The Bohr equation $E = -R_H\left(\frac{1}{n^2}\right)$

n = energy level = 1, 2, 3, 4...

$R_H = 2.18 \times 10^{-18}$ J (Rydberg constant)

ex: What is the energy of an electron in the H atom at the 4th level

$E = -(2.18 \times 10^{-18} J)\left(\frac{1}{4^2}\right)$

$= -1.36 \times 10^{-19} J \times \frac{1 \text{ kJ}}{1000 \text{ J}} = -1.36 \times 10^{-22}$ kJ

$\frac{-1.36 \times 10^{-22} \text{ kJ}}{\text{photon}} \times \frac{6.02 \times 10^{23}}{\text{mole}} = -82.02$ kJ/mol

What is the energy of a photon released if an electron falls from the 6th level to the 2nd level?

$\Delta E = R_H\left(\frac{1}{n_i^2} - \frac{1}{n_f^2}\right)$ n_i = initial, n_f = final

$\Delta E = 2.18 \times 10^{-18} J \left(\frac{1}{6^2} - \frac{1}{2^2}\right) = -4.84 \times 10^{-19}$ J

↑ E lost

$\Rightarrow E_{photon} = 4.84 \times 10^{-19}$ J

What is the wavelength of the photon? $E = h\nu$

The Bohr equation $E = -R_H\left(\frac{1}{n^2}\right)$

n = energy level = 1, 2, 3, 4....

$R_H = 2.18\times10^{-18}$ J (Rydberg constant)

ex: What is the energy of an electron in the H atom at the 4th level

$$E = -(2.18\times10^{-18}\,J)\left(\frac{1}{4^2}\right)$$

$$= -1.36\times10^{-19}\,J \times \frac{1\,kJ}{1000\,J} = -1.36\times10^{-22}\,kJ$$

$$\frac{-1.36\times10^{-22}\,kJ}{photon} \times \frac{6.02\times10^{23}}{mole} = -82.02\,kJ/mol$$

What is the energy of a photon released if an electron falls from the 6th level to the 2nd level?

$$\Delta E = R_H\left(\frac{1}{n_i^2} - \frac{1}{n_f^2}\right)$$

n_i = initial

n_f = final

$$\Delta E = 2.18\times10^{-18}\,J\left(\frac{1}{6^2} - \frac{1}{2^2}\right) = -4.84\times10^{-19}\,J$$

↑ E lost

$\Rightarrow E_{photon} = 4.84\times10^{-19}$ J

What is the wavelength of the photon? $E = h\nu$