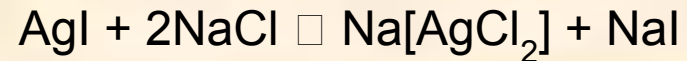
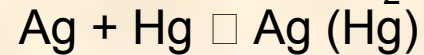
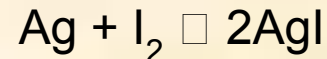




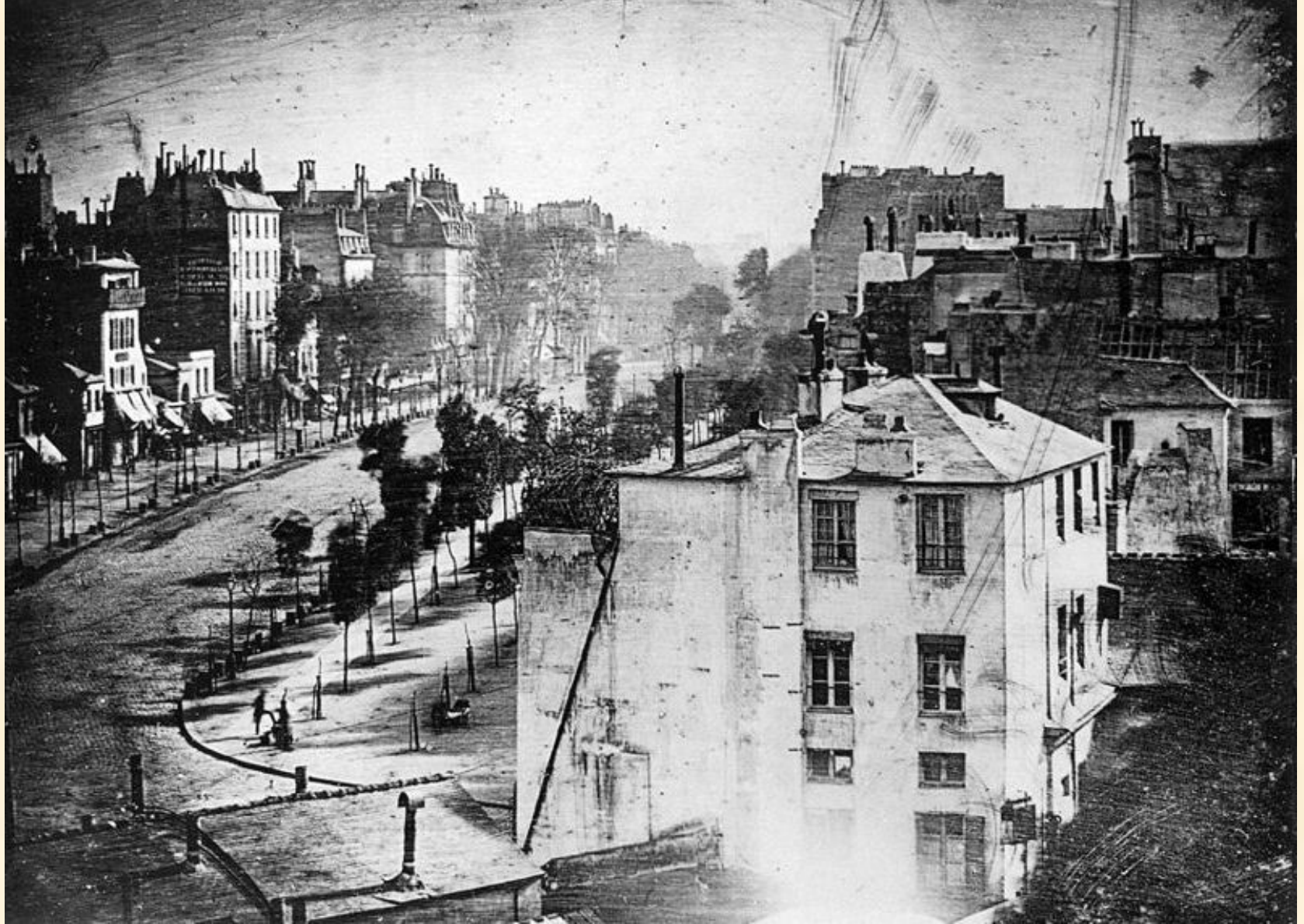
L. Daguerre announced the latest perfection of the **Daguerreotype** in 1839, with the French Academy of Sciences

A daguerreotype is one of the earliest photographic processes, in which the image is formed by amalgam



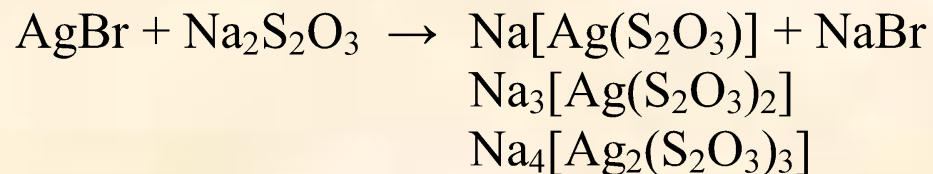
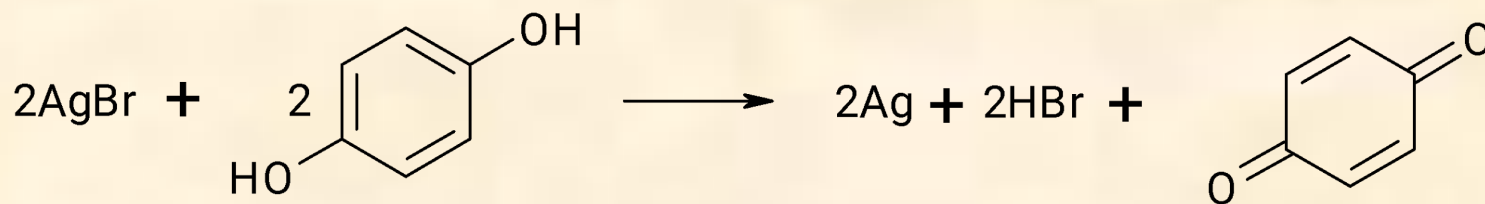
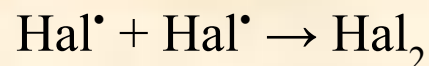
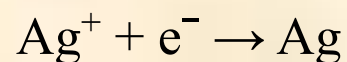
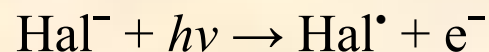
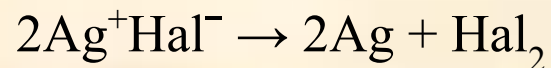
Louis-Jacques-Mandé Daguerre (18.11.1787 – 10.07.1851)

L. Daguerre was a French artist and chemist, recognized for his invention of the daguerreotype process of photography. Daguerre was born in Cormeilles-en-Parisis, Val-d'Oise, France. He apprenticed in architecture, theater design, and panoramic painting. Exceedingly adept at his skill for theatrical illusion, he became a celebrated designer for the theater and later came to invent the Diorama, which opened in Paris in July 1822.



Boulevard du Temple, Paris, 1838, by Daguerre (the first picture of a person). The image shows a busy street, but because exposure time was more than ten minutes, the traffic was moving too much to appear. The exception is the man at the bottom left, who stood still getting his boots polished long enough to show.

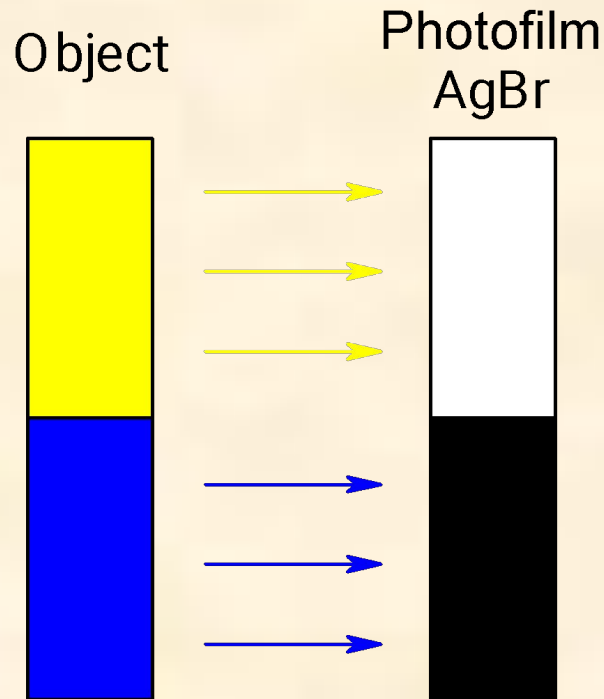
Principle of work of photography silver halide



