Entering AP Chemistry 2024-25 Name: _____

AP Chem Summer Assignment

Directions: Answer all questions to 3 significant figures. You may use a calculator. Show all work. Using your TCS emails should give you access to the two links at the bottom which include a Periodic Table and a List of Constants and Equations that are included with the AP test.

Moles, Molar Mass, and Atomic Mass

Avogadro's #: $6.02 * 10^{23}$ particles/mole

1. How many moles of CO_2 are in 300. µg of CO_2?

2. What is the mass in kg of 2.5 moles of Copper (Cu)?

3. Calculate the atomic masses of the following elements based on their isotopes and relative abundances and identify the elements based on the calculated atomic masses.
    a. 18.7% 10 amu, 81.3% 11 amu

    b. 51.5% 90 amu, 11.2% 91 amu, 17.1% 92 amu, 17.4% 94 amu, 2.8% 96 amu

Elemental (%) Composition of Pure Substances

4. Determine the Empirical Formulas of the following compounds based on their % Compositions:
    a. C: 40.7% , H: 5.1%, O: 54.2%

    b. C: 66.6%, H: 11.2%, O: 22.2%

5. How many moles of Chlorine are present in a 3.00 g sample that is 74.5% Chlorine?

Atomic Structure and Electron Configuration

6. Write the electron configuration and orbital diagram for Nitrogen ($_{7}N$):

7. Write the electron configurations for the following elements:
    a. $_{22}Ti$

    b. $_{24}Cr$

Periodic Trends

8. Arrange the following groups of atoms and ions in order according to the properties listed below.

    a. smallest to largest in terms of atomic or ionic radii:

    F^{-}, Mg^{2+}, N^{3-}, Na^{+}, Ne, O^{2-}, Al^{3+}

    b. List in order of the highest electronegativity value to lowest electronegativity value (measure of how tightly an element holds to bonding electrons:

    Cl, K, N, Na, P, Sr

    c. Order from the lowest ionization energy to the highest ionization energy (energy required to remove an electron from an atom or ion in the gaseous state):

    Ar, Cl, F, K, Sr

Valence Electrons and Ionic Compounds

9. Write the valence electron configurations and the charge of the ion that forms from the following elements:
    a. $_{19}Kg$

    b. $_{8}O$

    c. $_{17}Cl$

d. $_{20}Ca$

10. Write the chemical formula for the ionic compounds that form from combinations of the following elements:
    a. Magnesium(Mg) and Bromine(Br)
    b. Calcium (Ca) and Chlorine (Cl)
    c. Strontium (Sr) and Nitrogen (N)
    d. Sodium(Na) and Bromine(Br)
    e. Aluminum (Al) and Oxygen(O)
    f. Calcium(Ca) and Sulfur (S)

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