

Name: KEY

PHYSICS 2220 - QUIZ #12 - SPRING 2009

1. A hydrogen atom undergoes a transition from a state with  $n = 5$  to a state with  $n = 2$ .

- a. What is the energy of the photon emitted?

$$\begin{aligned} E_{\text{photon}} &= E_{\text{high}} - E_{\text{low}} \\ &= -13.6 \text{ eV} \left( \frac{1}{n_{\text{high}}^2} - \frac{1}{n_{\text{low}}^2} \right) \\ &= -13.6 \text{ eV} \left( \frac{1}{5^2} - \frac{1}{2^2} \right) \\ &= \boxed{2.856 \text{ eV}} \end{aligned}$$

- b. What is the wavelength of the photon emitted?

$$\begin{aligned} E_{\text{photon}} &= \frac{hc}{\lambda} \quad \text{or} \quad \lambda = \frac{hc}{E_{\text{photon}}} \\ \lambda &= \frac{1240 \text{ eV} \cdot \text{nm}}{2.856 \text{ eV}} \\ &= \boxed{434 \text{ nm}} \end{aligned}$$