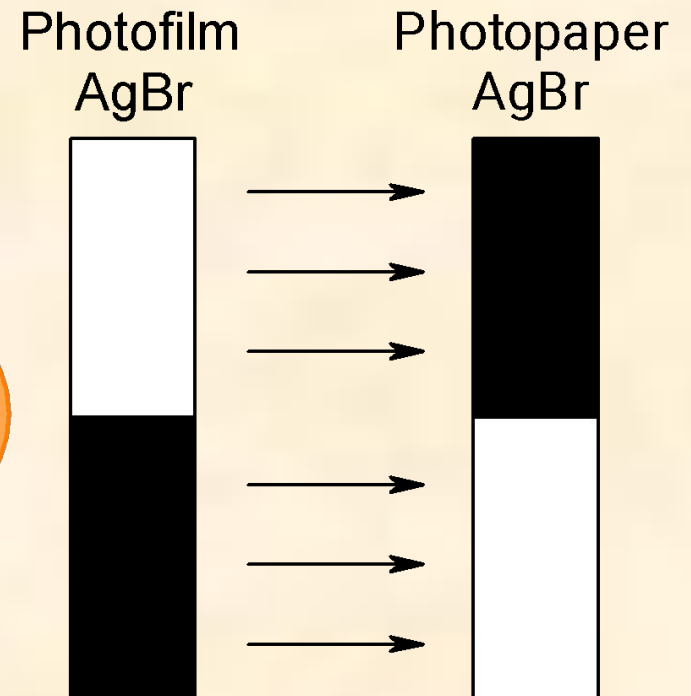
Black-and-white photography

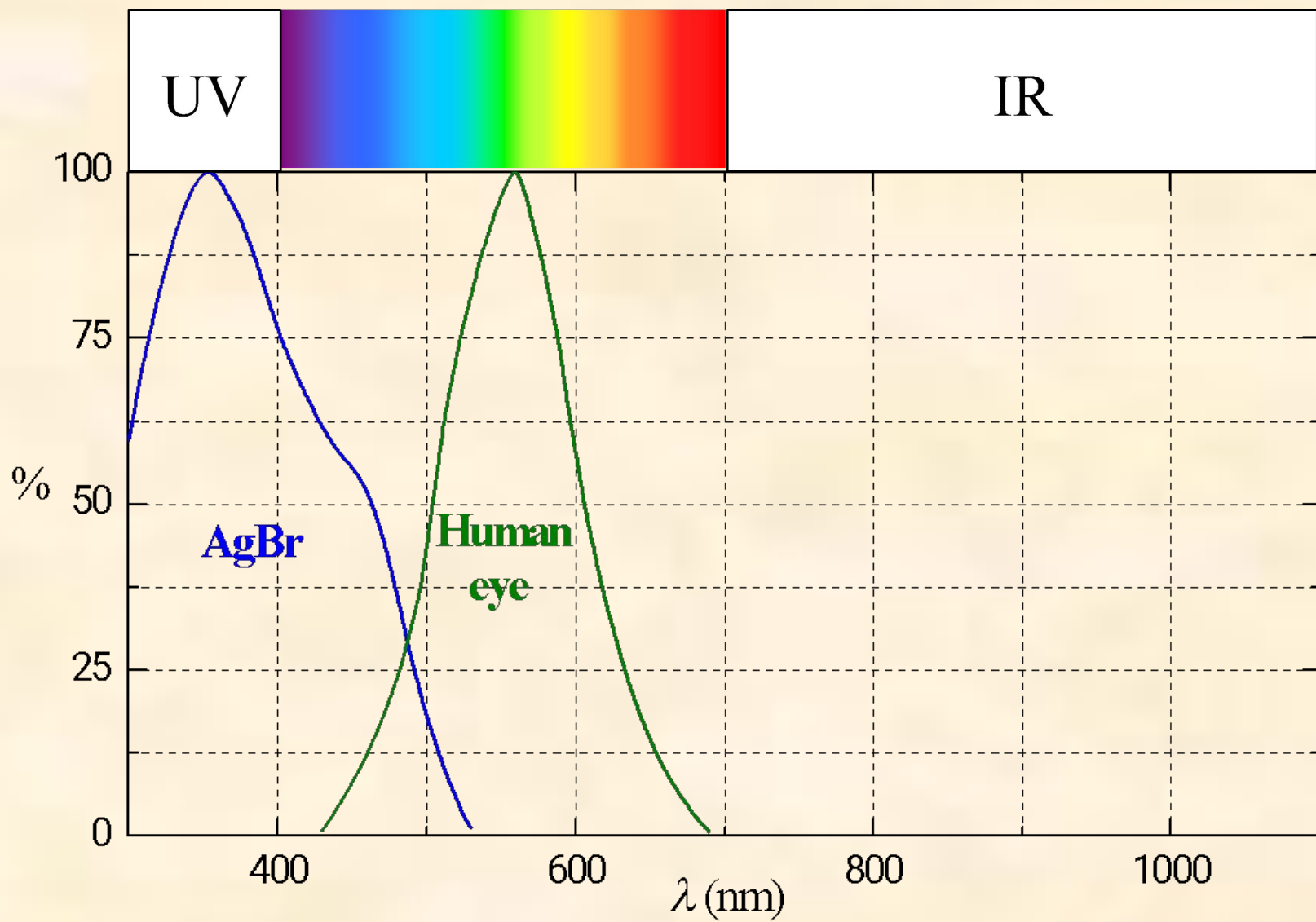
$$E = h\nu = \frac{hc}{\lambda}$$

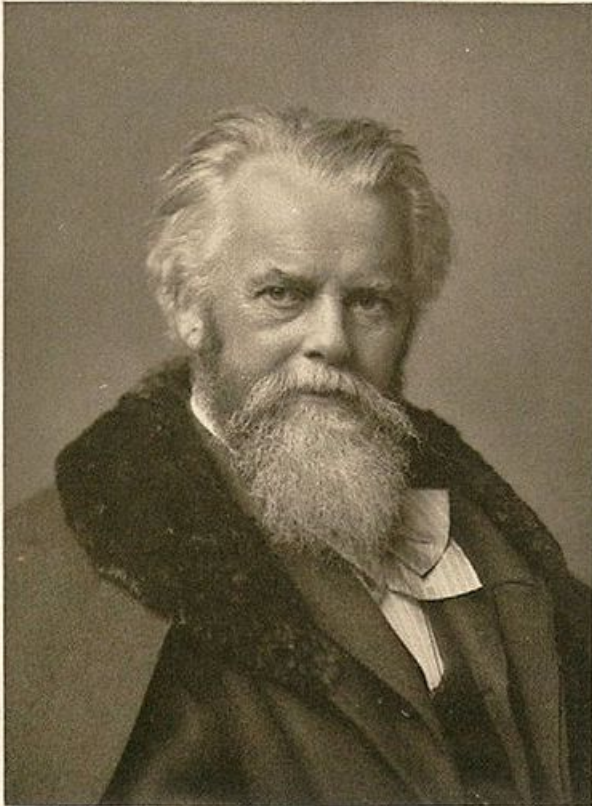
Negative photoprocess



Positive photoprocess





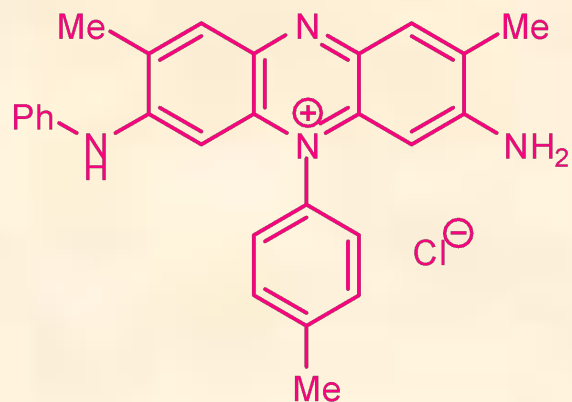


Hermann Wilhelm Vogel
(26.03.1834 – 17.12.1898)

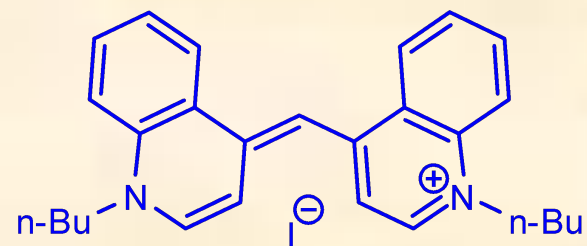
H.W. Vogel was a German photochemist and photographer who made key contributions to practical color photography. From 1860 he was a professor at Berlin's Technische Hochschule (from 1879, the Technical University of Berlin), where he introduced photography as a field of study.

In 1873 he discovered how to extend the spectral sensitivity of photographic emulsions (which until then were then only sensitive to blue and UV light) to green light by adding dyes. By 1884 he had discovered how to extend the sensitivity into the orange. However the achievement of a fully panchromatic response, into the red, had to wait until fresh dye-discoveries, in the early 1900s, shortly after his death.

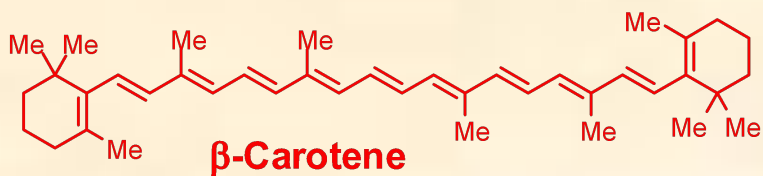
Die chemischen Wirkungen des Lichts und die Photographie (2. Aufl., Leipzig 1883)



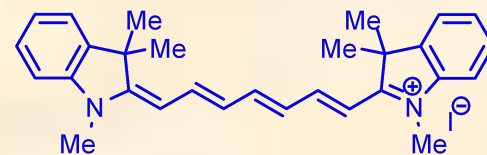
The first synthetic organic dye –
Perkin's **Mauveine** (1856)



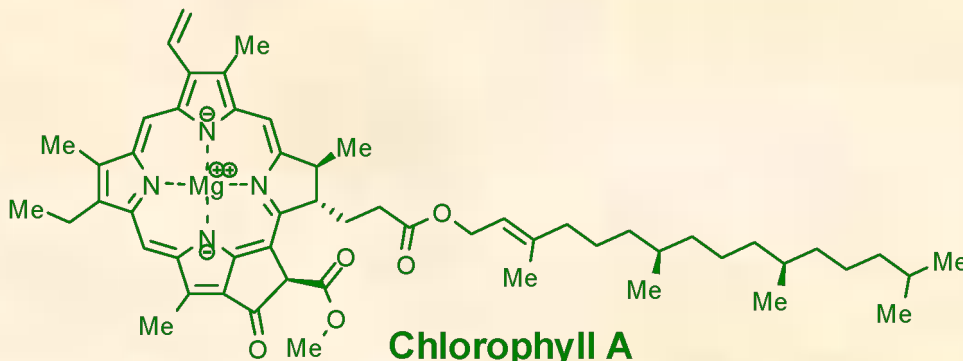
The first cyanine dye –
Cyanine (Quinoline Blue)
was also synthesized in 1856



$\lambda_{\max} = 453 \text{ nm}; \epsilon = 137000 \text{ (n-hexane)}$

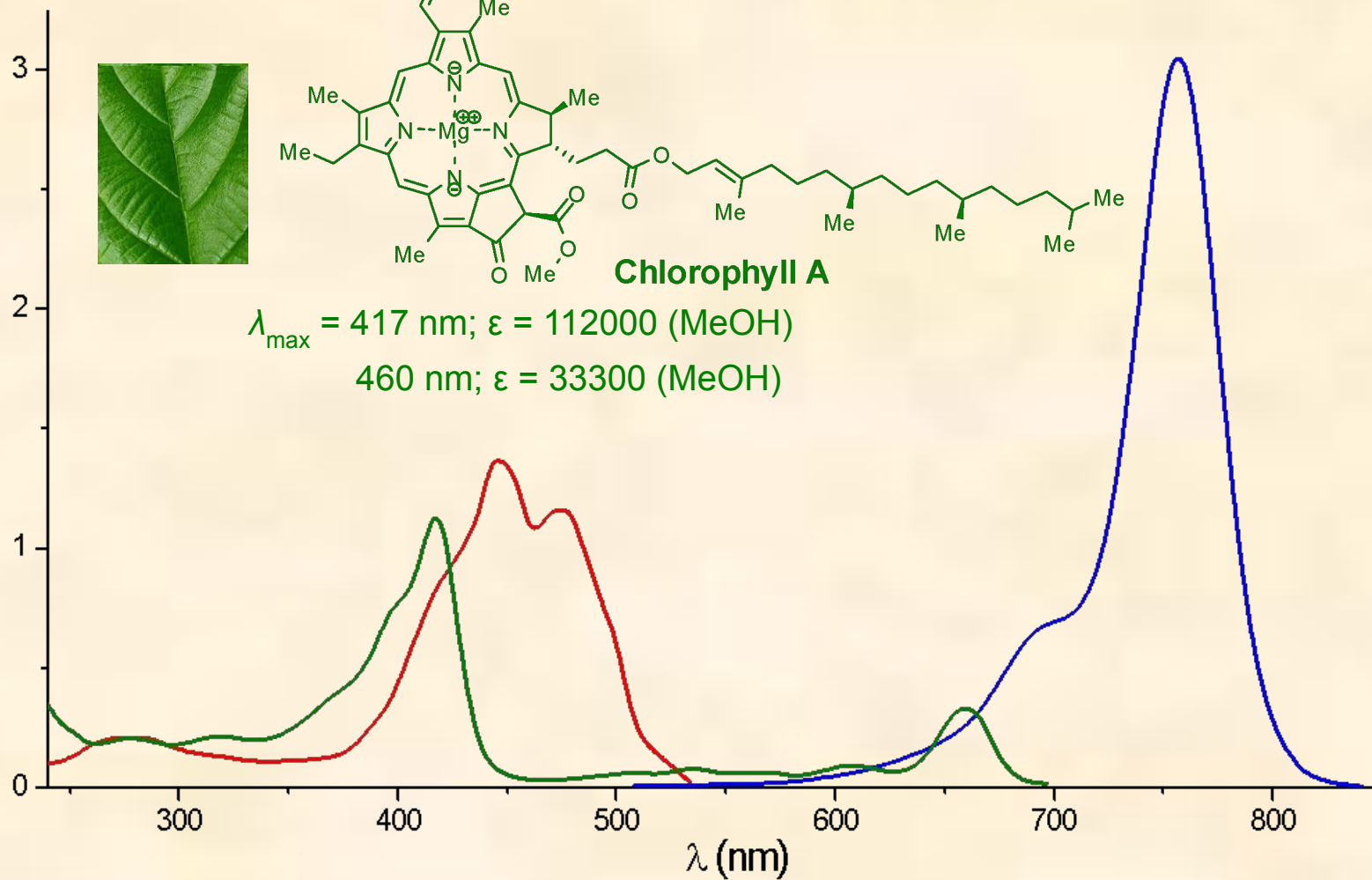


$\lambda_{\max} = 758 \text{ nm}; \epsilon = 305000 \text{ (CH}_2\text{Cl}_2)$



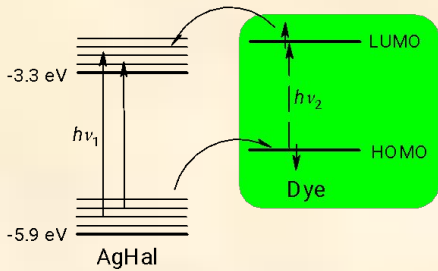
$\lambda_{\max} = 417 \text{ nm}; \epsilon = 112000 \text{ (MeOH)}$
 $460 \text{ nm}; \epsilon = 33300 \text{ (MeOH)}$

$\epsilon \times 10^{-5}$
 $(\text{L} \times \text{mol}^{-1} \times \text{cm}^{-1})$

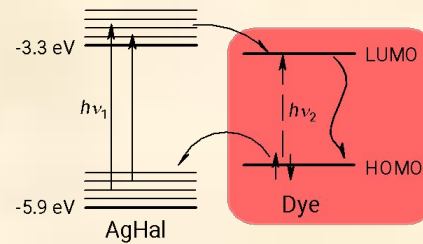


Spectral sensitization of photoemulsion silver halide

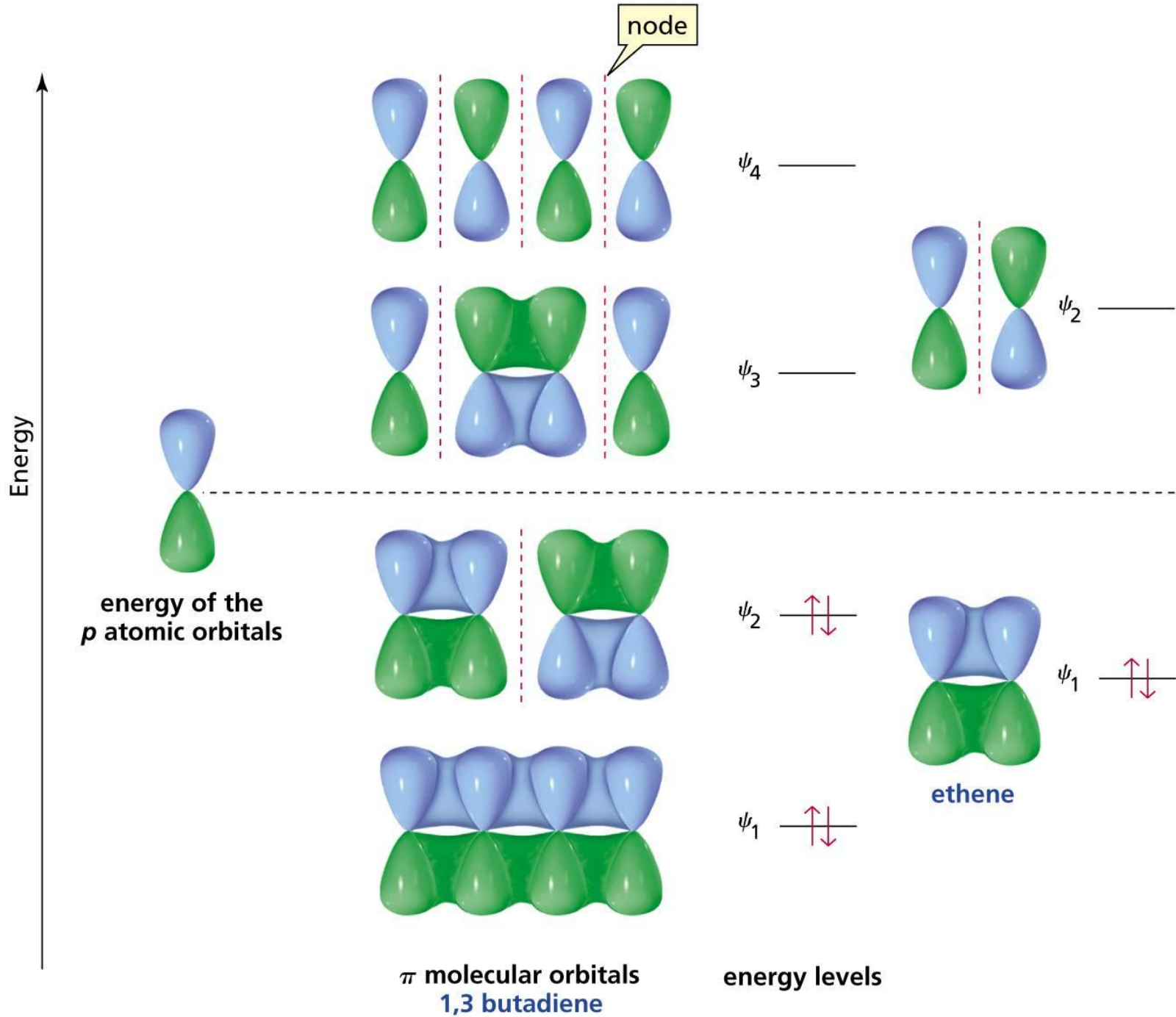
(*sensibilis(lat)* – чутливий)

