

CHEMISTRY 123-01

Exercise #4

November 07, 2007

$$\text{Mass of electron} = 9.11 \times 10^{-31} \text{ kg}$$

$$h = 6.63 \times 10^{-34} \text{ J}\cdot\text{s}$$

$$R = 2.18 \times 10^{-18} \text{ J}$$

$$\text{Speed of light} = 3.00 \times 10^8 \text{ m/s}$$

- Determine the energy of 1 mol of photons of visible light with wavelength of 500 nm.
- An electron has a de Broglie wavelength of 225 nm. What is the speed of the electron?
- Determine whether each of the following transitions in the hydrogen atom corresponds to absorption or emission of energy:
 - $n = 3$ to $n = 1$
 - $n = 2$ to $n = 4$
- Calculate the wavelength of light emitted when an electron in a hydrogen atom makes the transition from $n = 3$ to $n = 1$.
- Which set of quantum numbers below cannot occur together to specify an orbital:
 - 2, 1, -1
 - 3, 3, 2
 - 3, 2, 0
 - 4, 3, 4
 - 5, 0, 0
- Among the electron configurations below, indicate those that do not correspond to ground states.
 - [Ar]4s²3d²
 - [Xe]6s¹5d¹
 - [Ne]3s²3p⁵4s¹
- Indicate the electron configurations that are impossible:
 - [He]2s³
 - [Kr]5s²4d⁹5p³
 - [Ar]4s²3d¹¹4p⁶

8. Write the explicit electron configuration of the following elements:

a. Ar

b. As

c. Y

9. Determine the elements that have the following electron configurations of the ground states:

a. $[\text{Ar}]4s^23d^{10}4p^6$

b. $[\text{Kr}]5s^2$

c. $[\text{Xe}]6s^24f^{14}5d^{10}6p^2$

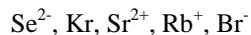
10. Write the electron configuration of each of the following ions:

a. Cu^{2+}

b. Cr^{3+}

c. O^{2-}

11. Arrange the following isoelectronic species in order of increasing radius:



12. Choose the element with the highest first ionization energy from each of the following pairs:

a. P or I

b. Na or Rb

c. Si or Cl

13. For each of the following elements, predict where the “jump” occurs for successive ionization energies:

a. B

b. Si

c. Ca