UV and Visible Light Spectroscopy

Energy: \( h \nu = \frac{h \cdot c}{\lambda} \)

1. Which of the following transitions, \( n \rightarrow \pi^* \) or \( \pi \rightarrow \pi^* \) requires a shorter wavelength of light? What else might you call these transitions?

2. A solution of acetone shows an absorbance of 30 at 274nm in a cell with a 1-cm light path. Its molar absorptivity in hexane is \( 15 \, \text{M}^{-1} \text{cm}^{-1} \). What is the molar concentration of acetone?

3. Which of the following will absorb light with the longest wavelength?
   a. 
   ![Chemical structure](image)
   ![Chemical structure](image)
   b. 
   ![Chemical structure](image)
   ![Chemical structure](image)
   c. 
   \( \text{CH}_2=\text{CHCH}=\text{CHCH}_3 \)
   \( \text{CH}_2=\text{CHCH}=\text{CHCH}=\text{CH}_2 \)
   d. pH=6
   ![Chemical structure](image)
   pH=12
   ![Chemical structure](image)
4. Why do the answers in the previous problem absorb longer wavelengths of light?

5. How would changing the pH of the solution change the light absorbance of the following compound?

6. Label the pKa of NADH

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\begin{align*}
\text{CH}_3\text{CCOO}^- + \text{NAD} + H^+ & \xrightarrow{\text{lactate dehydrogenase}} \text{CH}_3\text{CHCOO}^- + \text{NAD}^+ \\
& \text{pyruvate} \quad \lambda_{\text{max}} = 340 \text{ nm} \\
& \text{lactate}
\end{align*}
\]