Ultraviolet And Fluorescence Spectroscopy

from chapter _____ in the recommended text

A. Introduction

B. Fundamental Physics

more
X-ray

ground state energy level to a(n) *excited*

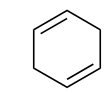
inversely proportional to the *energies*
directly related to their *number*.

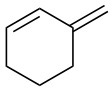
broad
IR-vibrational

Chromophores
cross-section and the *more*

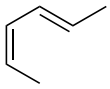
C. Molecular Orbital Diagrams Of Alkenes, Dienes, and Polyenes

just one


non-conj'd


conj'd


conj'd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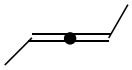
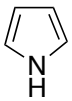
non-conj'd


non-conj'd

$H_2C{=}CH_2$
non-conj'd

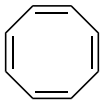

conj'd



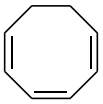
conj'd

conj'd

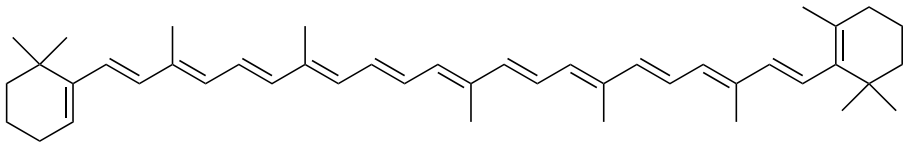
non-conj'd

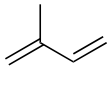

conj'd

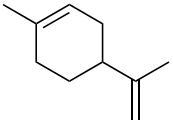

non-conj'd

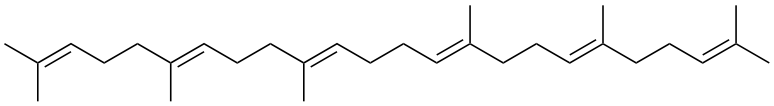

conj'd

Thank you to Dr Syed Hussaini of U Tulsa who pointed out that 4H-pyran (4 th example) is conjugated of its oxygen is sp^2 hybridized.

