

Answer on Question #74298 - Chemistry – General Chemistry

An electron in the $n=4$ level of a H atom emits a photon of wavelength 972 nm. To what energy level does the electron move?

Solution:

$$\Delta E = \frac{hc}{\lambda} = \frac{6.626 \cdot 10^{-34} \cdot 3 \cdot 10^8}{972 \cdot 10^{-9}} = 2.045 \cdot 10^{-19} \text{ J} = 1.3 \text{ eV}$$

$$E_n = -13.6 \cdot \frac{1}{n^2} \text{ eV}$$

$$E_4 = -13.6 \cdot \frac{1}{4^2} = -0.85 \text{ eV}$$

$$\Delta E = E_4 - E_n$$

$$1.3 = -0.85 - E_n$$

$$E_n = -2.15$$

$$E_n = -13.6 \cdot \frac{1}{n^2} = -2.15$$

$$\frac{1}{n^2} = 0.16$$

$$n^2 = 6.25$$

$$n = 2.5$$

Answer: 2.5