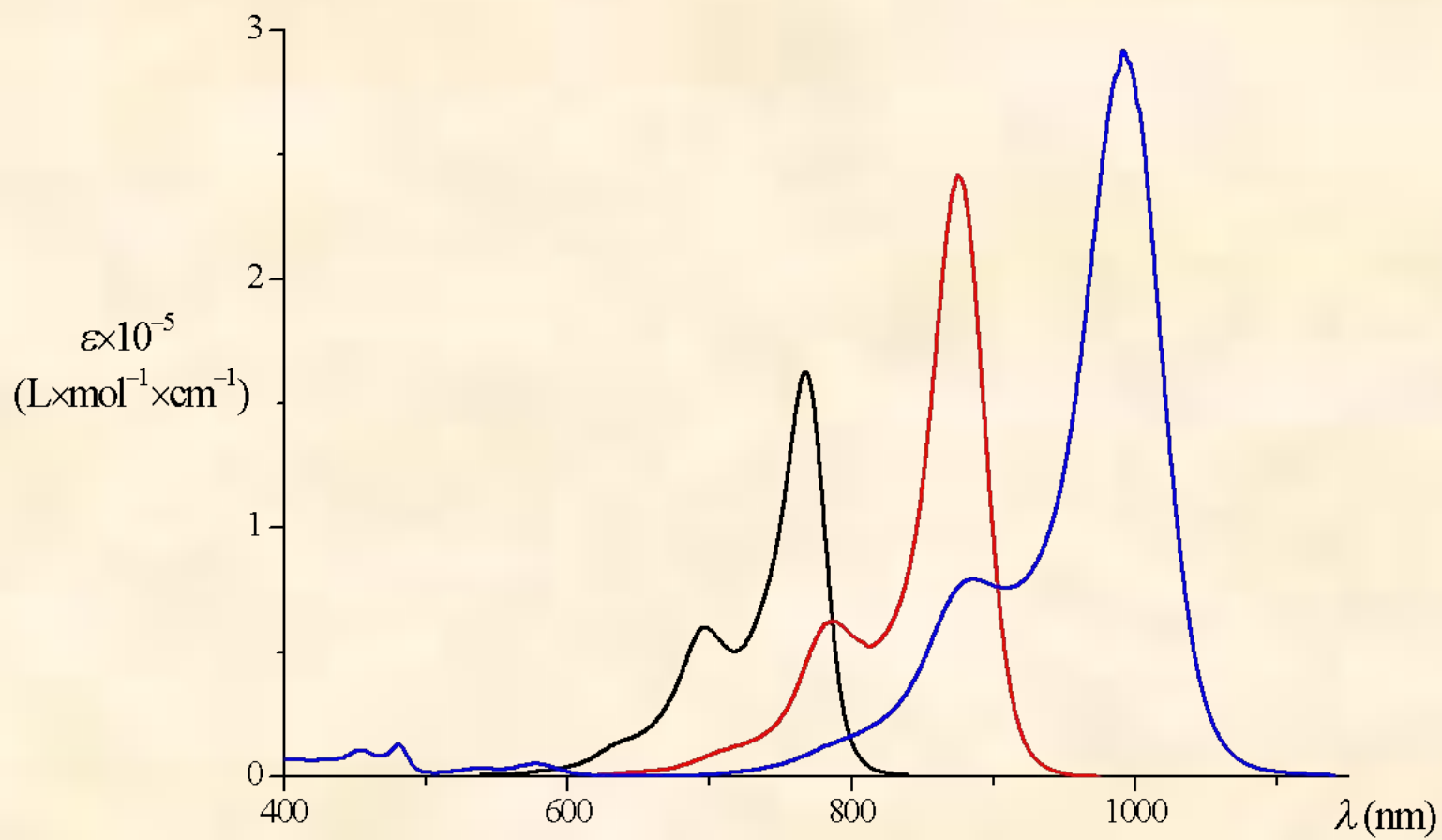
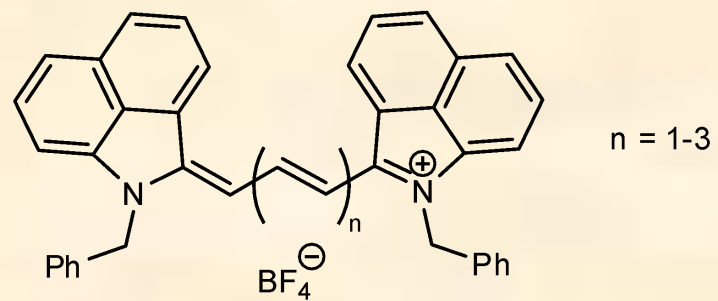


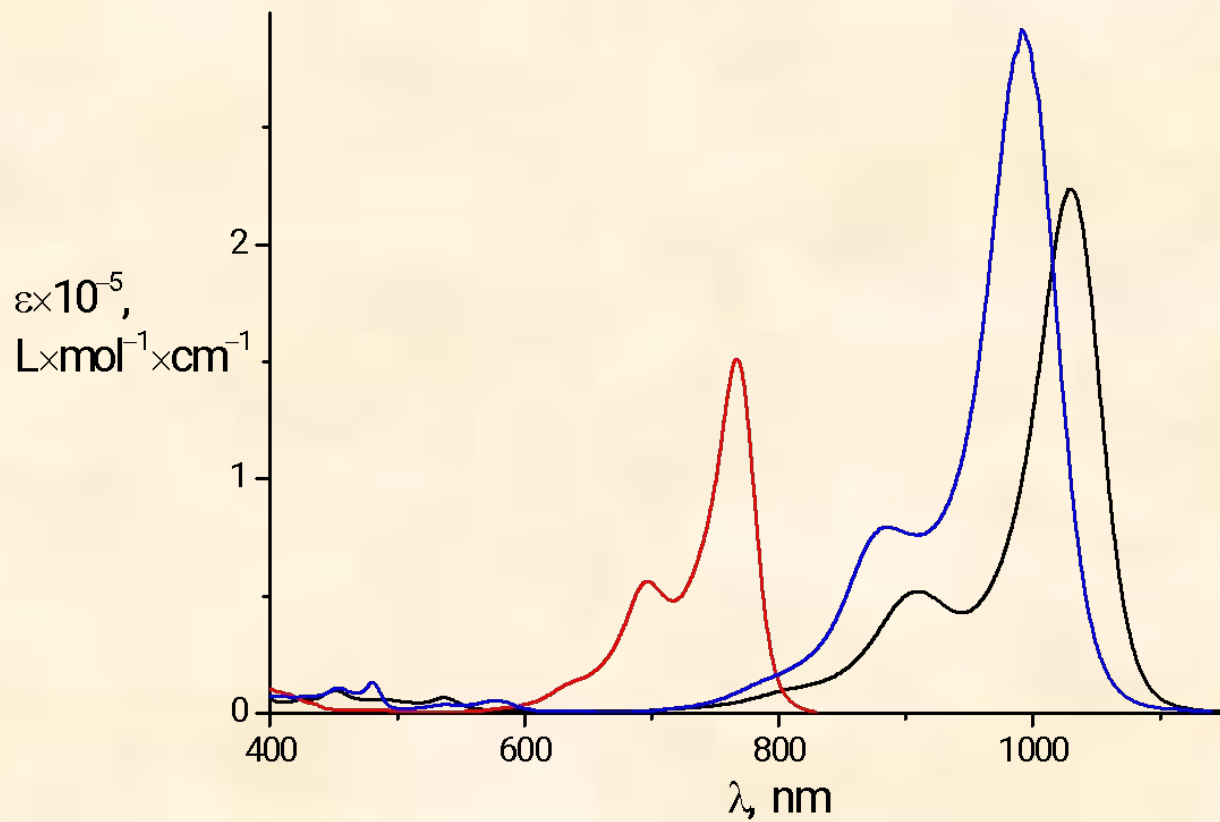
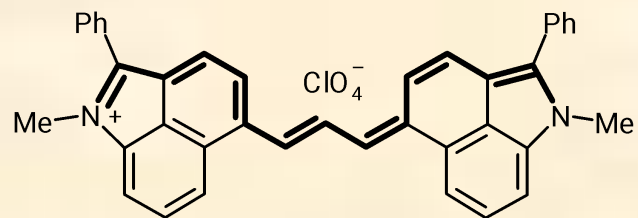
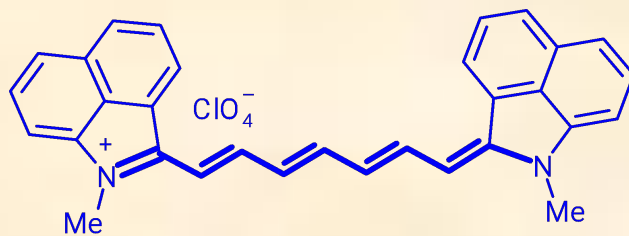
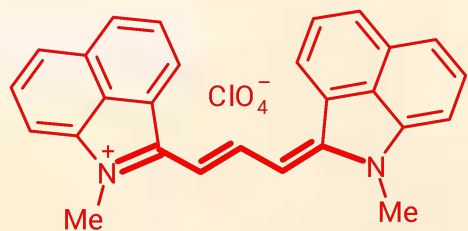
AgHal sensitization

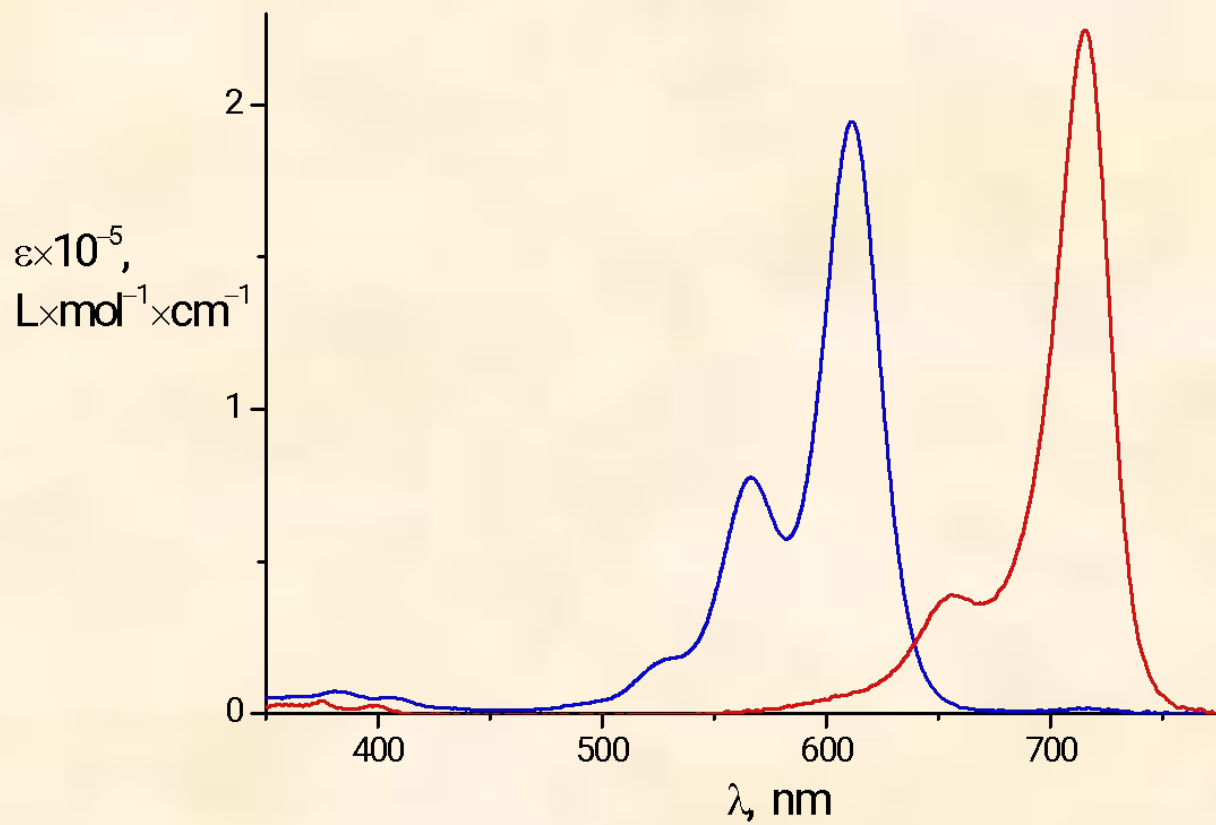
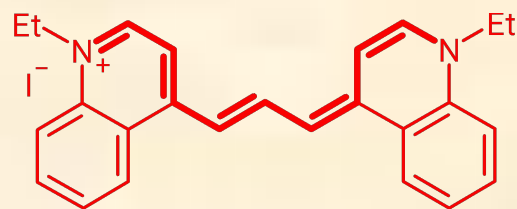
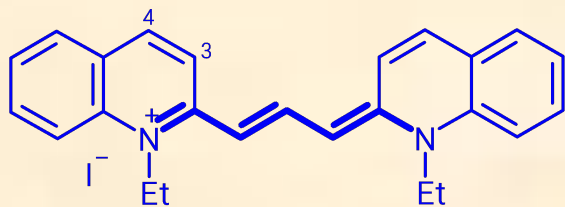