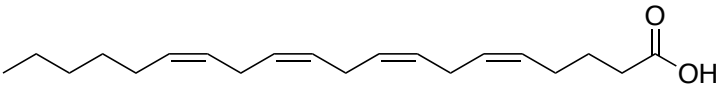

β-carotene *conj'd*


isoprene
conj'd

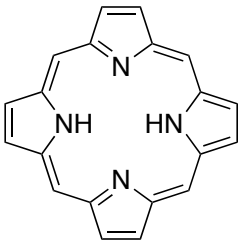

limonene
non-conj'd



squalene non-conj'd

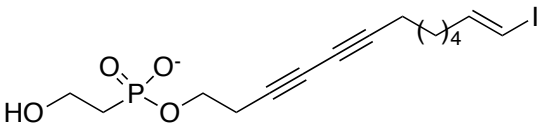


arachidinoic acid non-conj'd

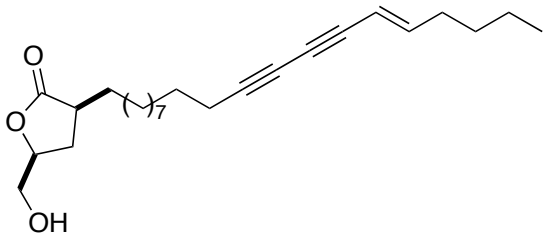


porphyrin conj'd

is



