G11 Chemistry: Class 6 Homework

MULTIPLE CHOICE: Circle the correct answer. [10 marks]

1. There are two stable isotopes of chlorine: chlorine-35, with a mass of 34.968853 amu; and chlorine-37, with a mass of 36.965903. Given that the average atomic mass of a chlorine atom is 35.45 amu, which of the following statements is true?
   A) Chlorine contains almost exclusively of Cl-35, with very little Cl-37
   B) Chlorine contains more Cl-35 than Cl-37.
   C) Chlorine contains roughly equal amounts of Cl-35 and Cl-37.
   D) Chlorine contains more Cl-37 than Cl-35.
   E) Chlorine contains almost exclusively of Cl-37 with very little Cl-35.

2. What is the average mass, in grams, of one potassium atom?
   A) 5.14×10^{-23} g
   B) 6.49×10^{-23} g
   C) 6.02×10^{-18} g
   D) 31.0 g
   E) 39.1 g

3. The mass of 1.21×10^{20} atoms of sulfur is
   A) 3.88×10^{21} g
   B) 2.00 mg
   C) 32.06 g
   D) 6.44 mg
   E) 2.00×10^{-4} g

4. If 0.274 moles of a substance weighs 62.5 g, what is the molar mass of the substance, in units of g/mol?
   A) 2.28×10^{2} g/mol
   B) 1.71×10^{1} g/mol
   C) 4.38×10^{-3} g/mol
   D) 2.17×10^{2} g/mol
   E) none of these

5. How many silicon atoms are there in 1.00 g of silicon?
   A) 1 atom
   B) 0.0356 atoms
   C) 2.57×10^{23} atoms
   D) 2.14×10^{22} atoms
   E) 1.75×10^{25} atoms

6. Determine the number of moles of aluminum in 96.7 g of Al.
   A) 0.279 mol
   B) 3.58 mol
   C) 7.43 mol
   D) 4.21 mol
   E) 6.02×10^{23} mol

7. A gold wire has a diameter of 1.00 mm. What length of this wire contains exactly 1.00 mol of gold? (density of Au = 17.0 g/cm^3)
   A) 2630 m
   B) 3.69 m
   C) 251 m
   D) 14.8 m
   E) 62.7 m

8. How many sulfur atoms are there in 21.0 g of Al_2S_3?
   A) 8.42×10^{22} atoms
   B) 2.53×10^{23} atoms
   C) 2.14×10^{23} atoms
   D) 6.02×10^{23} atoms
   E) 6.30×10^{26} atoms

9. How many moles of O atoms are in 25.7 g of $CaSO_4$?
   A) 0.189 mol
   B) 0.755 mol
   C) 4.00 mol
   D) 1.14×10^{23} mol
   E) 4.55×10^{23} mol

10. What is the mass of 0.20 mole of C_2H_6O (ethanol)?
   A) 230 g
   B) 46 g
   C) 23 g
   D) 4.6 g
   E) None of these.

SHORT ANSWER: Answer the following questions.

11. A sample of hydrogen cyanide HCN, contains 3.33×10^{22} atoms. How many moles of hydrogen cyanide are in the sample? **[3 marks]**

12. Aluminum oxide Al_2O_3 forms a thin coating on aluminum when aluminum is exposed to the oxygen in the air. Consider a sample made up of 1.17mol of aluminum oxide. **[6 marks]**

    a. How many molecules are in the sample?

    b. How many atoms are in the sample?

    c. How many oxygen atoms are in the sample?

13. Fill in the missing values: **[18 marks]**

Compound	Number of Molecules	Mole (mol)	Molar Mass (g/mol)	Mass (g)
NH_3		2.00		
$C_6H_{12}O_6$				85.0
$K_2Cr_2O_7$		1.50		
$Fe_2(SO_4)_3$				62.0
$SrSO_4$		3.00		
Al_2O_3	7.71×10^{24}			

14. The two stable isotopes of boron exist in the following proportions: 19.78% Boron-10 (10.01u) and 80.22% Boron-11 (11.01u). Calculate the average atomic mass of boron. **[2 marks]**

15. Naturally occurring silver has two isotopes Ag-107 with an atomic mass of 106.9u and a relative abundance of 51.8% and Ag-109, with an atomic mass of 108.9u and a relative abundance of 48.2%. Calculate the average atomic mass of silver. **[2 marks]**

16. Potassium exists as two naturally occurring isotopes: K-39 and K-41. These isotopes have atomic masses of 39.0 u and 41.0 u respectively. If the average atomic mass of potassium is 39.10 u, calculate the relative abundance of each isotope. **[4 marks]**

17. A sample of a compound is analyzed and found to contain 0.90g of calcium and 1.60g of chlorine. The sample has a mass of 2.50g. Find the percentage composition of the compound. **[2 marks]**

18. Potassium nitrate KNO_3 is used to make fireworks. What is the mass percent of oxygen KNO_3? **[2 marks]**