radiant COLOR

The impact of changing formaldehyde regulation on fluorescent pigments

Ramspec, October 13th 2016
Dr. Ingrid Pollers

YOUR PARTNER IN COLORS AND RESINS

Overview

- Introduction
- Fluorescent pigments?
- Formaldehyde regulation and impact on fluorescent pigments
- Focus on coatings
- Conclusion

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MADE IN BELGIUM

Since 1967

market leader!

An RPM Company

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RPM

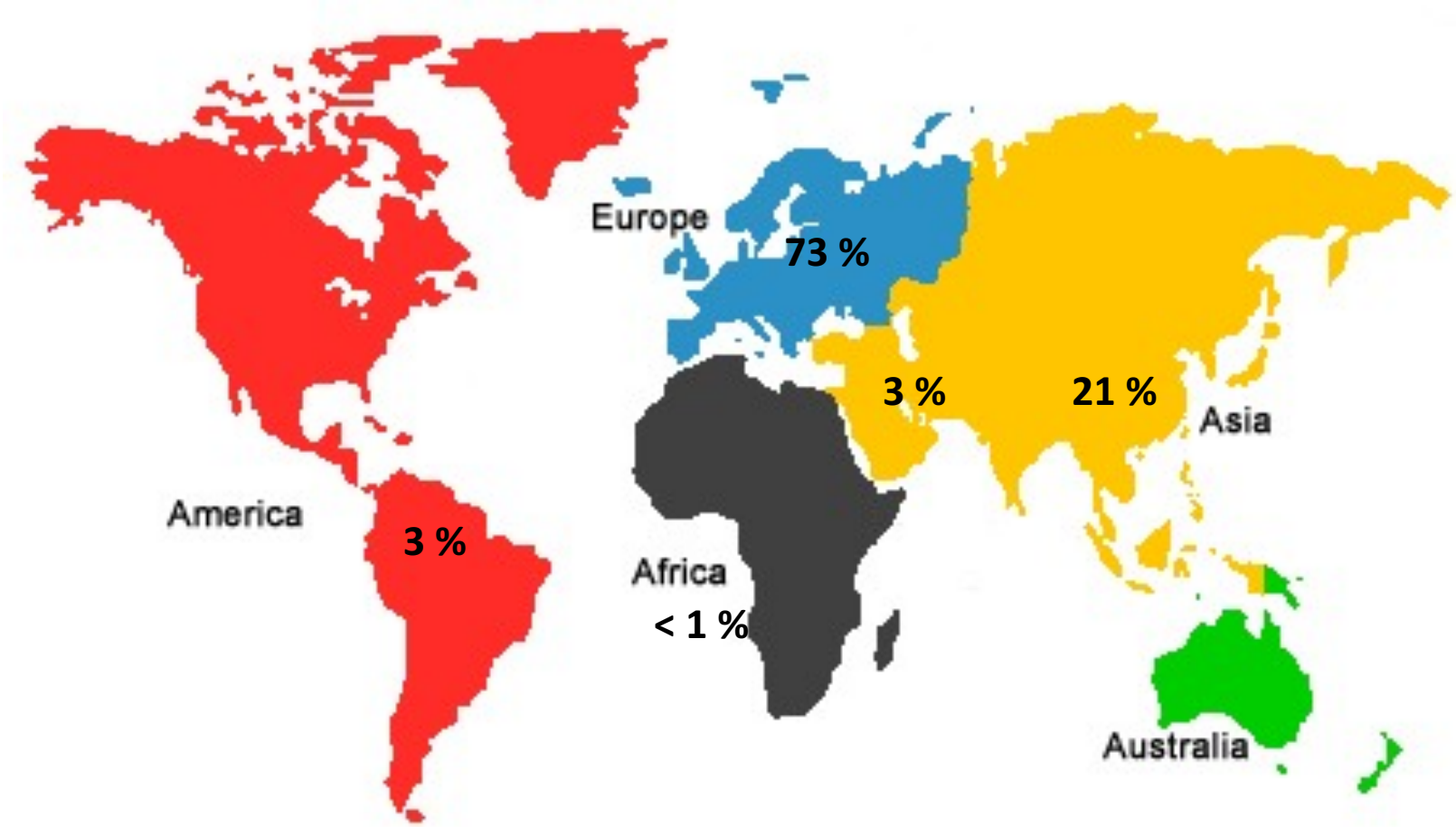
As of 8/31/15

Consumer Segment (32%)

Specialty Segment (15%)

Industrial Segment (53%)