AgHal desensitization

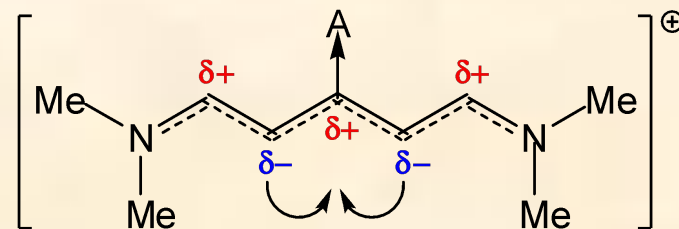
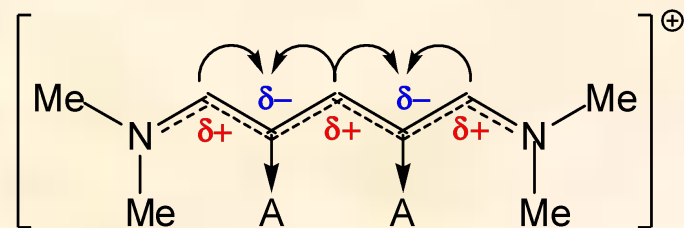
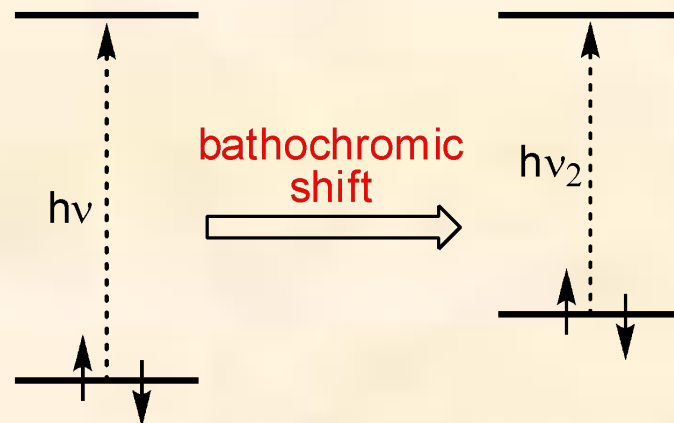
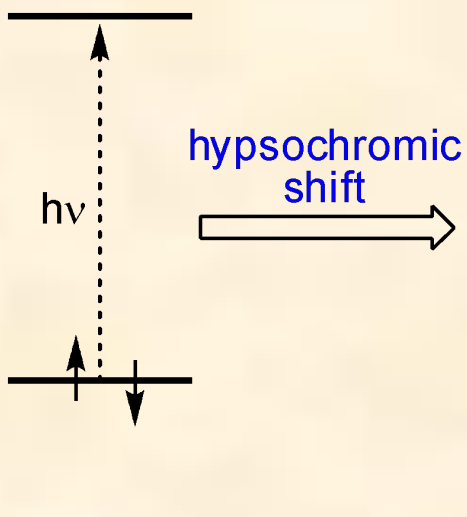
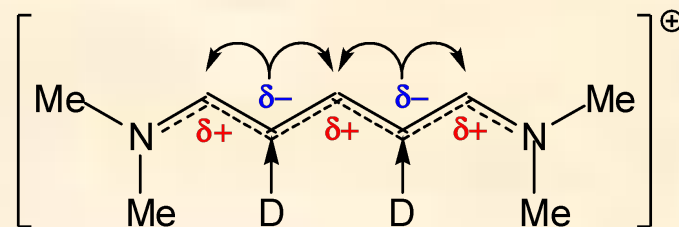
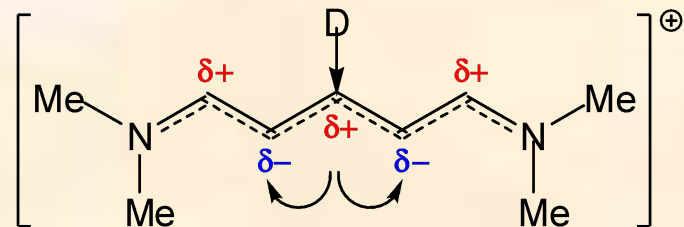


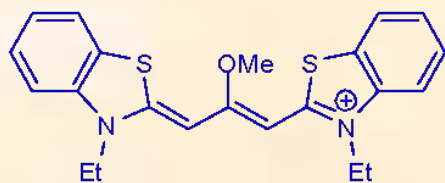




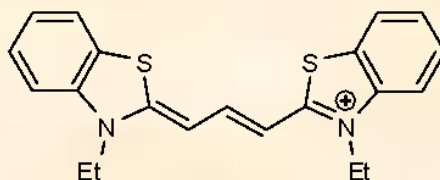


Förster-Dewar-Knott rule (FDK rule)

