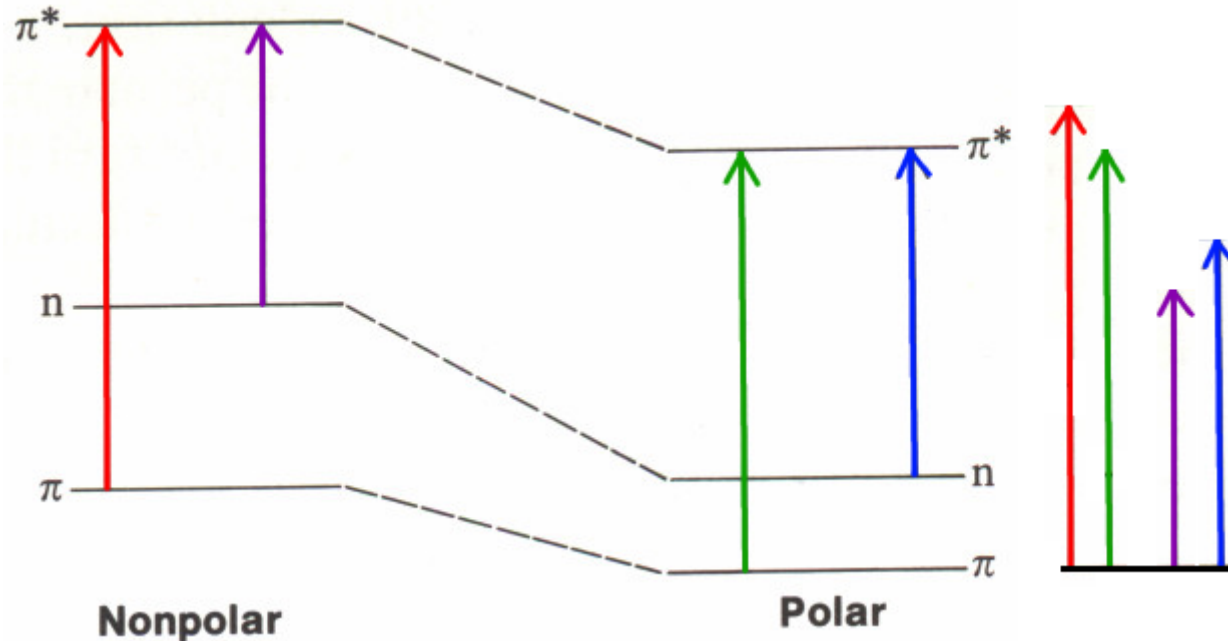


# Absorption Spectroscopy

## Homework Questions:

1. (9 pts) A macromolecule is moved from a non-polar solvent to a polar solvent, which causes a change in energy states as shown below. When moving to the polar solvent, do you expect a red or blue shift in the absorption profile, or none at all for (a, 3 pts) the  $n$  to  $\pi^*$  transition, and (b, 3 pts) the  $\pi$  to  $\pi^*$  transition? Explain why (3 pts). Arrows on the right are drawn to scale for comparison.



## Absorption Spectroscopy

2. (10 pts) Which electronic transition would account for ~280 nm absorbance band if the molecule were 1.2 nm in size (assume a 1-dimensional box). Indicate the quantum level from which the electron is promoted to the next higher energy level. Use a spreadsheet or write a program to find the level.
3. (10 pts) Find the angle between the two cytochrome C spectra (oxidized and reduced, can be downloaded from the Demeler download archive at [demeler.uthscsa.edu/biophysics/](http://demeler.uthscsa.edu/biophysics/)), and based on the angle, decide if you could measure a mixture of oxidized and reduced to tell how much of each is present. Use a spreadsheet or write a program to find the angle.