Sales per region



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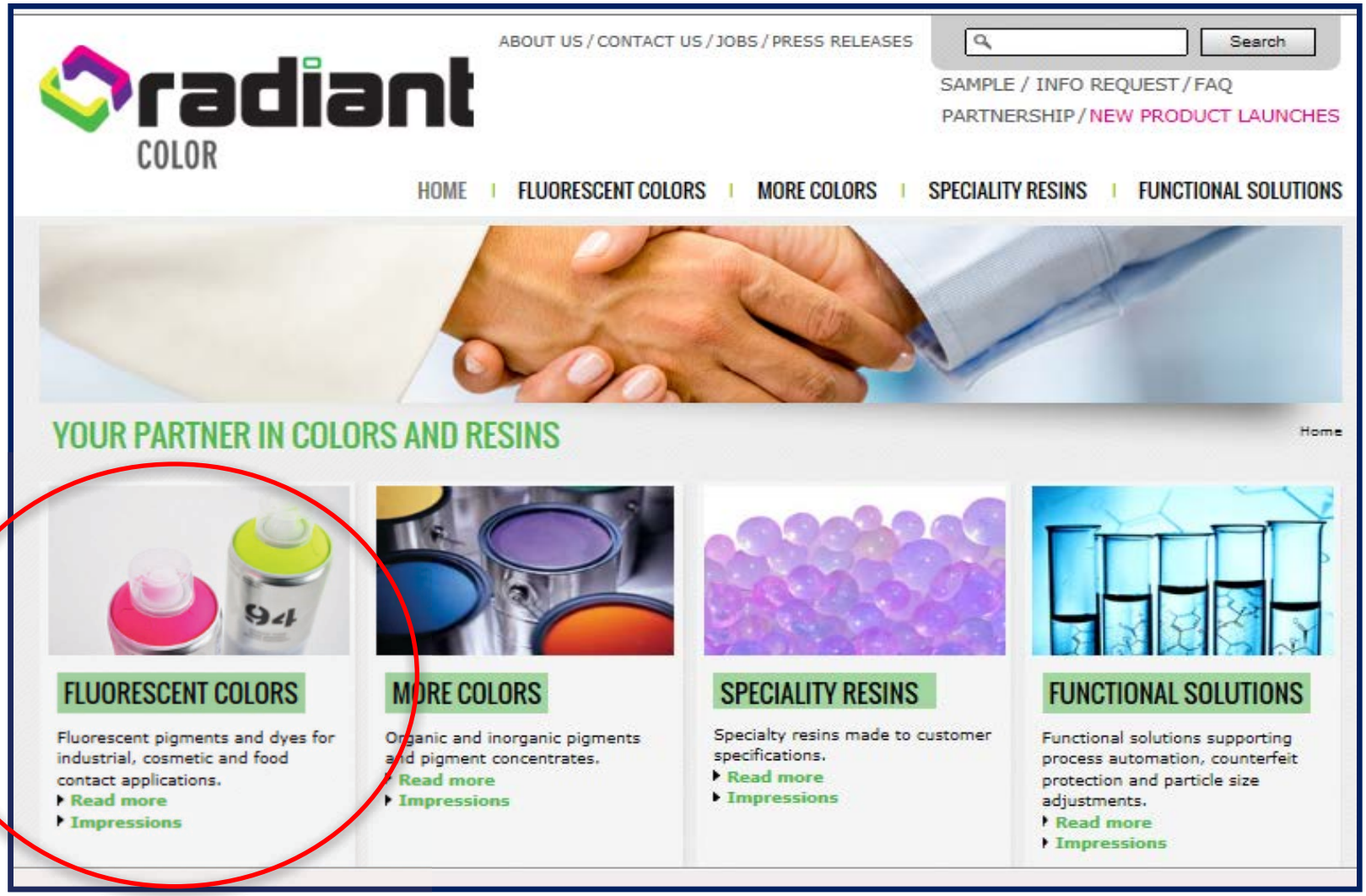

