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*

\[
\begin{align*}
&\text{non-conj'd} & \text{conj'd} & \text{conj'd} & \text{conj'd} & \text{non-conj'd} & \text{non-conj'd} & \text{non-conj'd} \\
&\text{conj'd} & \text{conj'd} & \text{conj'd} & \text{conj'd} & \text{non-conj'd} & \text{non-conj'd} & \text{non-conj'd} \\
&\text{conj'd} & \text{conj'd} & \text{conj'd} & \text{non-conj'd} & \text{conj'd} & \text{non-conj'd} & \text{conj'd} \\
&\text{conj'd} & \text{conj'd} & \text{conj'd} & \text{non-conj'd} & \text{conj'd} & \text{non-conj'd} & \text{conj'd} \\
\end{align*}
\]

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.

\[
\begin{align*}
&\beta\text{-carotene conj'd} & \text{isoprene conj'd} & \text{limonene non-conj'd} \\
\end{align*}
\]
squalene non-conj’d

arachidinoic acid non-conj’d

porphyrin conj’d

phospholiodyn A non-conj’d
debilisone conj’d
an alternative to $n$

2 bonding $\pi$- and antibonding

Maximal

ultraviolet region resulting in an excited IR energy

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

\[ \psi_1 \]

\[ \psi_2 \]

\[ \psi_3^* \]

\[ \psi_4^* \]

\[ \pi^- \text{ bond} \]

\[ \pi^+ \text{ nonbond} \]

AOs

two p-orbitals

three p-orbitals

AOs

MOs

two 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
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 \(R\).

![Image of fluorescence solutions](image)

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

\[
\frac{\#\text{ photons absorbed}}{\#\text{ photons emitted}} = \frac{\#\text{ photons emitted}}{\#\text{ photons absorbed}} = \frac{\#\text{ photons lost as heat}}{\#\text{ photons absorbed}}
\]

Circle the correct descriptor of fluor brightness:
quantum yield \times \text{absorbance at excitation wavelengths} \quad \text{quantum yield} \times \text{absorbance at } \lambda_{\text{max}}

\text{absorbance at excitation wavelengths only} \quad \text{quantum yield only} \quad \text{absorbance at } \lambda_{\text{max}} \text{ only}