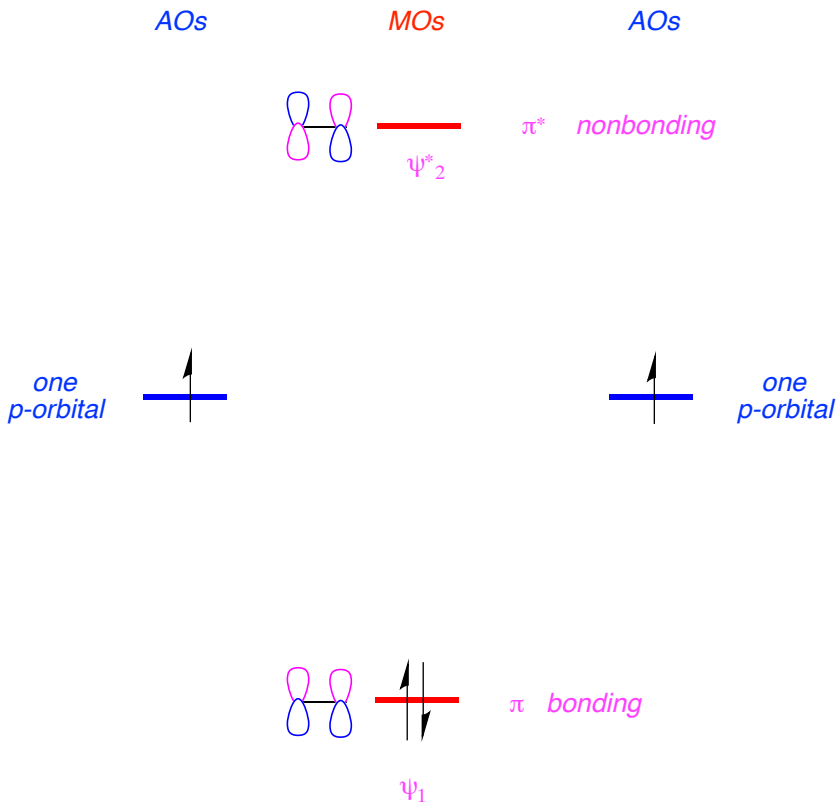
phosphoiodyns A
non-conj'd



debilisone
conj'd

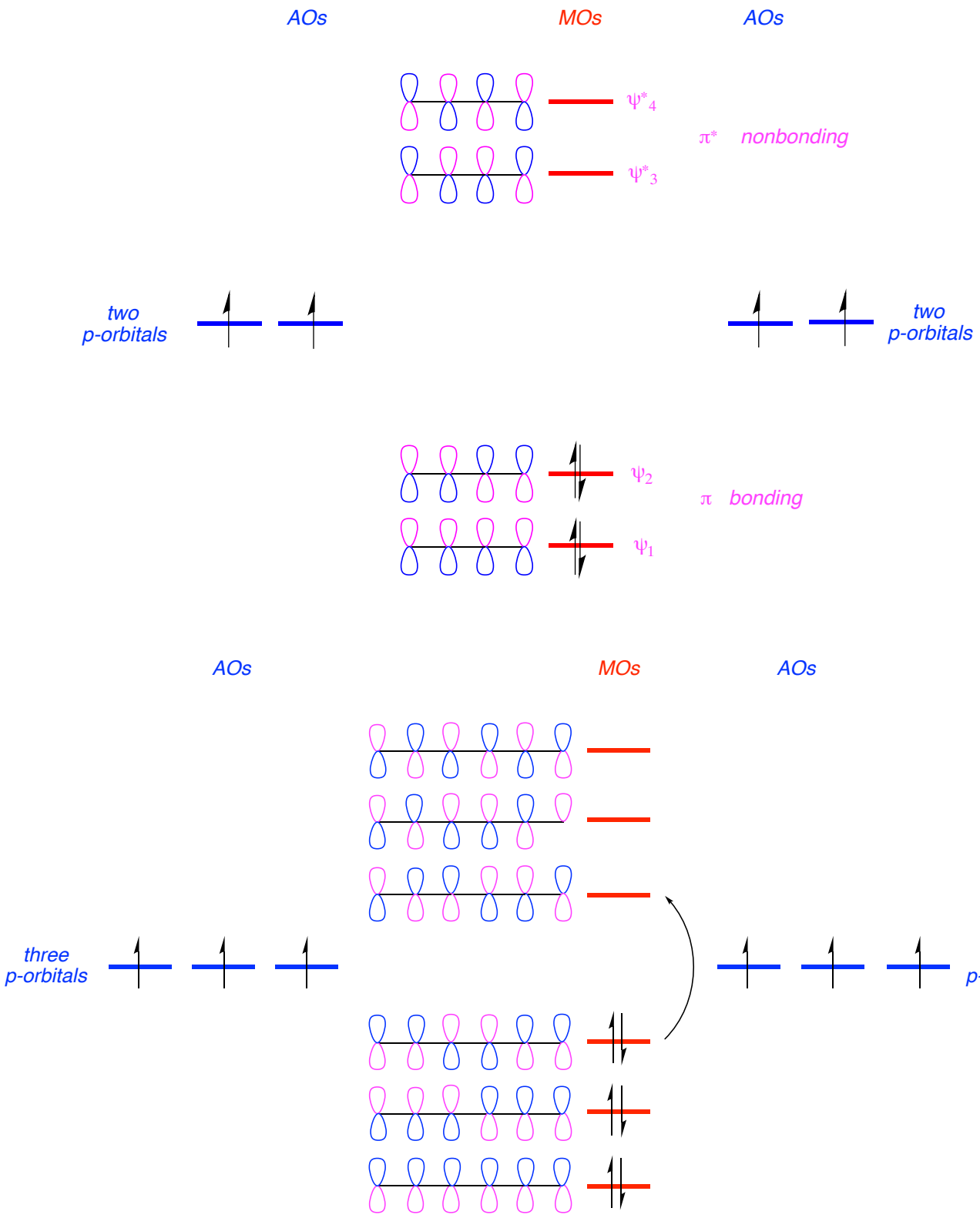
an alternative to
n

2
bonding π- and *antibonding*
Maximal



ultraviolet region resulting in an *excited*
IR energy

larger cross-sections, therefore they absorb *more*
absorbance of the *chromophore*
larger