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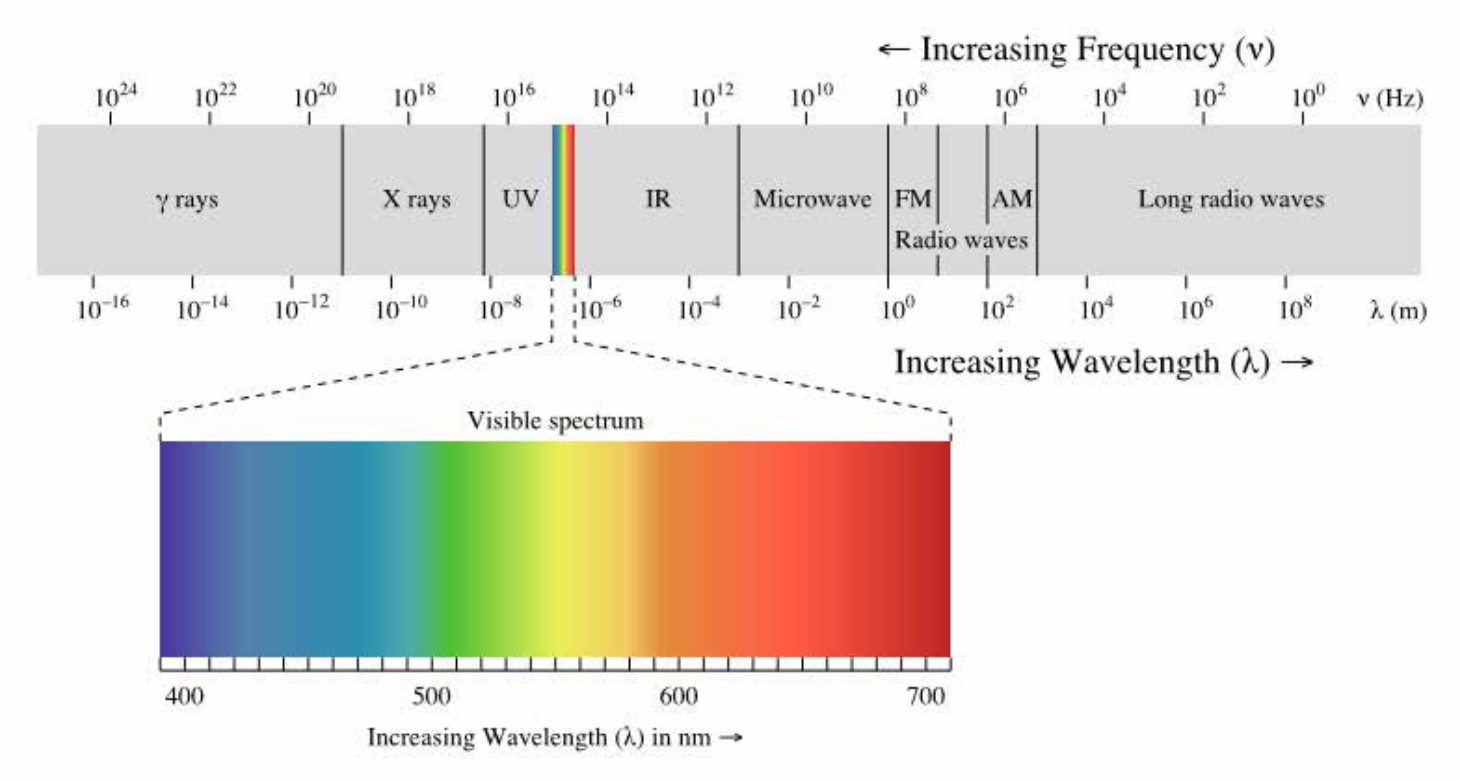
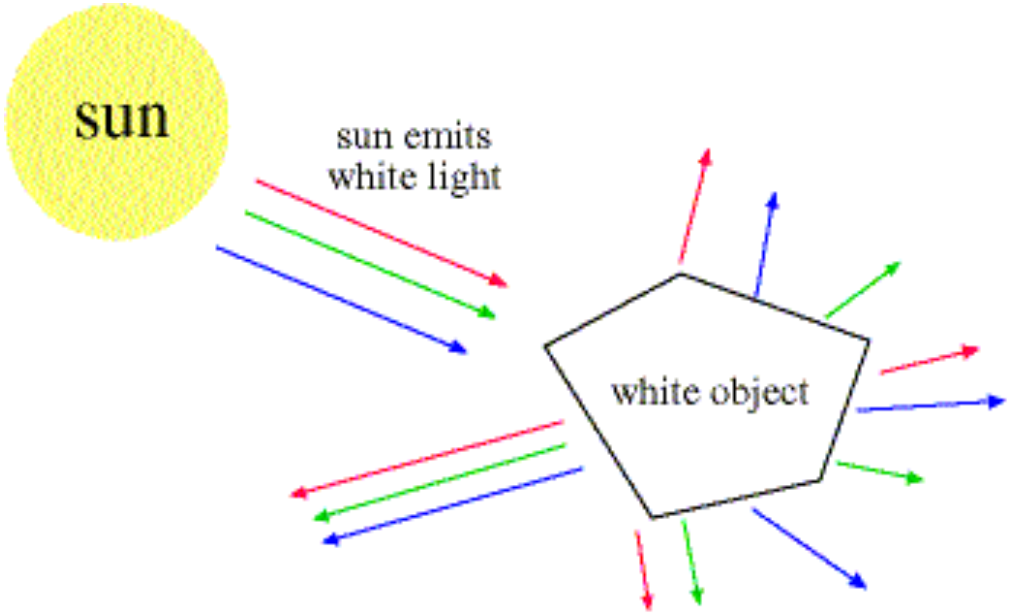
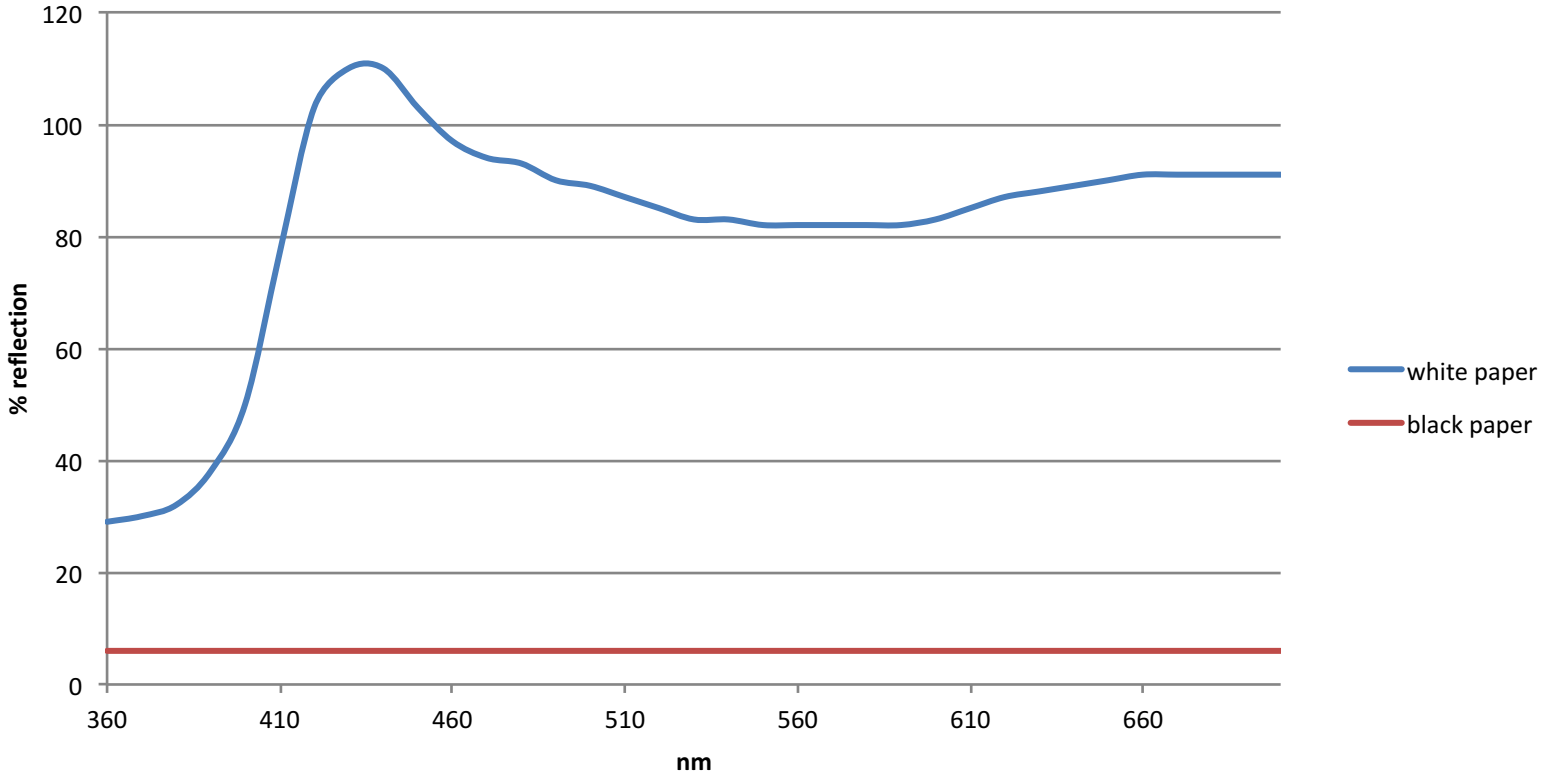
Visible light