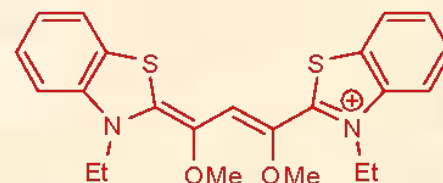




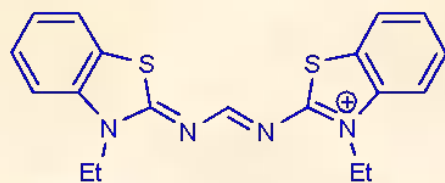
$$\lambda_{\max} = 495 \text{ nm}$$



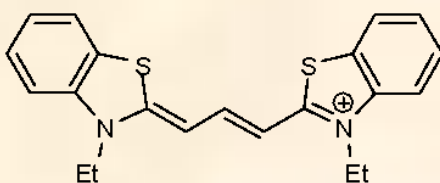
$$\lambda_{\max} = 558 \text{ nm}$$



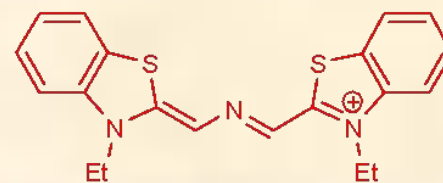
$$\lambda_{\max} = 586 \text{ nm}$$



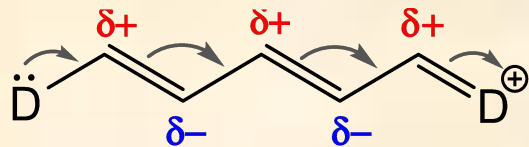
$$\lambda_{\max} = 411 \text{ nm}$$



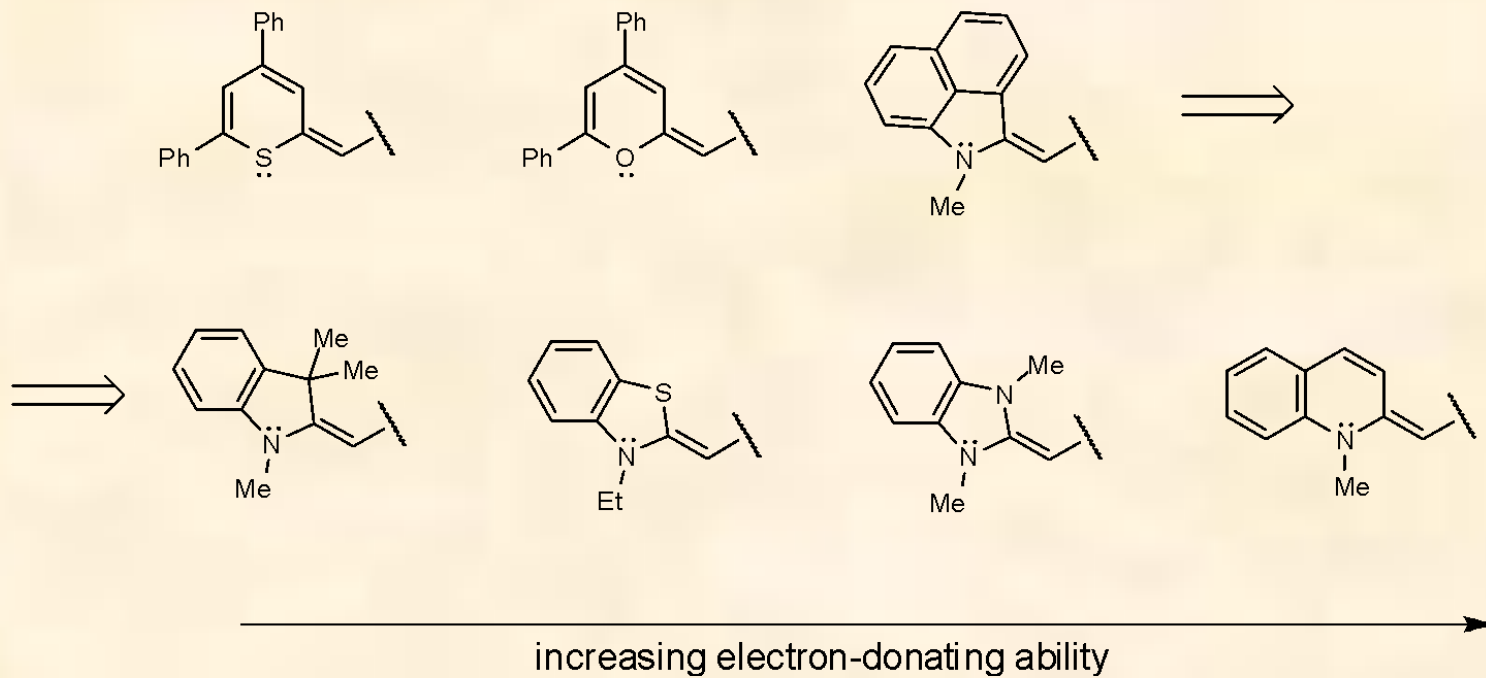
$$\lambda_{\max} = 558 \text{ nm}$$

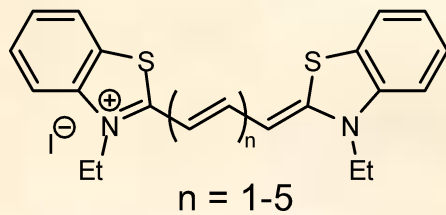


$$\lambda_{\max} = 596 \text{ nm}$$

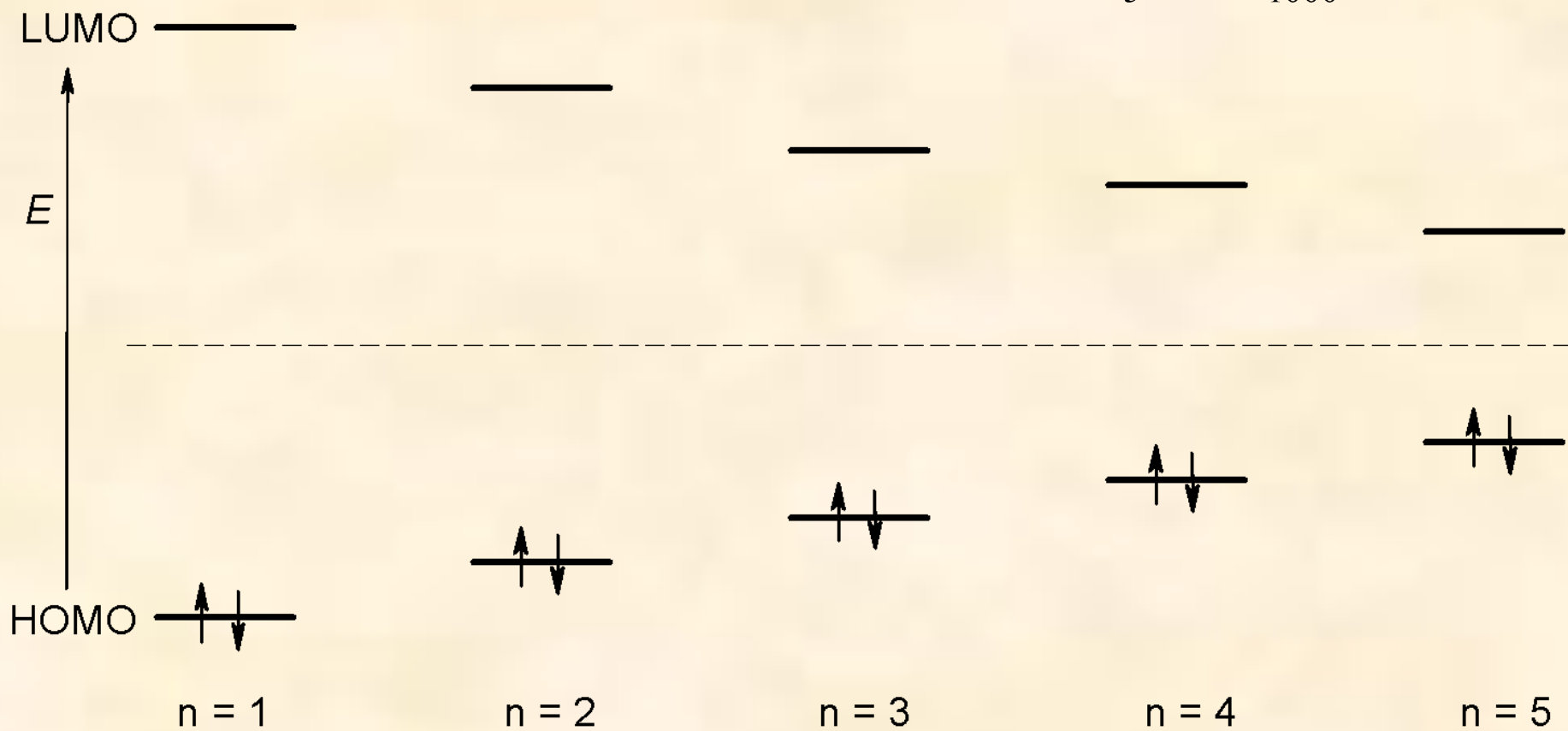


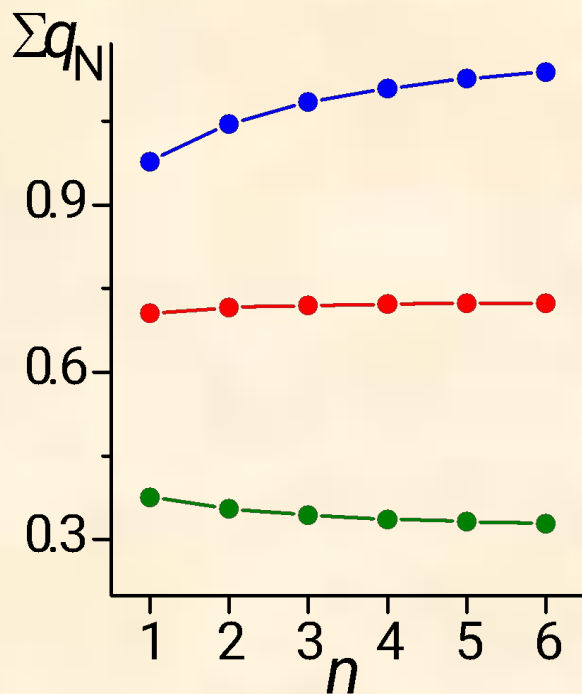
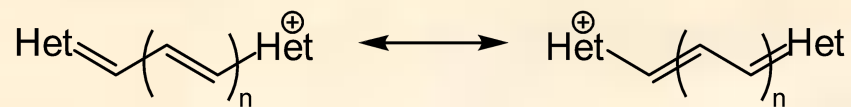
D =





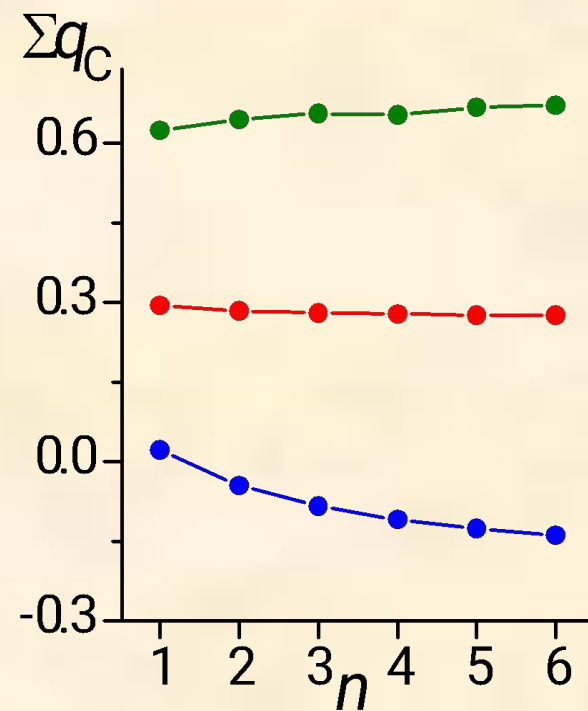
n	λ_{max} (nm) in CH_2Cl_2
1	560
2	665
3	770
4	895
5	1000



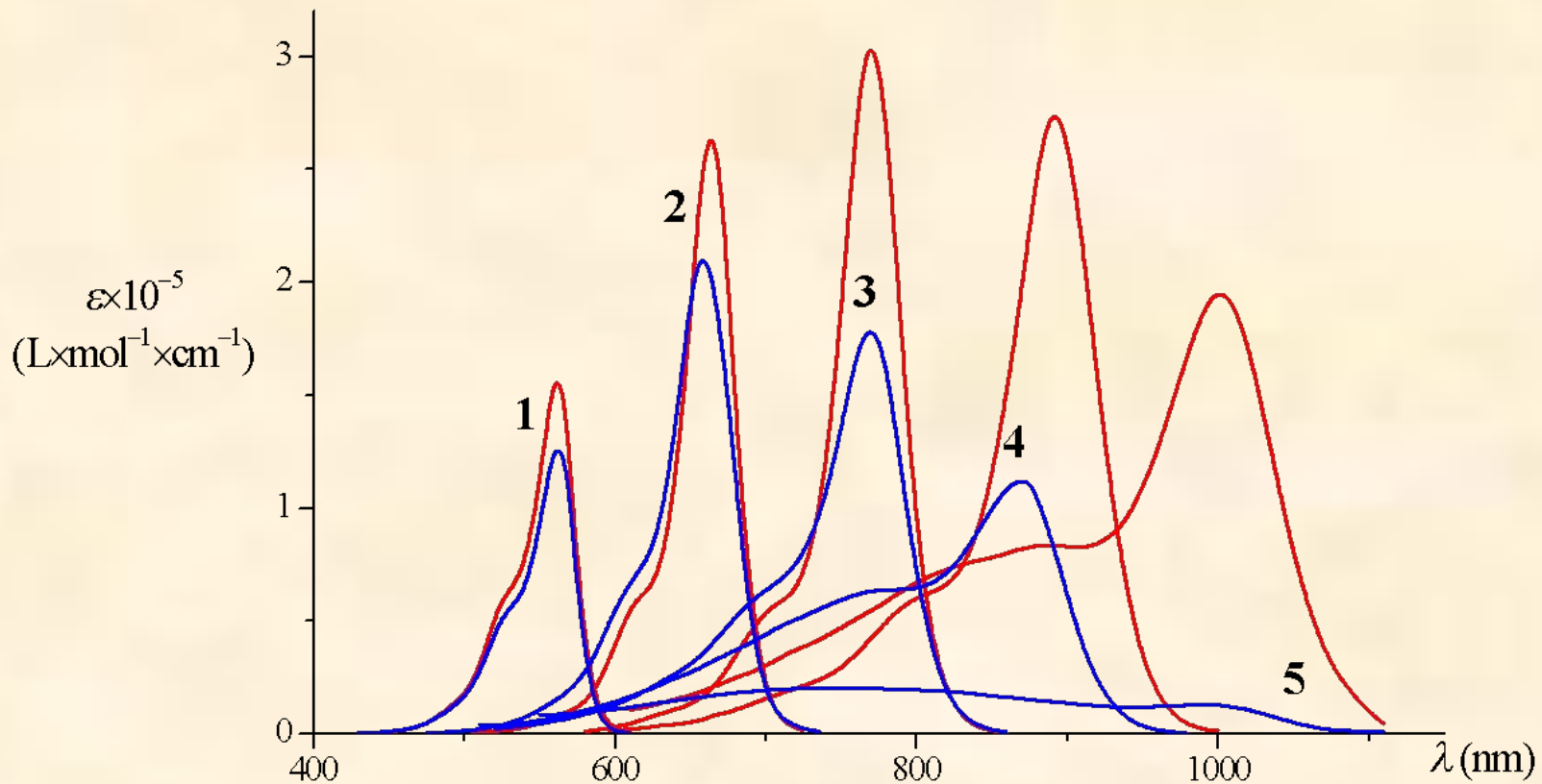
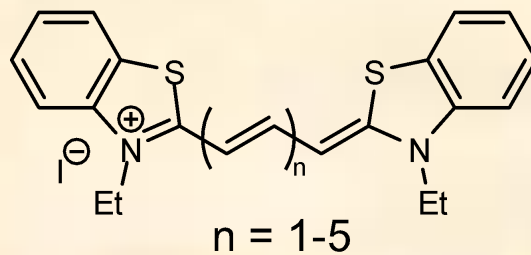


Electron-donor ability:

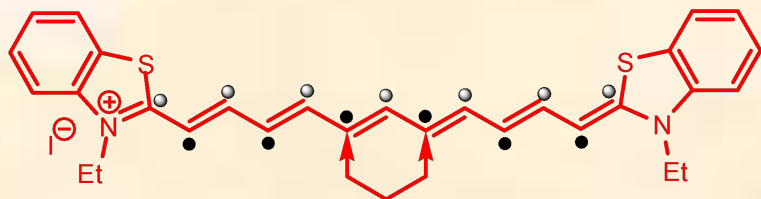
-strong-
-medium-
-weak-



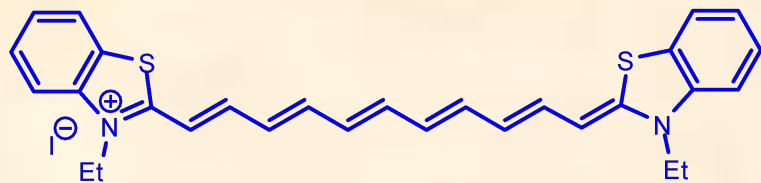
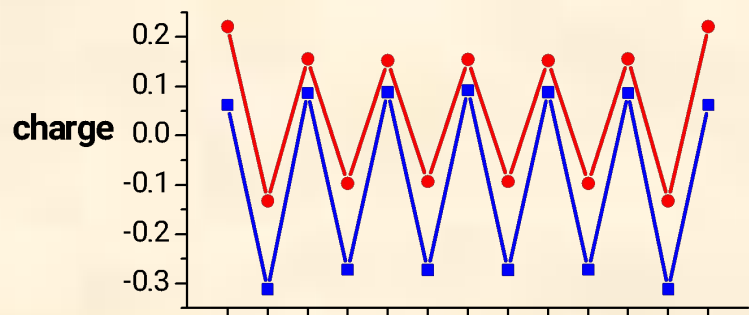
Dependences of total charges distribution in end groups (Σq_N) and polymethine chain (Σq_C) on electron-donor ability of end groups (Het) and chain length (n)



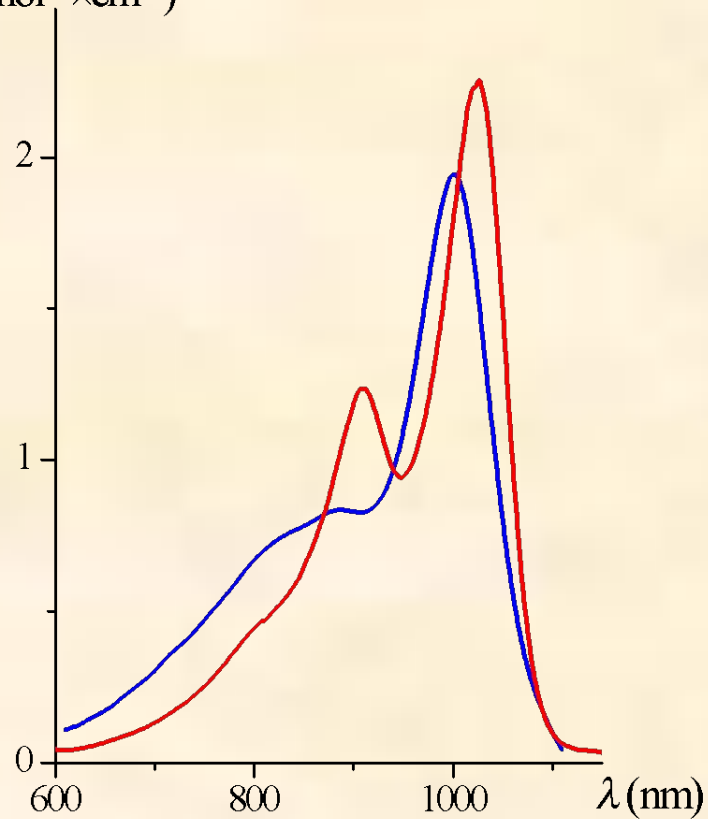
Electronic absorption spectra of dyes **1-5** in CH_2Cl_2 and **DMF**

