Worksheet – Bohr Model of Atom

Name:_____ Period:_____

In Bohr's atomic model, electrons must occupy specific, quantized energy levels in an atom. For hydrogen, the following equation was derived to calculate electron orbit energy (E_n).

$$E = -(2.18 \times 10^{-18} J)/n^2$$

Where n = quantum number (1, 2, 3 and etc.)

1. Use the above equation, answer the following question:
    a. What is the energy associated with the ground state orbital (n = 1) for the hydrogen atom?
    b. What is the energy associated with the excited state orbital where n = 3?
    c. What is the energy difference between the two orbitals (excited state – ground state)?
    d. What is the energy for the photons released when an electron jumps from the above excited state (n = 3) to the ground state (n = 1)?
    e. What is the frequency of the emitted photons?
    f. What is the wavelength of the emitted photons?
    g. Classify the emitted electromagnetic radiation (light) based on its wavelength.

2. Use the energy equation for the hydrogen atom, calculate the following:
    a. The energy associated with the excited state orbital (n = 6).
    b. The energy associated with the excited state orbital (n = 2).
    c. Energy required for an electron to move from the more stable orbital (n = 2) to the less stable one (n = 6).
    d. Energy released in the form of photons when an electron jumps from the high energy orbital (n = 6) to the lower one (n = 2).
    e. The frequency associated with the emitted photon in d.
    f. The wavelength of the emitted photon in d.
    g. Classification of the emitted light based on wavelength.