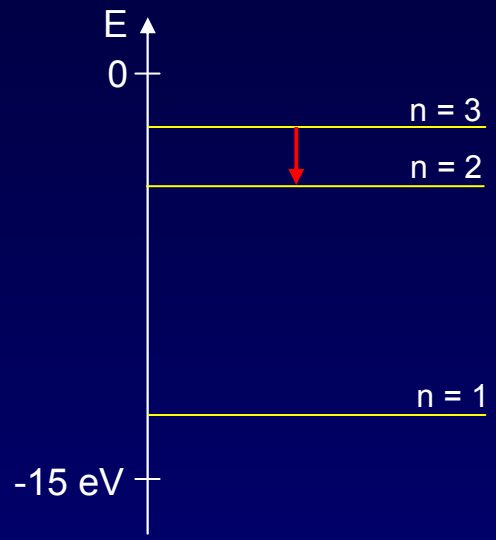
Solution

An electron, initially excited to the n = 3 energy level of the hydrogen atom, falls to the n = 2 level, emitting a photon in the process.



1) What is the energy of the emitted photon?

a) 1.5 eV **b) 1.9 eV** c) 3.4 eV

$$E_n = \frac{-13.6\ \text{eV}}{n^2}$$

$$\Delta E_{n_i \to n_f} = -13.6\left(\frac{1}{n_i^{\,2}} - \frac{1}{n_f^{\,2}}\right)\text{eV}$$

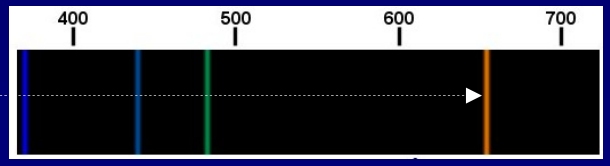
$$E_{photon} = \Delta E_{3\to 2} = -13.6\left(\frac{1}{9} - \frac{1}{4}\right)\text{eV} = 1.9\ \text{eV}$$

2) What is the wavelength of the emitted photon?

a) 827 nm **b) 656 nm** c) 365 nm

$$\lambda = \frac{hc}{E_{photon}} = \frac{1240\ \text{eV}\cdot\text{nm}}{1.9\ \text{eV}} = 656\ \text{nm}$$

Atomic hydrogen



λ (nm)

Question:
Which transition is this?
(λ = 486 nm)

You will measure several transitions in Lab.