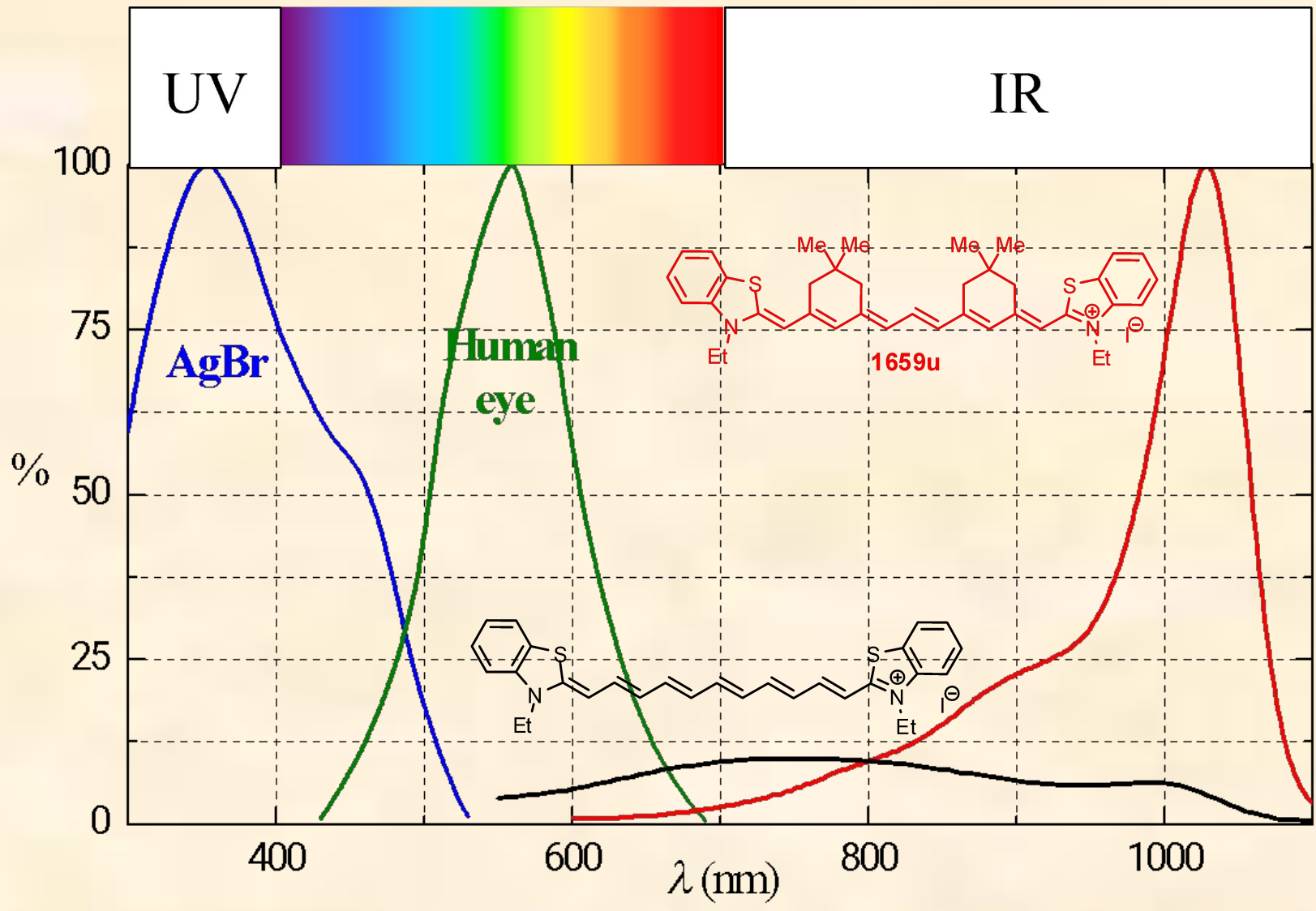


○ δ^+
● δ^-



$\epsilon \times 10^{-5}$
($\text{L} \times \text{mol}^{-1} \times \text{cm}^{-1}$)



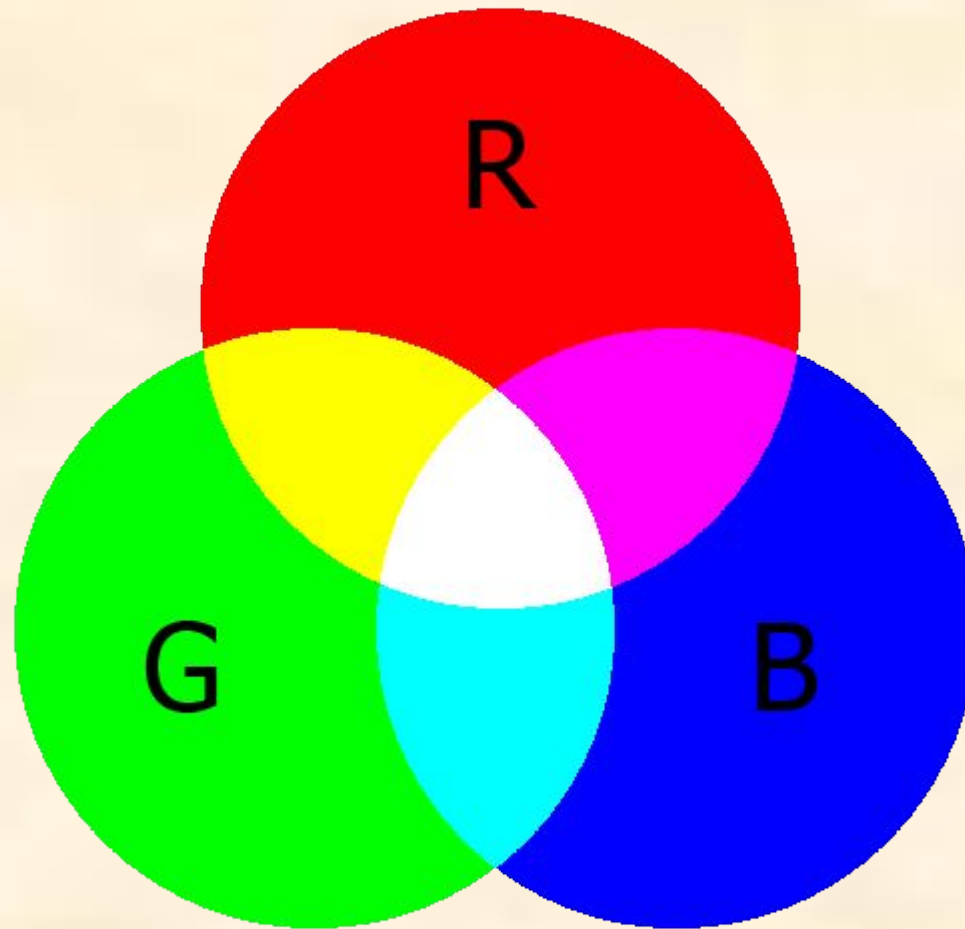


The portion of the EM spectrum from 400-800 is observable to humans- we (and some other mammals) have the adaptation of seeing color at the expense of greater detail

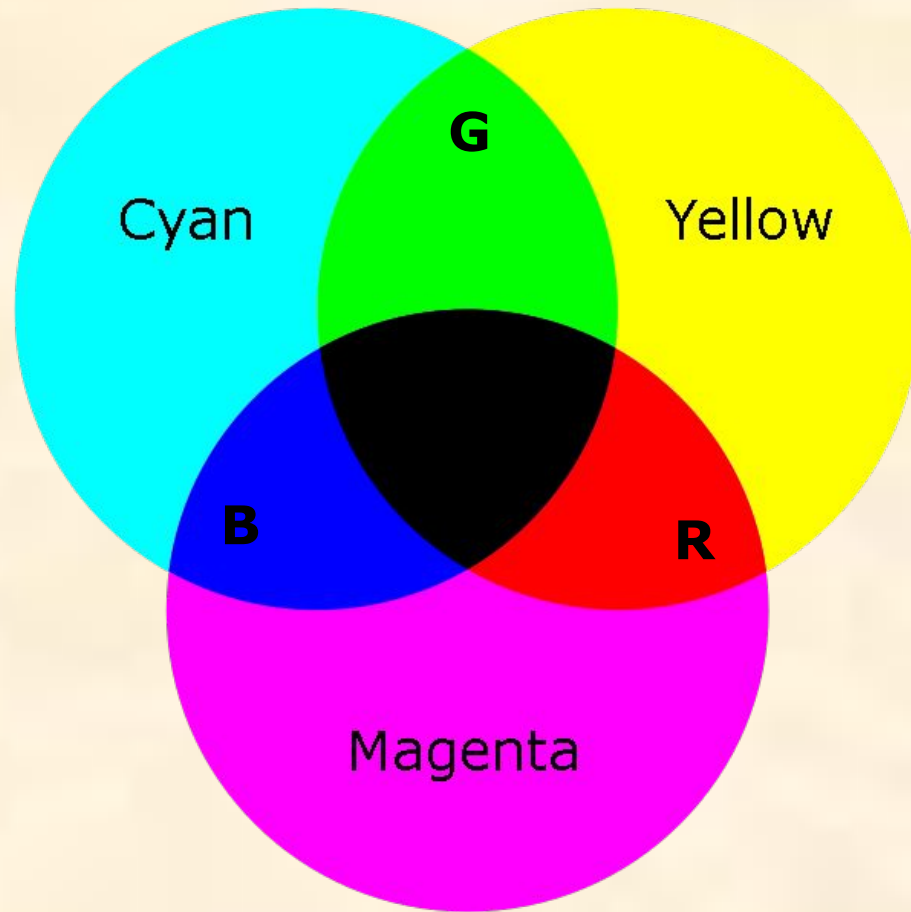


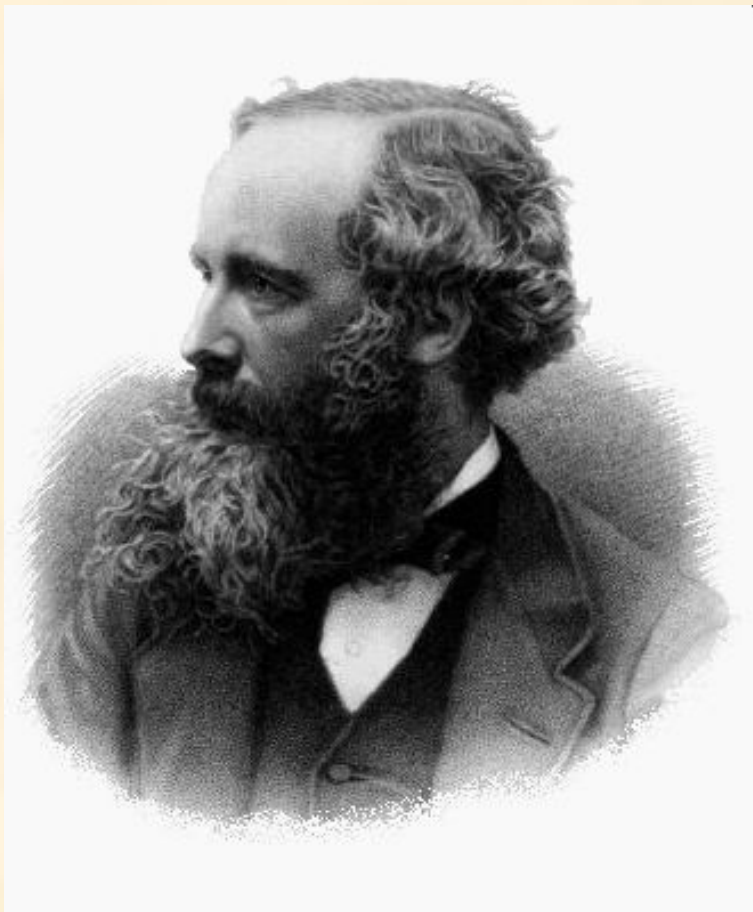
	λ , nm
Violet	400-420
Indigo	420-440
Blue	440-490
Green	490-570
Yellow	570-585
Orange	585-620
Red	620-780

Additive method of colours synthesis



Subtractive colour model (ideal CMY-scheme)

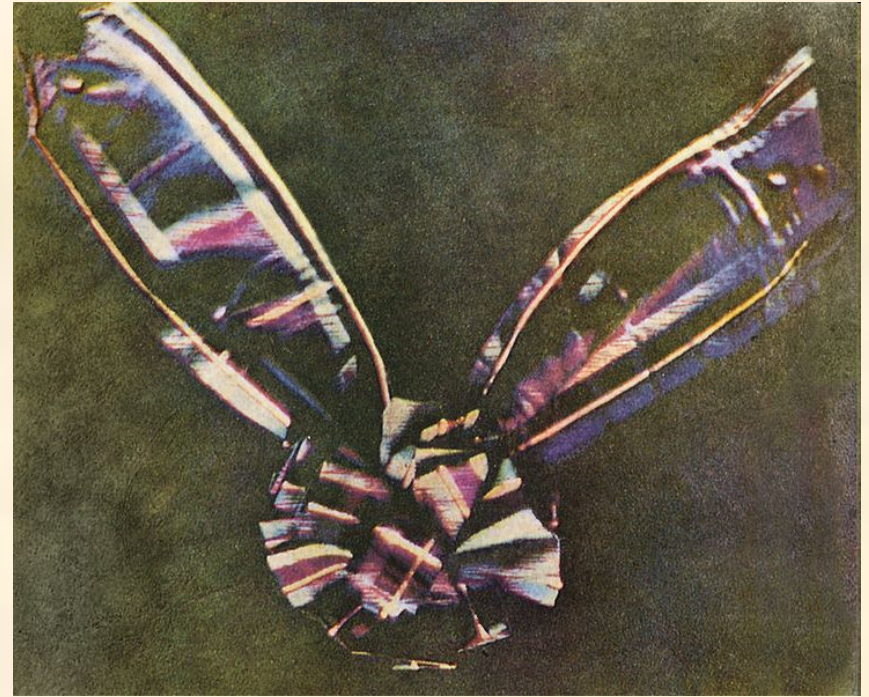




James Clerk Maxwell (13.06.1831–05.11.1879)

