G11 Chemistry: Class 7 Homework

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

1. What is the molar mass of acetaminophen, $C_8H_9NO_2$?
   A) 43 g/mol
   B) 76 g/mol
   C) 151 g/mol
   D) 162 g/mol
   E) 125 g/mol

2. The molecular formula of aspirin is $C_9H_8O_4$. How many aspirin molecules are present in one 500-milligram tablet?
   A) 2.77 molecules
   B) 2.77×10^{-3} molecules
   C) 1.67×10^{24} molecules
   D) 1.67×10^{21} molecules
   E) None of these is correct.

3. How many sodium atoms are there in 6.0 g of Na_3N?
   A) 3.6×10^{24} atoms
   B) 4.6×10^{22} atoms
   C) 1.3×10^{23} atoms
   D) 0.217 atoms
   E) 0.072 atoms

4. The empirical formula of a compound of uranium and fluorine that is composed of 67.6% uranium and 32.4% fluorine is
   A) U_2F
   B) U_3F_4
   C) UF_4
   D) UF_6
   E) UF_8

5. The percent composition by mass of a compound is 76.0% C, 12.8% H, and 11.2% O. The molar mass of this compound is 284.5 g/mol. What is the molecular formula of the compound?
   A) $C_{10}H_6O$
   B) $C_9H_{18}O$
   C) $C_{16}H_{28}O_4$
   D) $C_{20}H_{12}O_2$
   E) $C_{18}H_{36}O_2$

6. A compound was discovered whose composition by mass is 85.6% C and 14.4% H. Which of the following could be the molecular formula of this compound?
   A) CH_4
   B) C_2H_4
   C) C_3H_4
   D) C_2H_6
   E) C_3H_8

7. An organic thiol compound is 38.66% C, 9.73% H, and 51.61% S by mass. What is the empirical formula of this compound?
   A) C_2H_6S
   B) C_3H_8S
   C) $C_4H_{10}S$
   D) $C_4H_{12}S$
   E) $C_5H_{14}S$

8. What is the coefficient of H_2O when the following equation is properly balanced with smallest set of whole numbers?

$$\_\_\_\ Al_4C_3 + \_\_\_\ H_2O \rightarrow \_\_\_\ Al(OH)_3 + \_\_\_\ CH_4$$

   A) 3
   B) 4
   C) 6
   D) 12
   E) 24

9. What is the coefficient preceding O_2 when the following combustion reaction of a fatty acid is properly balanced using the smallest set of whole numbers?

$$\_\_\ C_{18}H_{36}O_2 + \_\_\ O_2 \rightarrow \_\_\ CO_2 + \_\_\ H_2O$$

   A) 1
   B) 8
   C) 9
   D) 26
   E) 27

10. The percent composition by mass of an unknown chlorinated hydrocarbon was found to be 37.83% C, 6.35% H, and 55.83% Cl by mass. What is the empirical formula of this compound?
   A) C_2H_4Cl
   B) C_3H_7Cl
   C) $C_3H_6Cl_2$
   D) C_4H_9Cl
   E) $C_5H_{11}Cl$

SHORT ANSWER: Answer the following questions.

1. What is the empirical formula of a compound that is 15.9% boron and 84.1% fluorine? **[3 marks]**

2. Muscle soreness from physical activity is caused by a buildup of lactic acid in muscle tissue. Analysis of lactic acid reveals it to be 40.0% carbon, 6.71% hydrogen, and 53.3% oxygen by mass. Calculate the empirical formula of lactic acid. **[4 marks]**

3. The empirical formula of codeine is $C_{18}H_{21}NO_3$. If the molar mass is 299g/mol, what is its molecular formula? **[1 mark]**

4. The empirical formula of butane, the fuel used in disposable lighters, is C_2H_5. In an experiment, the molar mass of butane was determined to be 58 g/mol. What is the molecular formula of butane? **[2 marks]**

5. A 0.539 g sample of a compound that contained only carbon and hydrogen was subjected to combustion analysis. The combustion produced 1.64 g of carbon dioxide and 0.807 g of water. Calculate the percentage composition and the empirical formula of the sample. **[5 marks]**

6. A 3.34 g sample of a hydrate has the formula $SrS_2O_3 \cdot xH_2O$, and contains 2.30 g of SrS_2O_3. Find the value of *x*. **[4 marks]**

7. 0.487 grams of quinine (molar mass = 324 g/mol) is combusted and found to produce 1.321 g CO_2, 0.325 g H_2O and 0.0421 g nitrogen. Determine the empirical and molecular formulas. **[5 marks]**