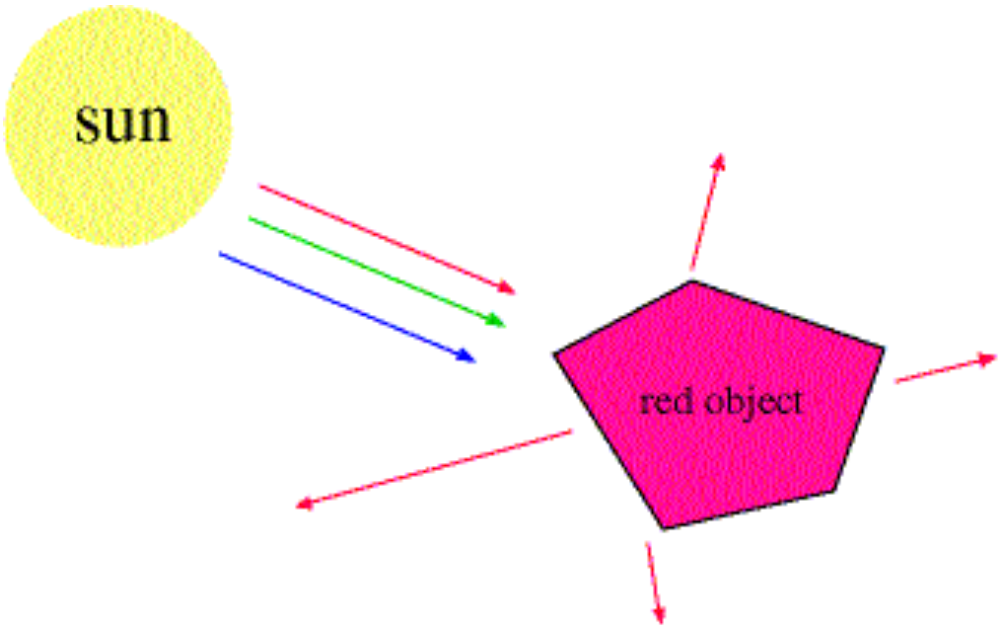
What is color?



Reflection?


120
100
80
60
40
20
0
% reflection
360
410
460
510
560
610
660
nm
white paper
black paper

What is color?



Fluorescence

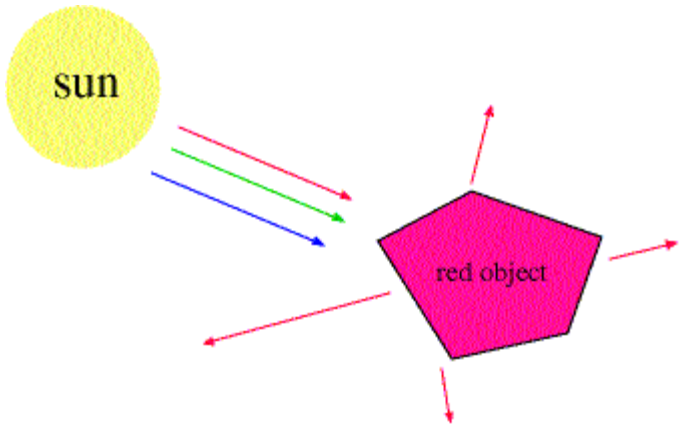
- Absorption of ultraviolet or visible electromagnetic radiation
- Molecules: elevated to an excited electronic state.
- Most molecules: dissipation excess energy as heat.
- Some molecules will emit some of this excess energy as light of a wavelength different from that of the absorbed radiation.

  = ***Photoluminescence***.