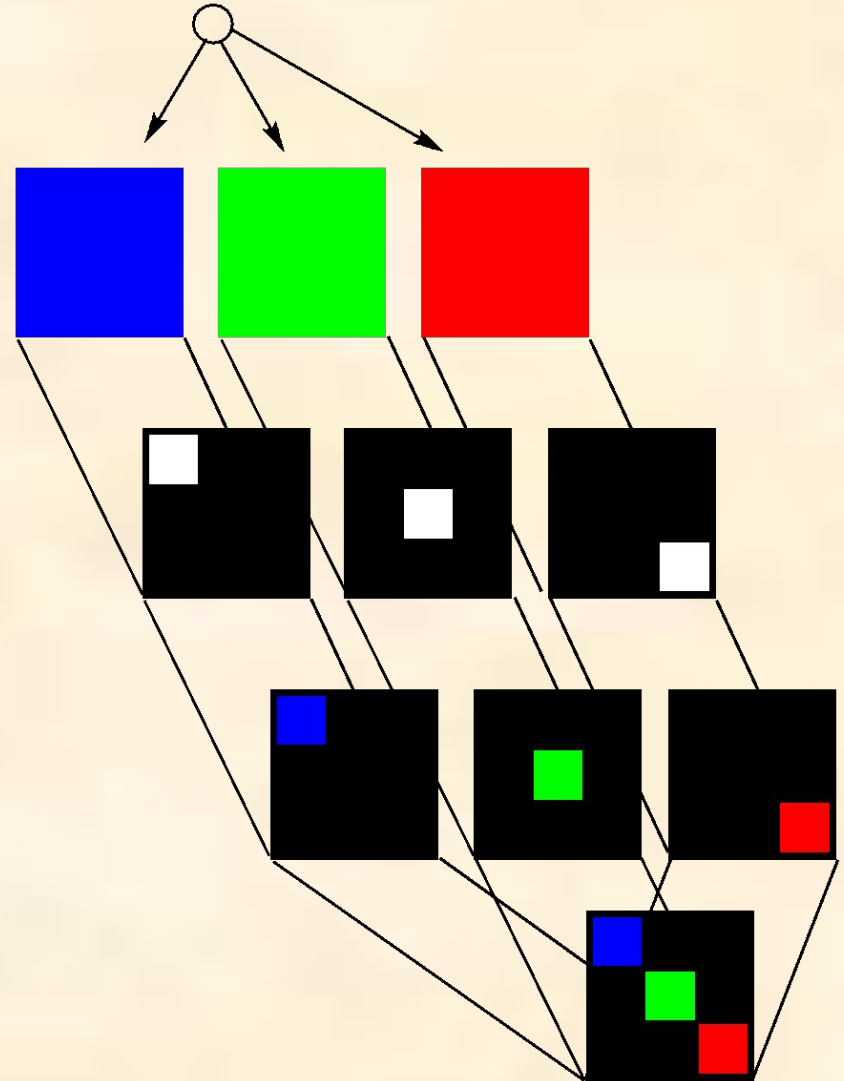
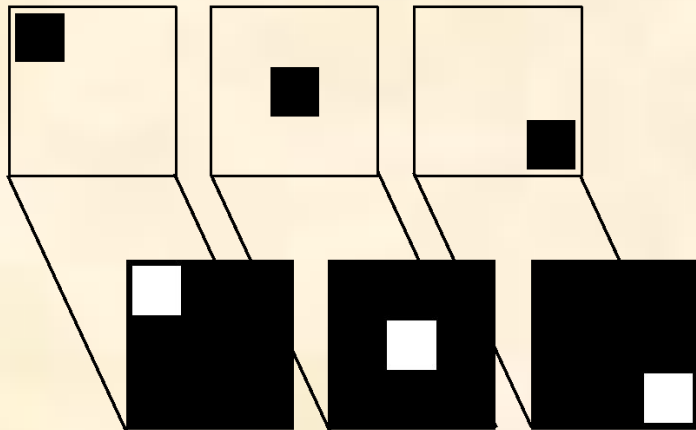
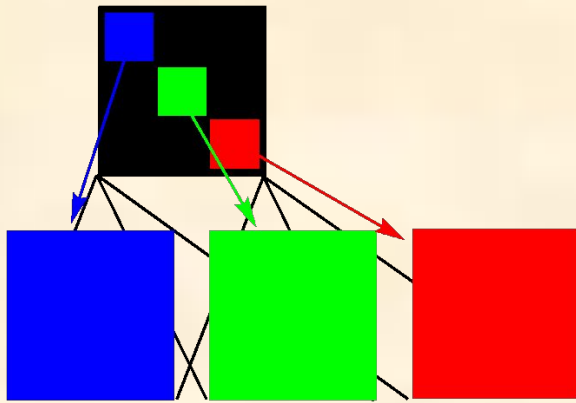
J.C. Maxwell was a Scottish theoretical physicist and mathematician. His most important achievement was classical electromagnetic theory.

Maxwell contributed to the area of optics and colour vision, and is credited with the discovery that colour photographs could be formed using red, green, and blue filters (in 1861)

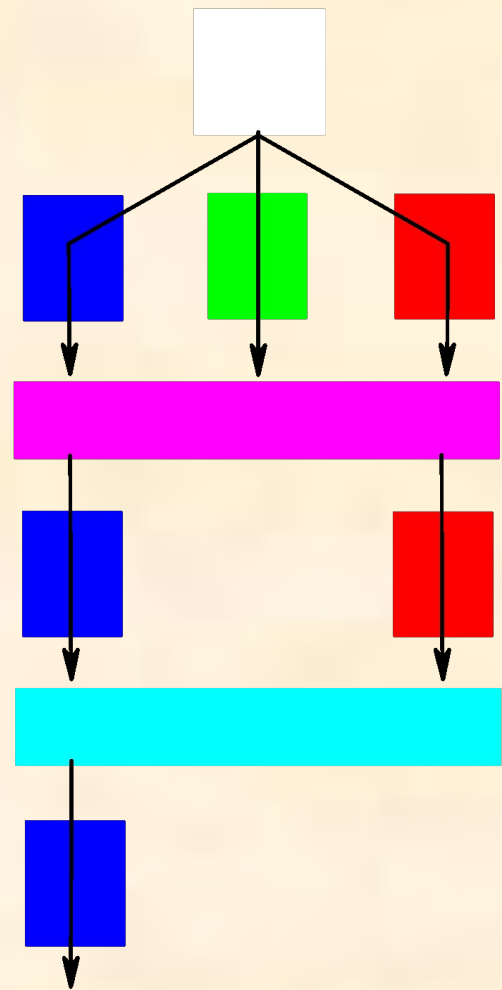
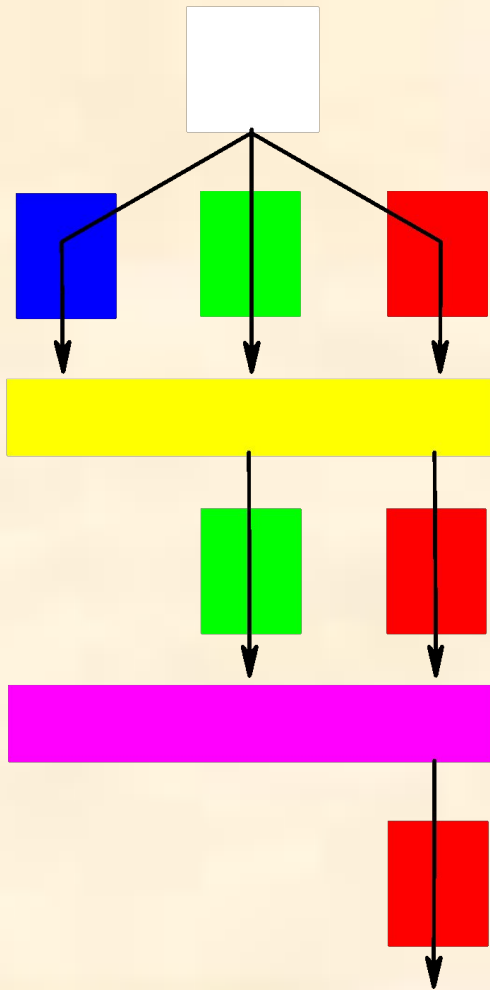


The first permanent colour image, taken by Maxwell in 1861 (a tartan ribbon)

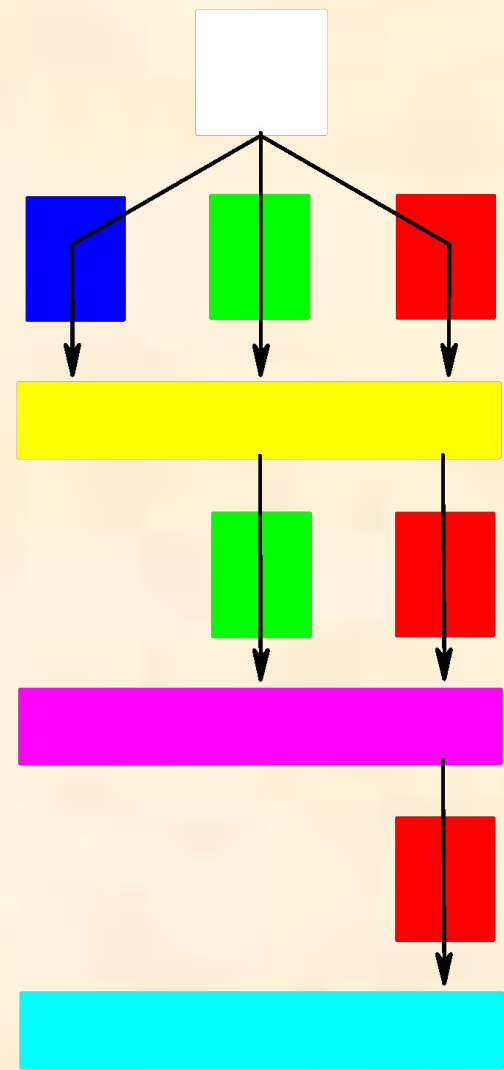
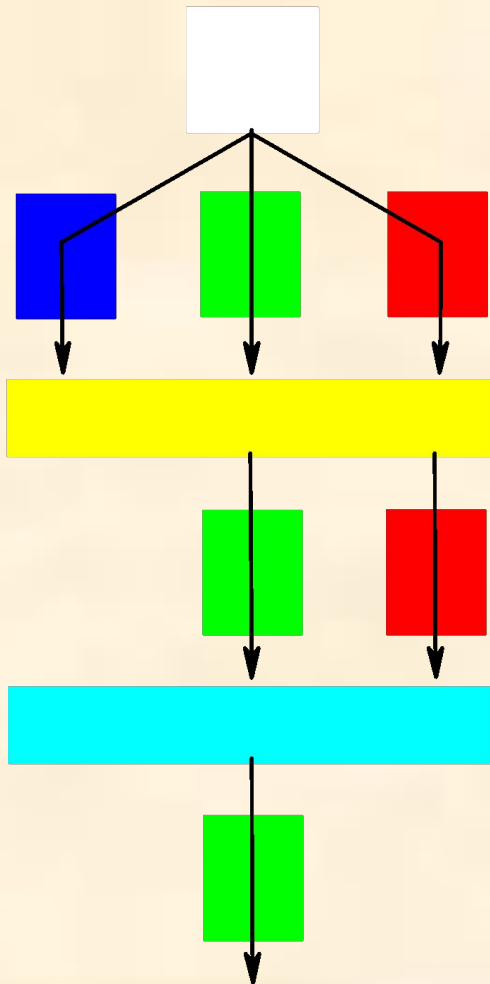
Additive principle of colour photography

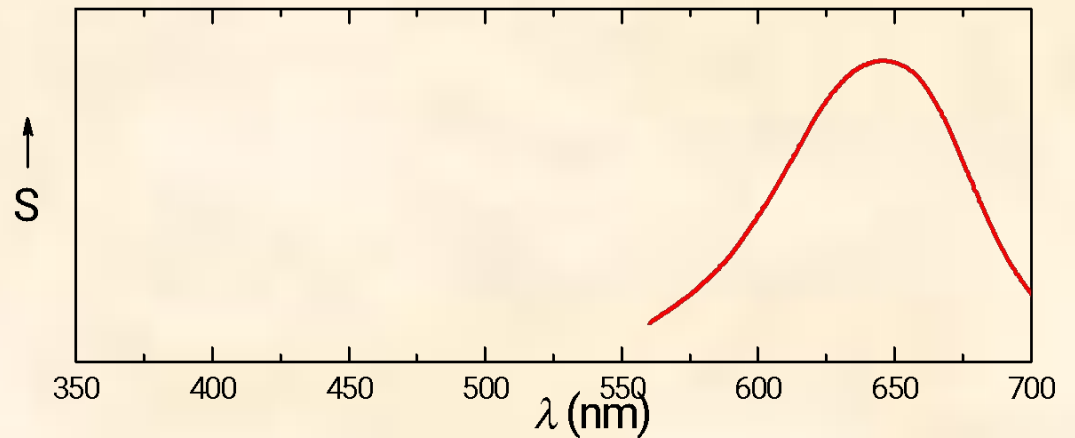
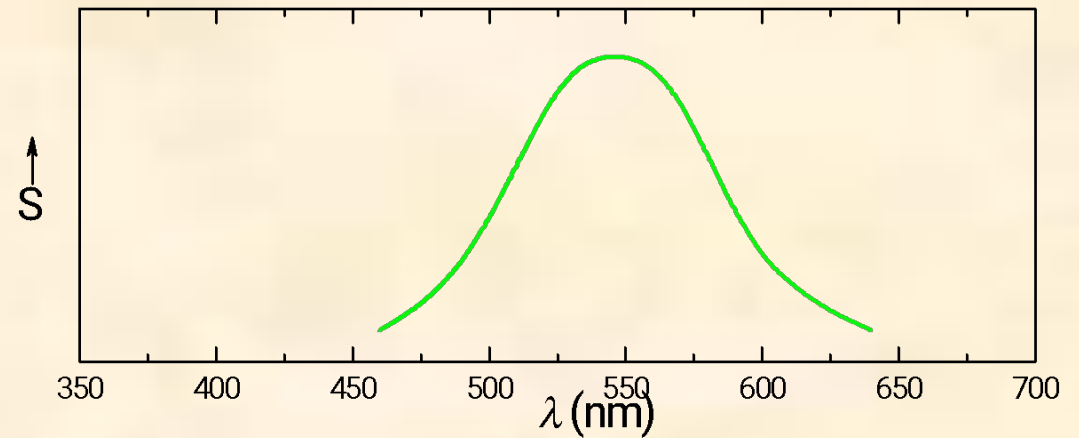
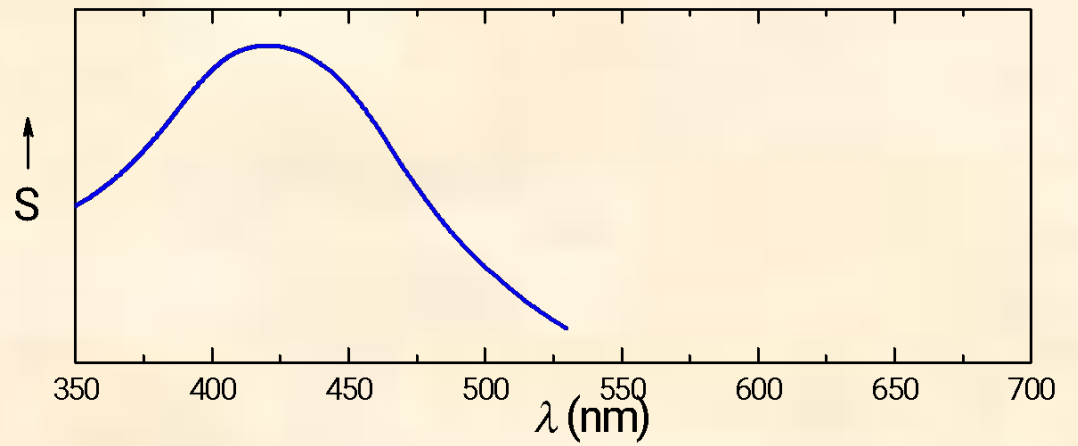


