGLO® CFS-0-06 Yellow is ideal to mark the oil with a distinguishable colour at a concentration of 10 ppm.
- **Branding**. Some companies like to create a company colour in their products in order to limit product piracy and build up customer recognition.

RADGLO® CFS-0-06 Yellow can be used in order to visualize transparent functional coatings. One example is the coloration of an epoxy system, used for rust treatment. Under normal light the coating appears slightly yellow to colourless, where under UV light the coating appears strongly green. This makes it possible to apply the system also in dark containers, where no daylight passes through (like silos, bins, vehicles, etc.).

The addition of RADGLO® CFS-0-06 Yellow is recommended for all primers, sealers, insulators, topcoats and generally spoken in all kind of coatings and paints, where the body colour and the coating performance shouldn't be influenced, but the traceability of uncoated areas is of major interest.

Since RADGLO® CFS-0-06 Yellow has a good solubility in epoxies, polyurethanes, alkyds and acrylics, the chemistry won't hinder turning it into smart systems.



The LNBridge photo is a bridge project which has been carried out using smart primer/sealer. (!)

(!): With the courtesy of Carboline®



Delivery form

RADGLO® CFS-0-06 Yellow is delivered as easily soluble powder to give the user full formulation freedom and eliminate the need to keep different liquid dyes in stock. In order to deliver best service to our customers, we are pleased to produce specified stock solutions. Limitations in this regard are only the needed volume and the chemical nature of the solution.

Storage & handling

As the pure RADGLO® CFS-0-06 Yellow dye has a low melting point, it is recommended to store it in closed isolating packaging at temperatures below 30 °C. Lumps caused by higher temperatures are easy to break and to dissolve. In order to avoid this cold flow, we recommend to store stock solutions. Specified solutions might be produced at our location upon request. Keep solutions in the dark.

Package of CFS-0-06 Yellow

| Package: | Bags containing: | |
|----------|------------------|-----------------|
| 1 box | 1 kg | = Minimal order |
| 1 box | 5 kg | |
| 1 box | 10 kg | |
| 1 box | 20 kg | |

® = registered trademark

Disclaimer: This technical information is just an advice. No warranty of fitness for a particular purpose is made.