Session 11 Worksheet

1. What is the equation to find energy transition of 2 states?

2. What is the wavelength of the line in the Balmer series of hydrogen that is composed of transitions from the \( n=5 \) to the \( n=2 \) level? (\( R = 1.097 \times 10^7 \text{ m}^{-1} \) and 1 nm = \( 10^{-9} \text{ m} \))

3. When a hydrogen atom undergoes a transition from \( E_3 \) to \( E_1 \), it emits a photon with \( \lambda = 102.6 \text{ nm} \). Similarly, if the atom undergoes a transition from \( E_3 \) to \( E_2 \), it emits a photon with \( \lambda = 656.3 \text{ nm} \). Find the wavelength of light emitted by an atom making a transition from \( E_2 \) to \( E_1 \).
4. What is the energy (in joules) and the wavelength (in meters) of the line in the spectrum of hydrogen that represents the movement of an electron from Bohr orbit with \( n = 4 \) to the orbit with \( n = 6 \)? In what part of the electromagnetic spectrum do we find this radiation?

5. The Paschen series of hydrogen corresponds to electron transitions from higher levels to \( n=3 \). From what level do electrons come that produce a wavelength of 1282 nm?
6. The ionization energy of the hydrogen atom in its ground state is 13.6 eV. What is the energy of the n=4 state?

7. A hydrogen atom in the ground state absorbs a 12.09 eV photon. To what level is the electron promoted? (The ionization energy of hydrogen in the ground state is 13.6 eV)

Quantum Numbers

8. Define n, l, m

9. What are nodes?
Write the unabbreviated electron configurations of the following elements:

1) copper________________________
2) iodine________________________
3) potassium______________________
4) bismuth________________________
5) zirconium_______________________

Write the abbreviated electron configurations of the following elements:

6) iridium________________________
7) chlorine________________________
8) nobelium________________________
9) caesium________________________
10) magnesium______________________