Subtractive method of colours synthesis

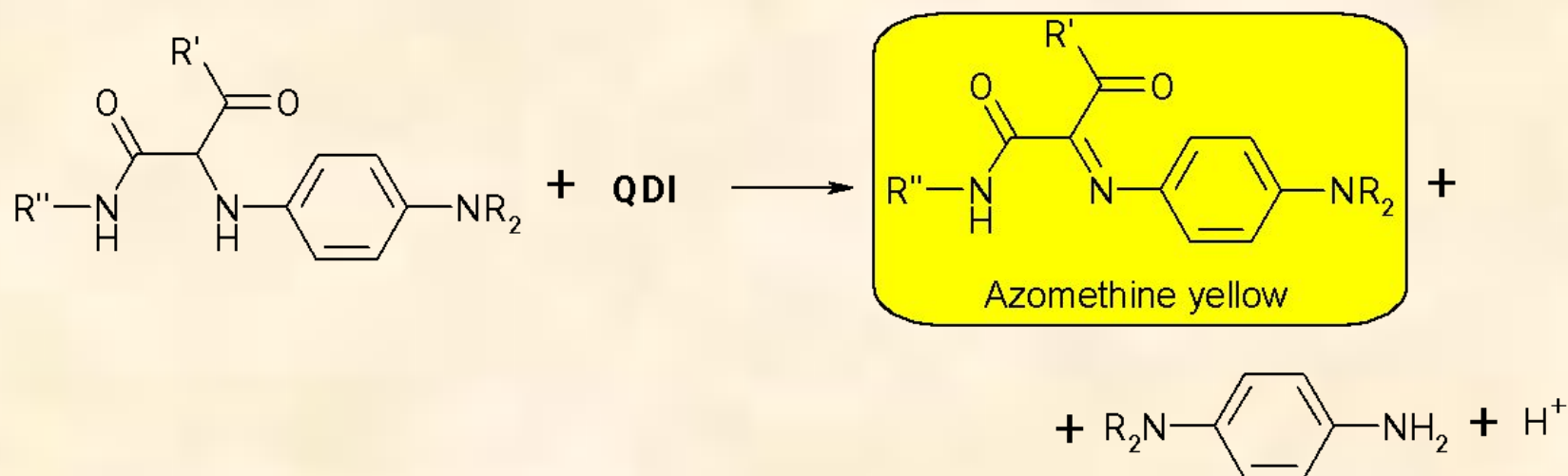
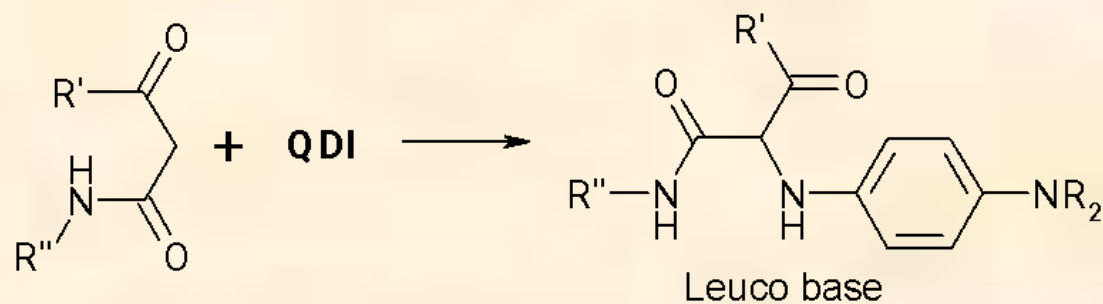
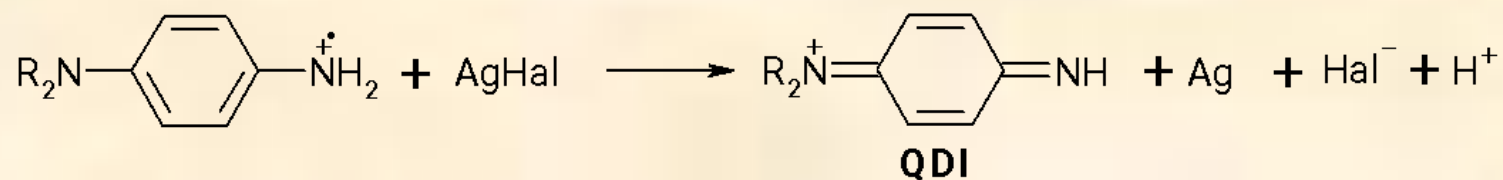
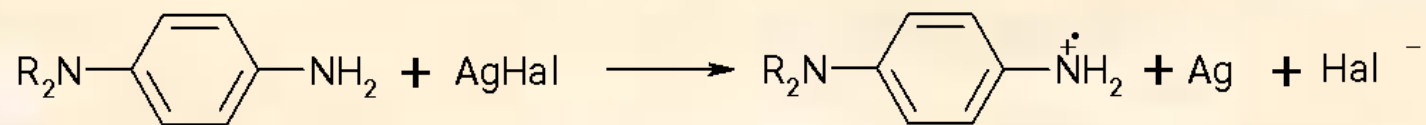


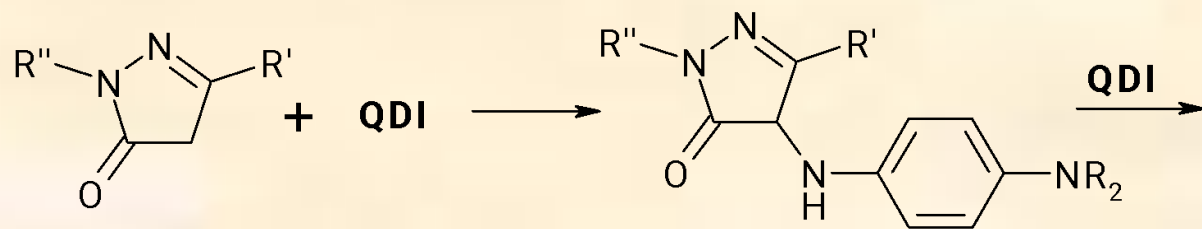
Subtractive method of colours synthesis



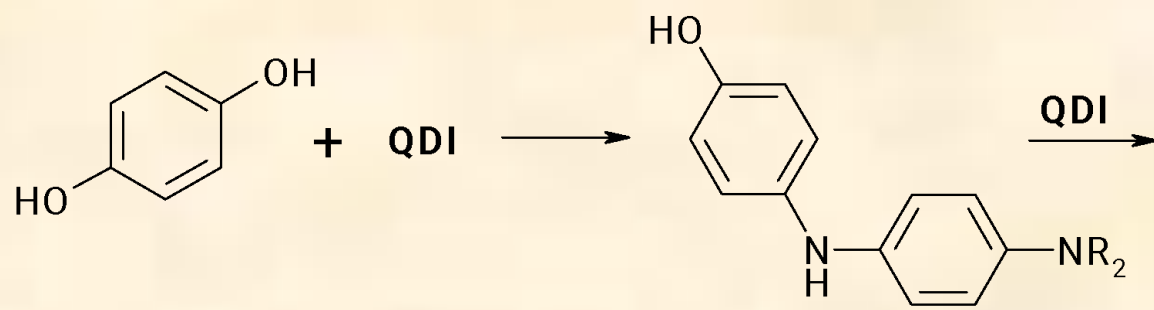
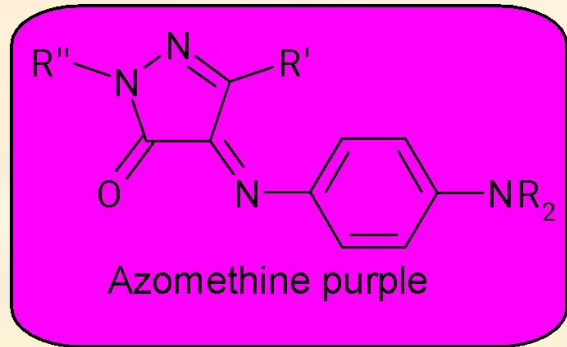


Curves of spectral sensitivity
of colour negative photofilm to
blue, **green** and **red** rays

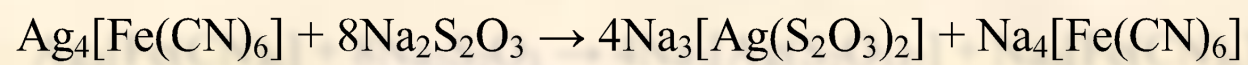
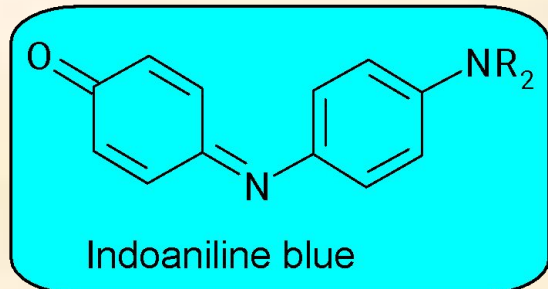




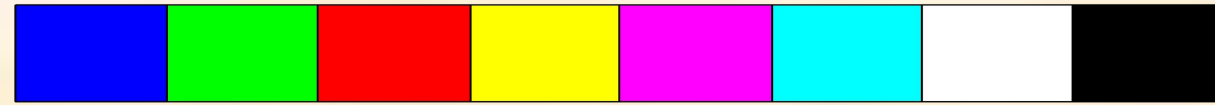
QDI



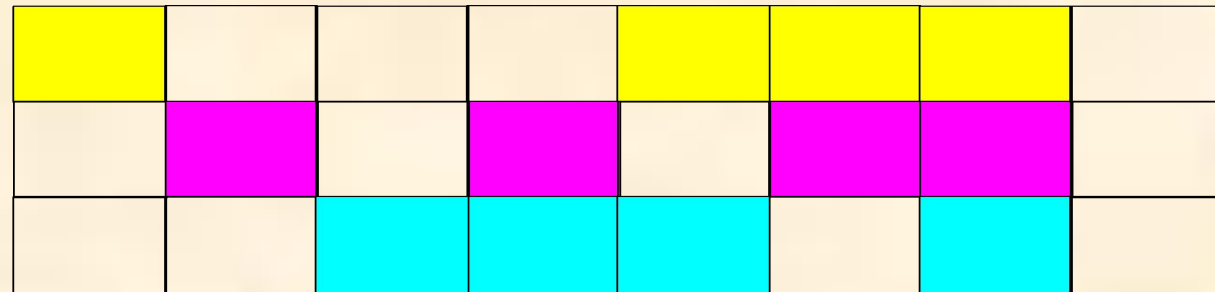
QDI



Subtractive principle of colour photography



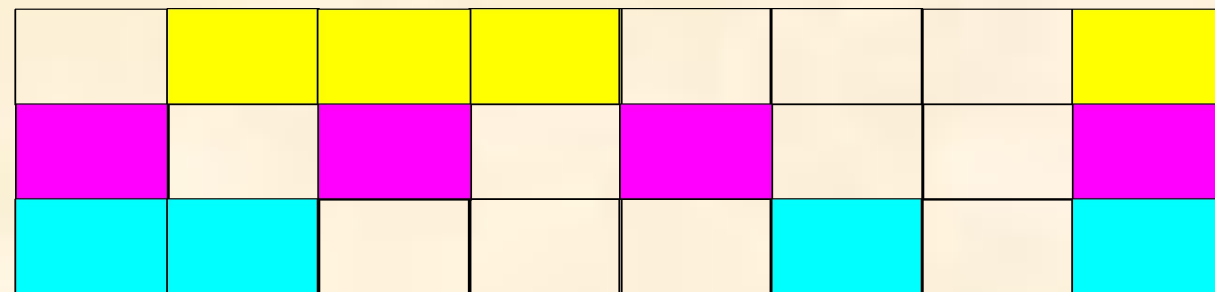
Photographed object



Negative film after development



Colour of negative film



Colours on photo paper after exposure and development



Colours of photo paper