

AP Chemistry Summer Work (2022-2023)

Answer the following questions. Please show your work, be sure to include the proper units, and **box** your answers.

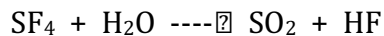
1. The Women's 100m dash record is 10.49s. What is this speed in km/hr?
2. How many significant figures are in the following measurements?
  - a) 20.03 kg
  - b) 120 m
  - c)  $1.90 \times 10^3$  L
3. How many protons, electrons, and neutrons are in the following isotopes?
  - a) Ca- 40,
  - b) U-238,
4. What is the atomic weight of antimony if it has two naturally occurring isotopes, Sb-121 with an isotopic mass of 120.904 amu and an abundance of 57.21% and Sb-123 with an isotopic mass of 122.904 amu and an abundance of 42.79%?
5. Determine the number of **valence** electrons around the nitrogen atom in the ion  $\text{NH}_2^-$ .
6. Write the expected formula when the following elements combine to form compounds:
  - a) B and Cl
  - b) Al and O

7.

Name the following molecular and ionic compounds:

- a)  $(\text{NH}_4)_2\text{SO}_4$       b)  $\text{KClO}_4$       c)  $\text{SF}_6$

8. Balance the following reaction:



9. Given the formula for ethanol as  $\text{C}_2\text{H}_6\text{O}$ , calculate it's a) molecular weight; b) the number of moles of ethanol in 1.00 g of ethanol; c) the number of molecules of ethanol in 1.00 g of ethanol; and d) the percentage of carbon in ethanol

10. A sample of  $\text{Na}_2\text{B}_4\text{O}_7$  contains 0.3478 g of sodium. What is the mass of the sample?

11. A compound contains only the elements Al and O. Its elemental composition is determined to be 53.0% aluminum and 47.0% oxygen. The mass of one mole of the compound is 102 g. What is the empirical formula of the compound? What is its molecular formula?

12. How many grams of HI are required to form 1.20 moles of  $\text{H}_2$  when HI decomposes to hydrogen gas and iodine gas.

13. Calculate the percent yield when 205 g of aluminum hydroxide reacts with 751 g of sulfuric acid to yield 252 g of aluminum sulfate.

14. Write a net ionic equation for the reaction of Lead(II) Nitrate with Potassium Bromide.

15. Write the shorthand notation (e.g. 2s) for the subshells described by the following quantum numbers:

a)  $n=2, l=1, m_l = 0$

b)  $n=3, l=2, m_l = 1$

16. Write the electron configuration for calcium

17. Arrange the following atoms in order of increasing atomic size: Mg, Ca, Sr

18. Predict which member of the pair has the greater first ionization energy: Na or Rb?

19. Draw the Lewis Structure for  $\text{H}_3\text{O}^+$ .

20. What is the valence electron configuration for  $\text{Se}^{2-}$ ?