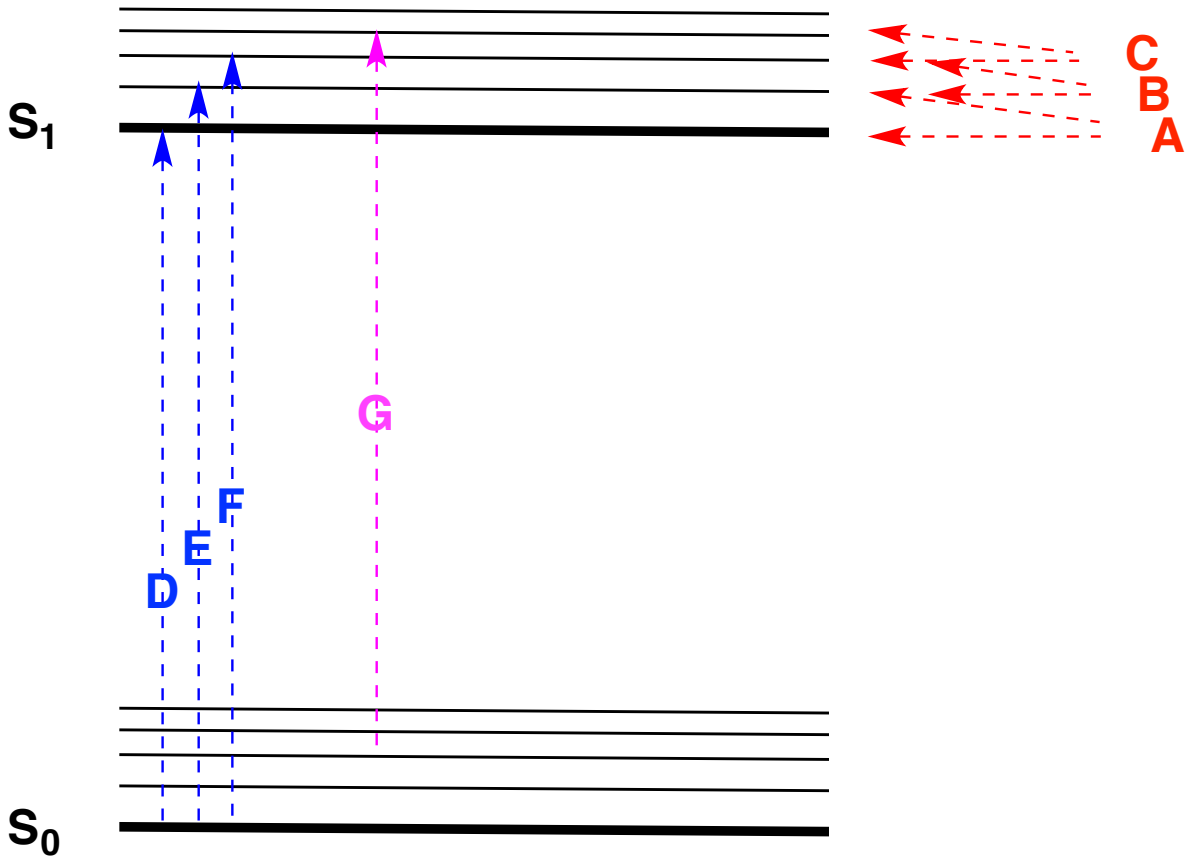

AOs
MOs
AOs
ψ*4
π*
nonbonding
ψ*3
two
p-orbitals
two
p-orbitals
ψ2
π
bonding
ψ1
AOs
MOs
AOs
three
p-orbitals
three
