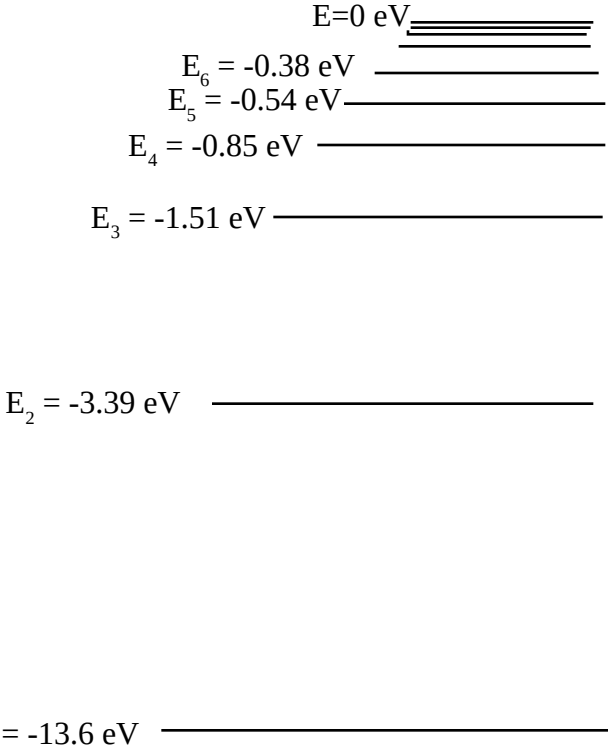
THE BOHR MODEL OF THE HYDROGEN ATOM Q1.0H

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

Rydberg constant : $R = 1.1 \times 10^7$ (MKS units)

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

$E = hf$ $\qquad$ Planck's constant : $h = 6.63 \times 10^{-34} J \cdot s = 4.14 \times 10^{-15} eV \cdot s$



1. What is the longest wavelength photon which could ionize the atom if the electron were initially at ground state?

2. If the excited electrons in a hydrogen gas were all at the n = 5 (or E_5) level, how many different frequencies of light would be emitted as they cascaded downward to n=1?

3. What wavelength of light would be absorbed as an electron leaped from n=4 to n=6?

4. Why might a rainbow spectrum from the sun be missing certain wavelengths?

5. What is the second lowest frequency of light emitted according to the Balmer Series?

6. What is the energy (in joules) of a 350 nm photon?

7. (True/False) Rutherford is credited with discovering the electron.

8. (True/False) J.J. Thomson's gold foil experiment demonstrated the existence of the nucleus.

9. (True/False) Bohr calculated the radius of the hydrogen atom to be about 0.5 angstroms.

10. Briefly explain how "glow in the dark" materials work.