

Name: _____

Class: _____

Due Date: _____

Physics Topic 62 – Bohr Model, Quantization of Energy Levels, and Angular Momentum

1. C: Use Newton's second law of motion, the equation for total energy, the equation for angular momentum $\vec{L} = r \times \vec{p}$, and the assumption that the angular momentum of an electron orbiting a hydrogen atom is quantized: $mvr = n \left(\frac{h}{2\pi} \right)$ to derive the equation for the energy of an electron orbiting a hydrogen atom is $E_{\text{electron}} \approx -\frac{13.6}{n^2} \text{ eV}$.

2. C: What is the significance and meaning of the equation $E = \frac{-13.6}{n^2}$ eV?
3. E: Determine the radius of the three lowest energy levels of an electron in a hydrogen atom.
4. E: Complete the following table for the four lowest energy levels of an electron in a hydrogen atom.

Energy level	n	E (eV)	E (Joules)
Ground state			
First excited state			
Second excited state			
Third excited state			

5. E: Determine the gain in total energy in eV when an electron jumps from the first excited state ($n = 2$) to the fifth excited state ($n = 6$).

6. E: Determine the gain in total energy in eV when an electron jumps from the ground state ($n = 1$) to the third excited state ($n = 4$).

7. C: Describe the *Bohr model of the atom*.