

General Chemistry I

PLI #12

June 22, 2021

1. In the ground state of cadmium (Cd):
 - a. Write the full and noble gas ground state electron configuration:
 - b. How many electrons have $l=2$ as one of their quantum numbers?
 - c. How many electrons have $n=4$ as one of their quantum numbers?
 - d. How many electrons have $m_l = -1$ as one of their quantum numbers?
2. Write the full and noble gas notation ground state electron configuration for the following elements:
 - a. Tellurium
 - b. Cesium
 - c. Arsenic
 - d. Iridium
 - e. Copper

3. The successive ionization energies for an unknown element are $I_1 = 896 \text{ kJ/mol}$; $I_2 = 1752 \text{ kJ/mol}$; $I_3 = 14807 \text{ kJ/mol}$; $I_4 = 17948 \text{ kJ/mol}$. To which group in the periodic table does the unknown element most likely belong?

4. Two elements, A and B, have the electron configuration shown:

A - $[\text{Ar}] 4s^2$ and B - $[\text{Ar}] 3d^{10} 4s^2 4p^5$

- Which element is a metal?
- Which element has the greater ionization energy?
- Which element has the larger atomic radius?
- Which element has the greater electron affinity?

5. Write the noble gas electron configuration of mercury:

a. How many electrons occupy atomic orbitals with $n=3$?

b. How many electrons occupy d atomic orbitals?

c. How many electrons have the "up" spin ($m_s = +1/2$)

6. Write a complete set of quantum numbers for each of the electrons in the Cu valance shell:

a. Write the complete electron configuration for the Cu^{2+} ion:

- b. If the first and second ionizations of copper are 745.4 kJ/mol and 1957.9 kJ/mol respectively, what are the wavelengths of the photons emitted upon ionization?
7. Within any period, noble gases have the highest ionization energy. Why?