Answer on Question #77989 – Chemistry – Other

Calculate the ionization potential energy of an electron in an excited state, if the electron was travelling at energy n=1

Solution:

The Rydberg Expression is given by:

$$\frac{1}{\lambda} = R\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$$

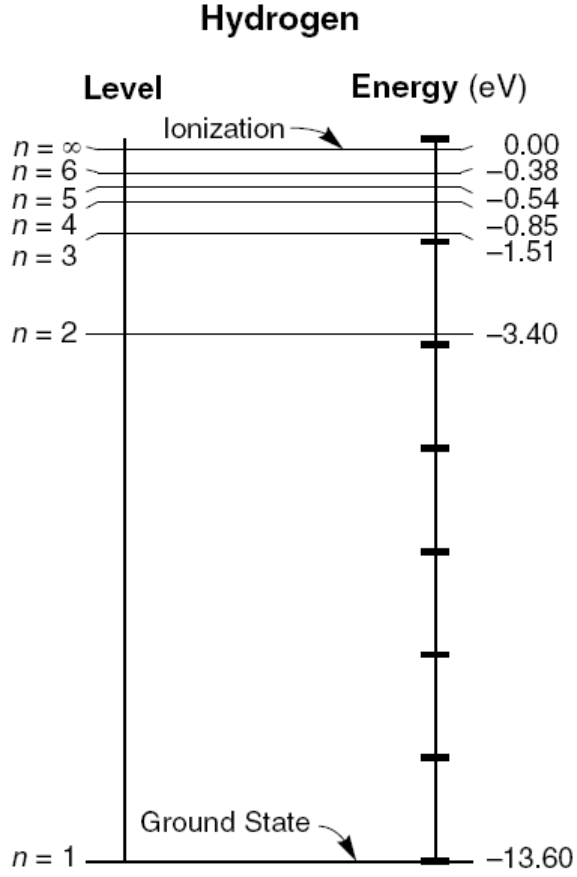
λ is the wavelength of the emission line

n_1 is the principle quantum number of the lower energy level

n_2 is the principle quantum number of the higher energy level

R is the Rydberg Constant 1.097×10^7 m^{-1}

For example, the energy levels converge and coalesce:



Energy Levels for the Hydrogen Atom

At higher and higher values of n_2 the term $\frac{1}{n_2^2}$ tends to zero. Effectively $n_2 = \infty$ and the electron has left the atom, forming an ion.

The Rydberg Expression refers to emission where an electron falls from a higher energy level to a lower one, emitting a photon.