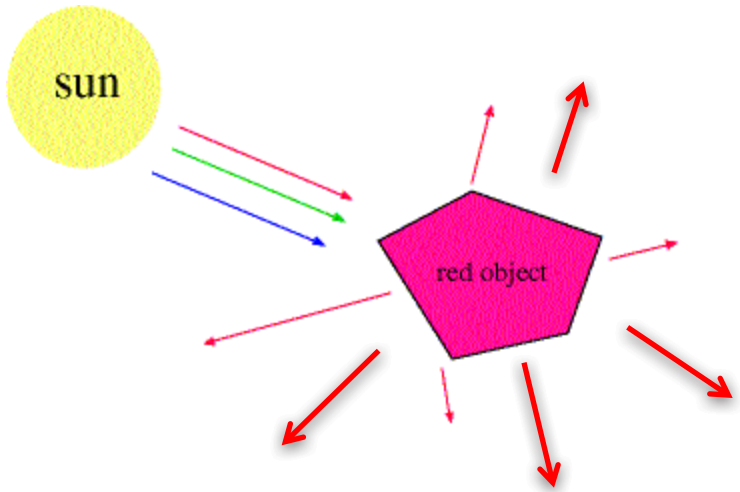
- Fluorescence and phosphorescence are examples of photoluminescence.

Fluorescence?

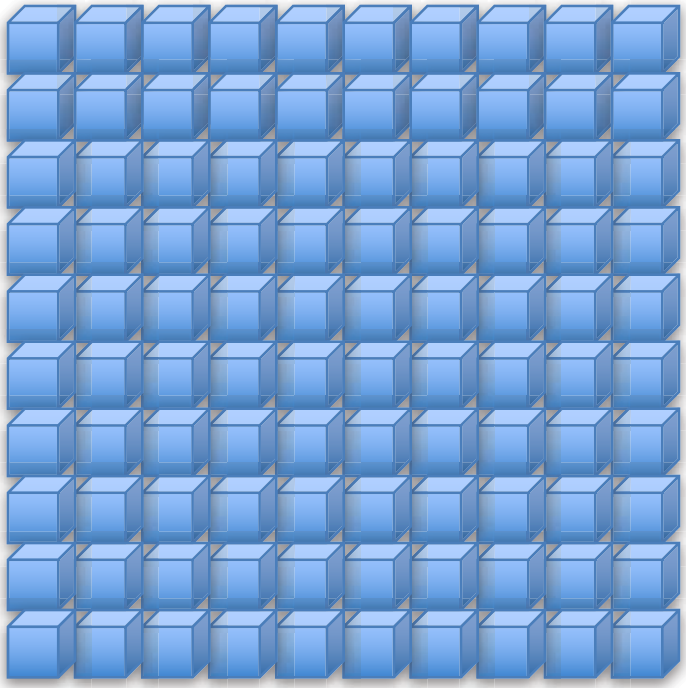
Red object



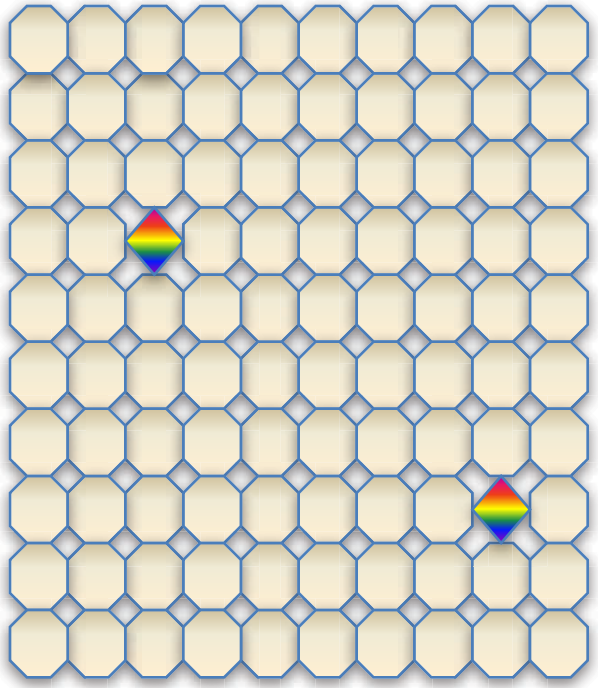
Fluorescent red object



Conventional pigment



Fluorescent pigment



Fluorescent pigments

- **Matrix** is necessary for performance.
- Fluorescent pigments are **transparent** or **semi-transparent.**
- Fluorescent pigments have **less color strength** than conventional pigments.
- **Limited light fastness** in exterior exposure.

- Fluorescent products are **seen 75% sooner.**

- **High visibility** due to brightness (safety applications / advertising).

- **Enlarge color space.**

- **Children are attracted** to bright and fluorescent colors.

Matrix traditional fluorescent pigments

TSA / Melamine / Formaldehyde

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Reclassification formaldehyde

- Since January 1, 2016
- Carcinogen Category 2 → Carcinogen category 1B
- “presumed to have carcinogenic potential for humans, the classification is largely based on animal evidence”
- High priority @ Radiant Color since many years to develop formaldehyde free fluorescent pigments.

Fluorescent pigments

- Formaldehyde containing RADGLO products
  - contain < 0.1% free formaldehyde*
  - Exception for UV curable ink RBL-series, which contain < 1% free formaldehyde *

- Formaldehyde free alternatives

* Determined by ISO14184-1 modified

TSA/melamine/formaldehyde matrix

- Colorless matrix: permitting color development
- Good dye acceptance
- Grinding properties allowing an average particle size < 5 micron
- Relative low reaction temperature
- Good solvent resistance
- Possibility to produce variants for different applications
- …
- Big challenge to find an alternative matrix!