p-orbitals

decreases
lower energy quanta of *increased*

vibrational energy states, while *electronic*
IR
UV quanta.

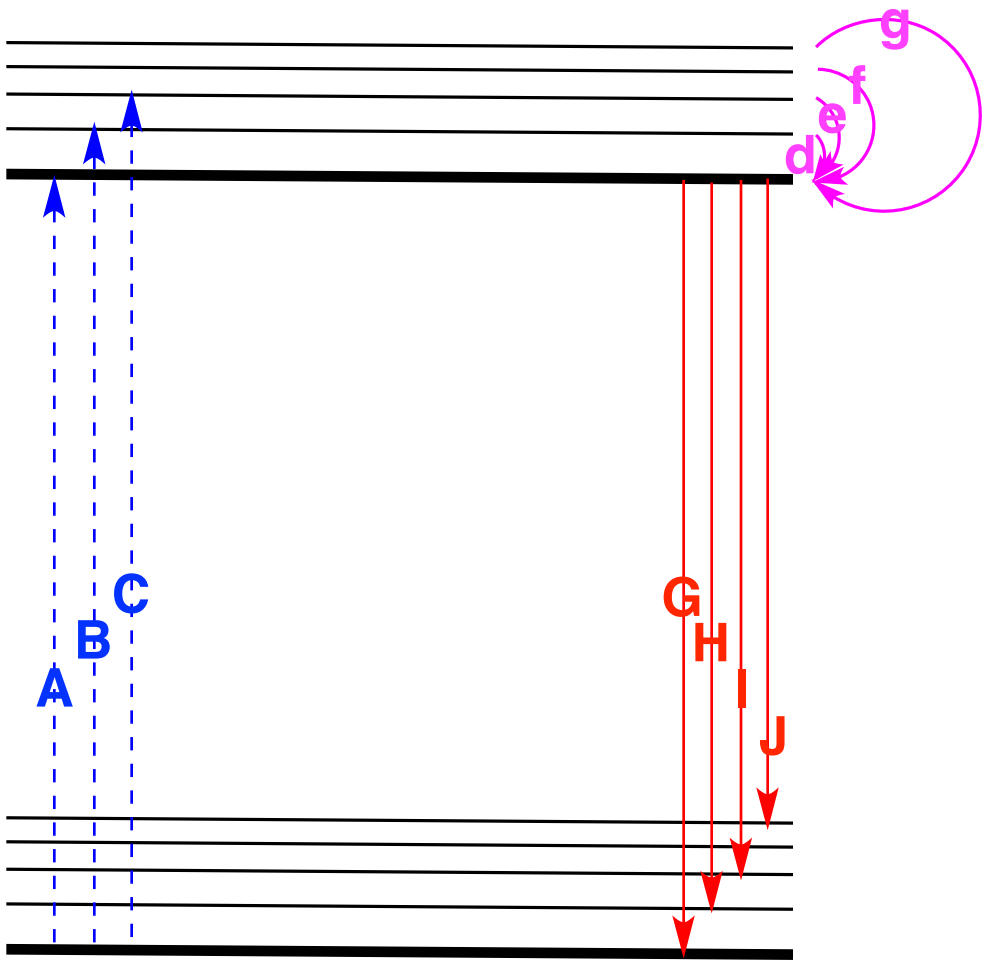
UV
IR.

