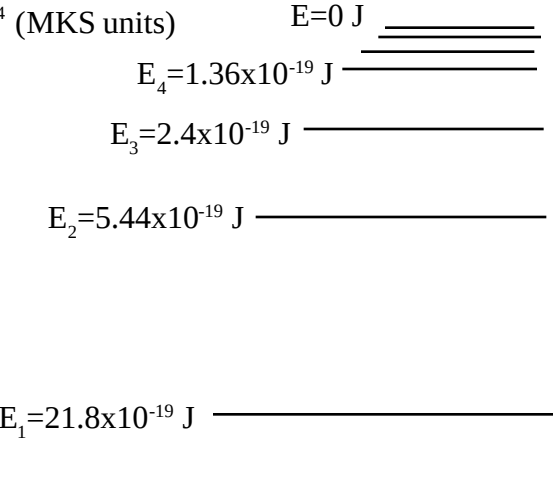
The Bohr Model of the Hydrogen Atom - Quiz 1.0

Balmer Series: $\frac{1}{\lambda} = R\left(\frac{1}{2^2} - \frac{1}{n^2}\right)$ Rydberg constant: $R = 1.1 \times 10^7$ (MKS units)

General formula for the spectral lines of the hydrogen atom: $\frac{1}{\lambda} = R\left(\frac{1}{n_f^2} - \frac{1}{n_i^2}\right)$

$c = 3.00 \times 10^8 \, m/s$ $c = f\lambda$

$E = hf$ Planck's constant: $h = 6.63 \times 10^{-34}$ (MKS units)



1. What minimum frequency of light would ionize the atom if the electron were initially at the ground state? (i.e., what kind of photon (if absorbed) would just make the electron escape the atom?)

2. If the excited electrons in a hydrogen gas were all at the n=4 (or E_4) level, how many different wavelengths of photons would be emitted as they cascaded downward to the ground state, n=1? (Do not calculate the actual wavelengths.)

3. If an electron was at n=4 and made a transition to n=2, directly, what wavelength of light would be emitted?

4. What is the lowest frequency of light emitted in the Balmer Series (where $n_f = 2$)?

5. (True/False) The Bohr Model stated that electrons, like planets, could exist anywhere in elliptical or circular orbits.

6. (True/False) Bohr was able to calculate the radius of the hydrogen atom.

7. (True/False) J.J. Thomson is credited with discovering the nucleus of the atom.

8. Briefly explain how “glow in the dark” materials work?