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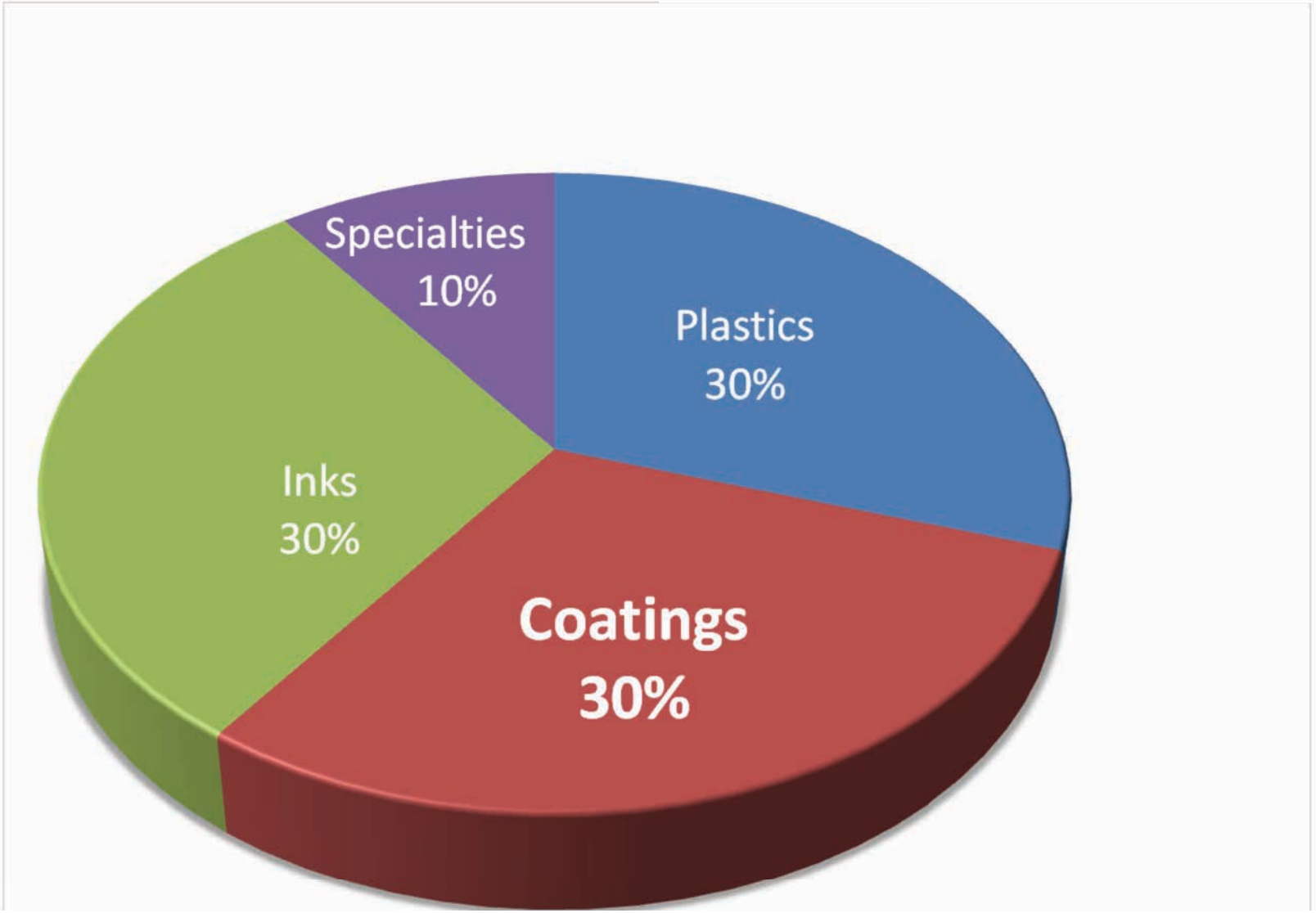
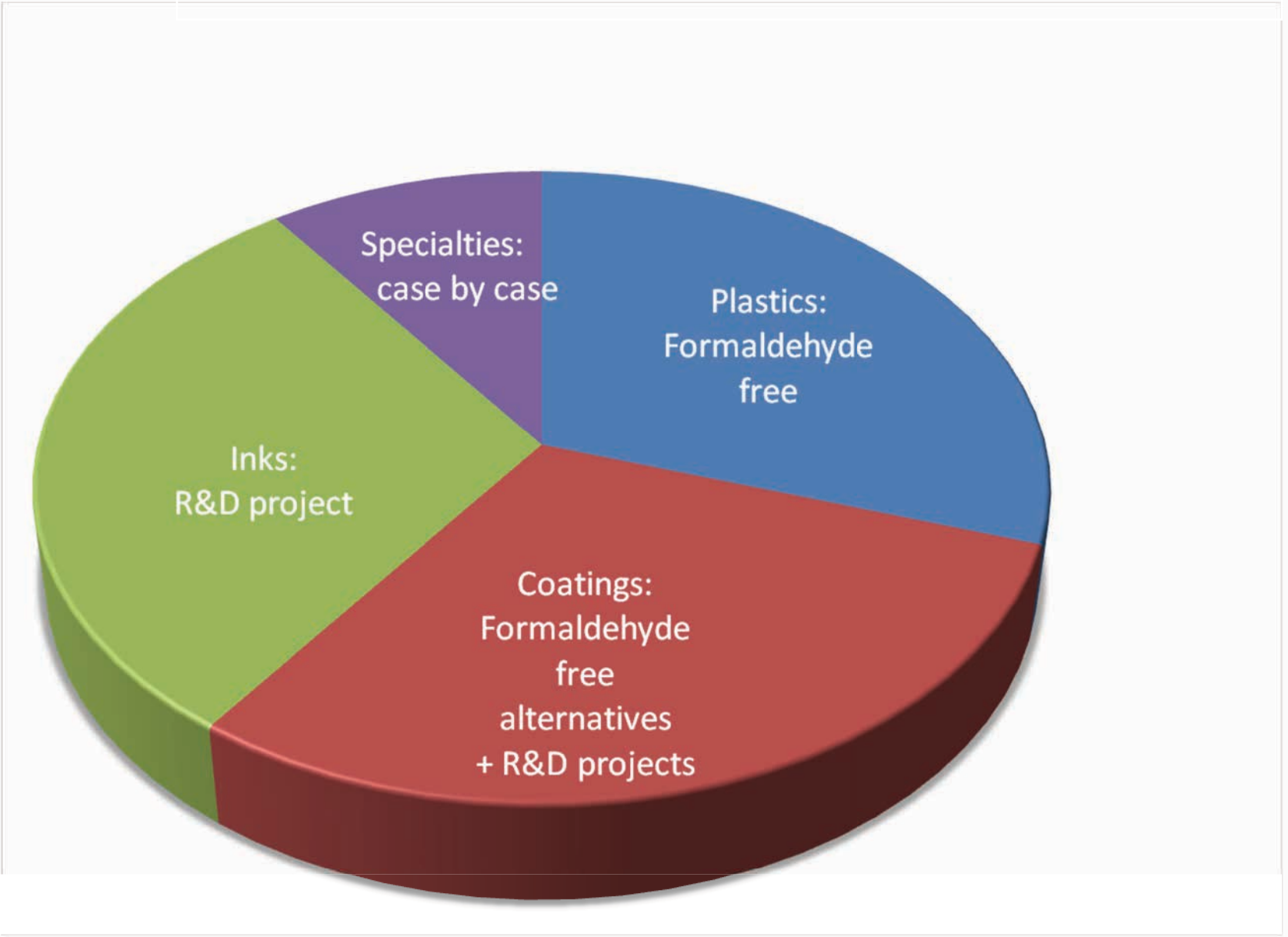
Sales per sector