IR
UV
greater than for transitions like **G**.



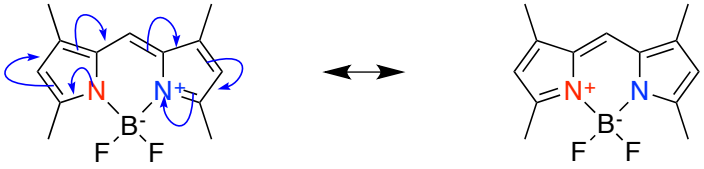
multiple
smaller
UV and transitions between *electronic*
vibrational emissions.

nano-second
fluorescent radiation
rigid molecules

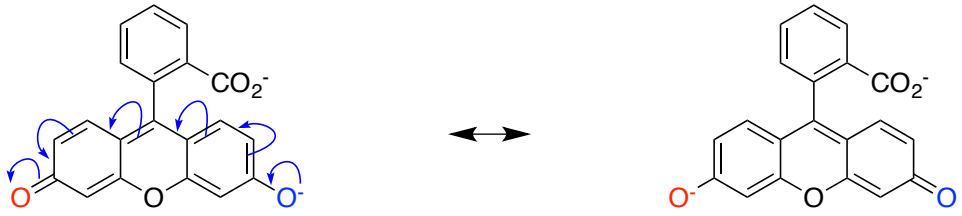


sensitive
higher
higher
fluorescence spectroscopy
fluors.
less

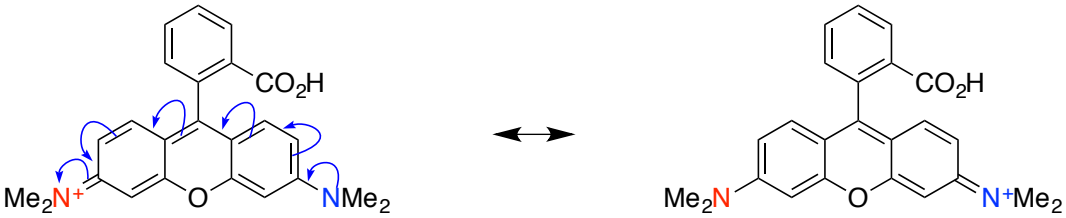
rigid



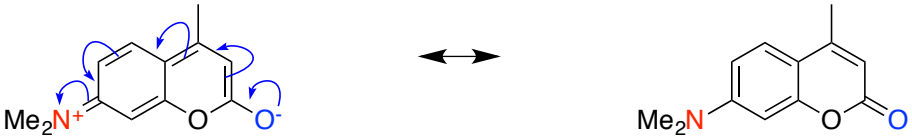
a BODIPY



a fluorescein



a rhodamine



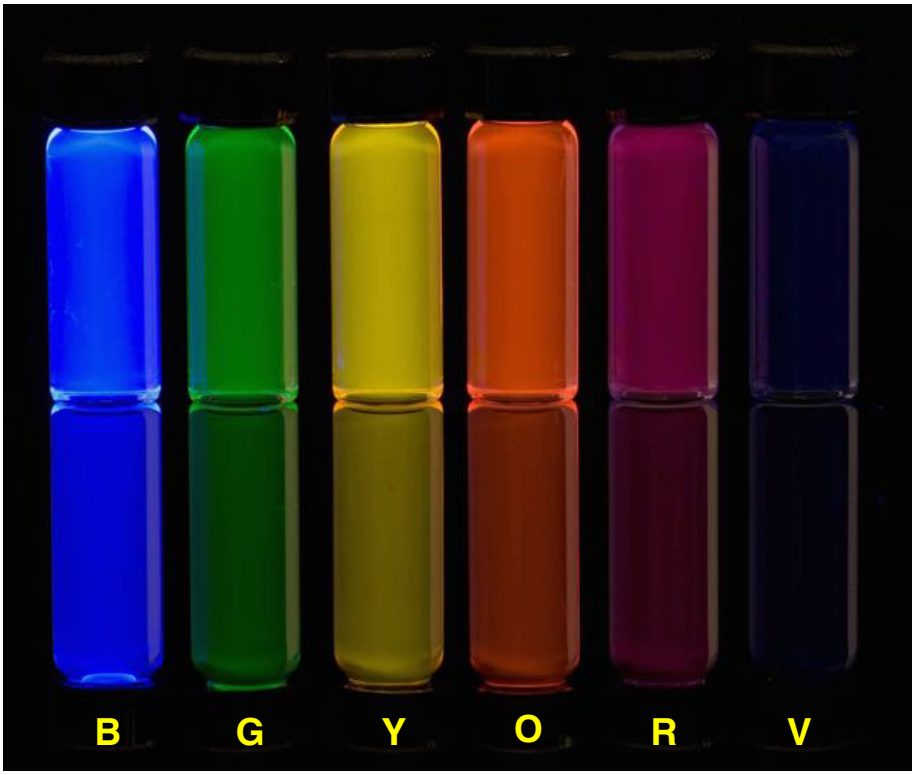
a coumarin

Of the probes shown above, the ones which has fluorescence that is most sensitive to reduced pH is the *fluorescein and coumarin*, whereas the *BODIPY* is least sensitive to pH.

This is because *fluorescein and coumarin* contain phenoate-O^- groups that can be protonated as the pH is reduced from 7.0.

Fluorescence of the *coumarin* is likely to be most sensitive to the dipole moment of the solvent it is in because the oscillation of charge in this molecule is unsymmetrical.

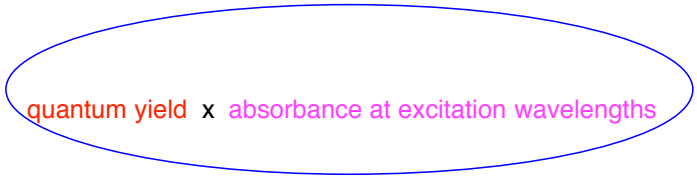
Which of the fluor solutions below emit the highest energy light *V*, and which of them emit at the longest wavelength *R*.



Circle the correct definition of fluorescence quantum yield from the following choices:

$$\frac{\#\text{ photons absorbed}}{\#\text{ photons emitted}} \qquad \frac{\#\text{ photons emitted}}{\#\text{ photons absorbed}} \qquad \frac{\#\text{ photons lost as heat}}{\#\text{ photons absorbed}}$$

Circle the correct descriptor of fluor brightness:



quantum yield x absorbance at λ_{max}

absorbance at excitation wavelengths only

quantum yield only

absorbance at λ_{max} only