Formaldehyde free series



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Latest product innovations...

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new

Radglo GWT:
Free of formaldehyde
fluorescent pigments

Textile applications

Waterborne formulations

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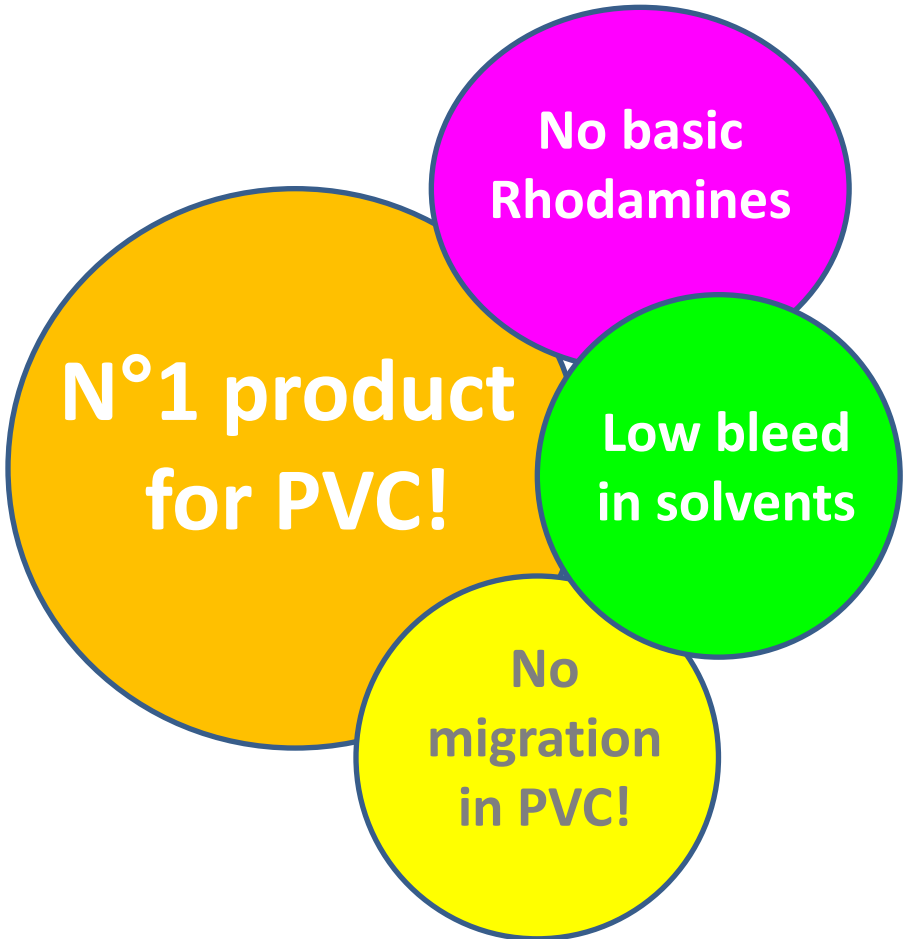
new

Radglo **GRT**:

Free of formaldehyde fluorescent pigments



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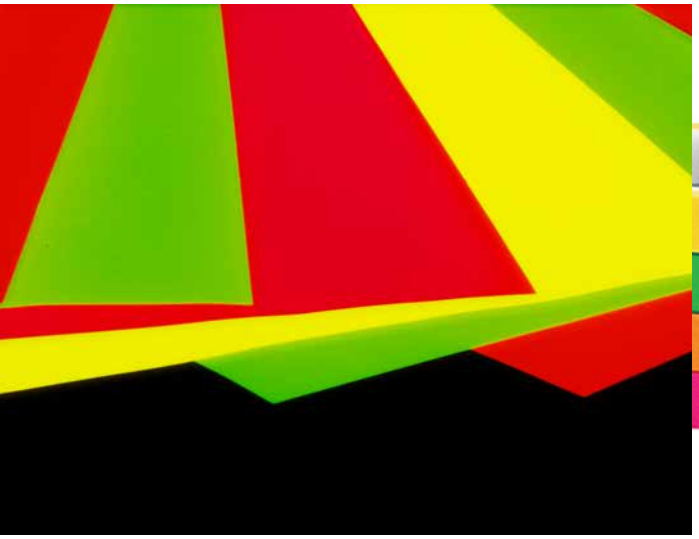
Water based paints

Powder pigments		
Aqueous and non-polar solvent formulations:	JST	
	GWT	Free of formaldehyde

Water dispersions		
50% water dispersion of JST pigments	WR	
50% water dispersion of GWT pigments:	WT	Free of formaldehyde
Others:	AFN, AFX	Free of formaldehyde



Paper coating

Tapes

Clay pigeon

Paper coating

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Solvent based lacquers

Powder pigments		
Non-polar solvent formulations	JST	
	GWT	Free of formaldehyde
Solvent based formulations, aerosols, 2K paints:	PS, PC, GM	
	GRT	Free of formaldehyde
Toners	GF(S)	

Water & solvent based aerosol formulations

	PS	PC
Carrier	TSA resin	TSA resin
Free of formaldehyde	No	No
Solvent resistance	OK	OK
Average particle size	5 µm	3 µm
Grind (Hegman)	6.0 - 5.5	6.5 - 5.5
Color strength	OK	Highest
Color(s)	11	10
Laquer	OK	OK
Aerosols	OK	OK
UV Blue:	P-09	

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PVC & PU coatings

	PS	GRT	PC
Carrier	TSA resin	PEA resin	TSA resin
Free of formaldehyde:	No	Yes	No
Solvent resistance	OK	Limited (no alcohols)	OK
Average particle size	5 µm	3 - 4.5 µm	3 µm
Grind (Hegman)	6.0 - 5.5	6.5 - 5.5	6.5 - 5.5
Color strength	OK	OK	Highest
Color(s)	11	8	10
PVC coating	OK	OK	OK
PU coating	OK	NOT	OK
UV Blue:	P-09		

Safety/protective clothing

PVC foils

Powder coating

	GF(S)	EA	RPC
Appearence	Powder	Powder	Powder
Free of formaldehyde	No	Yes	Yes
Average particle size	< 150 µm	8 - 15 µm	8 - 15 µm
Melting point	80 - 95 °C	100 - 140°C	125 - 150 µm
Heat stability	10’ @ 180°C	10’HDPE @ 240°C @	10’HDPE @ 280°C
Color(s)	7 + 2 GFS	15	5
UV Blue:	GF-09		
UV Green:			RPC-X-1182

Fluorescent wheels

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Conclusion

- Formaldehyde containing RADGLO products available that contain < 0.1% free formaldehyde*
- Formaldehyde free fluorescent pigments for the coating market:
  - GRT / GWT
  - EA / RPC
  - AFN / AFX
- R&D projects to develop formaldehyde free pigments for:
  - Aerosols
  - PU coatings
  - Ink industry

Future

* Determined by ISO14184-1 modified

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YOUR PARTNER IN COLORS AND RESINS

Fluorescent pigments based on green technology!

Brochures available!

Discover our assortment of fluorescent pigments ***free of formaldehyde!***

More information:
www.radiantcolor.be | info@radiantcolor.be | +32 11 52 07 40

PRODUCT NAMING

COLOR CARD

X9	X1
UV BLUE	UV GREEN
*0	*1
CHARTREUSE	GREEN
*2	*3
ORANGE YELLOW	ORANGE
*4	*5
ORANGE RED	RED
*6	*7
CERISE	PINK
*8	* 9
MAGENTA	BLUE

STANDARD COLORS PER PRODUCT SERIES

QUALITY

COLORS

No	Color	JST	GWT	PS	PC	GM	GRT	EA	RPC/RPCF	AFN	STX	GF/GFS	RBA	RBAG*	RBL
-X9	UV Blue			■						■	■	■	■		
-X1	UV Green			■					■						
-10	Chartreuse														
-20	Chartreuse														
-30	Chartreuse														
-11	Green														
-21	Green														
-12	Orange Yellow														
-22	Orange Yellow														
-32	Orange Yellow														
-13	Orange														
-23	Orange														
-33	Orange														
-43	Orange														
-14	Orange Red														
-24	Orange Red														
-34	Orange Red														
-44	Orange Red														
-15	Red														
-25	Red														
-35	Red														
-16	Cerise														
-36	Cerise														
-17	Pink														
-27	Pink														
-37	Pink														
-18	Magenta														
-28	Magenta														
-38	Magenta														
-78	Purple														
-88	Purple														
-19	Blue														
-29	Blue														

PANTONE		RBA	RBAG*	RBL
-9P1	Blue			
-1P2	Green			
-0P3	Yellow			
-3P4	Orange			
-5P5	Red			
-7P6	Pink			
-8P7	Magenta			

*RBAG: mineral oil free system

Similar codes in the different series offer a comparable color but are not 100% identical.
Color may depend on the specific formulation of the customer.
Additional colors are available on request. For detailed information per product please consult the specific datasheets.

2015