

Hon. Chemistry Worksheet 2

Stoichiometry and Percent Composition Practice

hcstoihprac10.doc

Name _____

Date _____ Period _____

1. Silicon is found in nature combined with oxygen to give sand, quartz, agate and similar materials. The element has three stable isotopes.

Exact Mass Relative abundance (%)

27.97693	92.23
28.97649	4.67
29.97376	3.10

Calculate the average atomic weight of silicon from the data above.

Answer _____ amu

2. Antimony, one of the elements known to the ancient alchemists, has two stable isotopes: ^{121}Sb (mass 120.90) and ^{123}Sb (mass, 122.90). Calculate the relative abundances of the two isotopes.

Answer:

^{121}Sb _____ %

^{123}Sb _____ %

3. Calculate the number of moles represented by each of the following:

a. 127.08g of Cu _____ mol

b. 20.0g of calcium _____ mol

c. 0.012g of potassium _____ mol

4. Calculate the number of grams in each of the following:

a. 0.10 mol iron _____ g

b. 2.31 mol Si _____ g

c. 0.0023 mol carbon _____ g

5. Black gunpowder contains several chemicals, among them sulfur and carbon. A typical powder is about 10.09% S (by mass) and 14.29% C. If you have 1.00 pound (454g) of gunpowder, how many grams of sulfur and how many grams of carbon are present? How many moles of each?

a. grams of S _____ g moles of S _____ mol

b. grams of C _____ g moles of C _____ mol

6. Determine the mass of one copper atom?

Answer _____ g

7. The average mass of one gold atom in a sample of naturally occurring gold is 3.2702×10^{-22} g. What is the molar mass of gold?

Answer _____ g/mol

8. Calculate the molar mass:

a. Fe_2O_3 , iron(III)oxide

_____ g/mol

b. N_2O , dinitrogen monoxide (laughing gas)

_____ g/mol

c. $\text{MnCl}_2 \cdot 4\text{H}_2\text{O}$, manganese(II)chloride tetrahydrate

_____ g/mol

9. Calculate the number of moles in 1.00g of each compound.

a. CH_3OH , methyl alcohol

_____ mol

b. Cl_2CO , phosgene, a poisonous gas

_____ mol

c. $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$, magnesium sulfate heptahydrate (Epsom salt)

_____ mol

10. Tin(II)fluoride is used in some brands of toothpaste to prevent tooth decay.

a. How many moles of SnF_2 are there in 0.050g of SnF_2 ?

Answer _____ mol

b. How many F^- ions and how many Sn^{2+} ions are present in 0.050g

Answer _____ F^- ions

Answer _____ Sn^{2+} ions

11. Arrange the following in order of increasing mass (label 1 to 5 in the blanks)

a. 3.0×10^{23} molecules of C_4H_{10} _____

b. 1 penny (about 3 grams) _____

c. 6.0×10^{23} molecules of CO _____

d. 1.0 mol of B_2H_6 _____

e. 1 molecule of N_2 _____

12. An Alka-Seltzer® tablet contains 324mg of aspirin ($\text{C}_9\text{H}_8\text{O}_4$), 1904mg of sodium bicarbonate (NaHCO_3), and 1,000. mg of citric acid ($\text{C}_6\text{H}_8\text{O}_7$). The last two compounds react with each other to provide the "fizz" bubbles of CO_2 when the tablet is dissolved in water.

a. Calculate the number of moles of each substance in the tablet.

Answer _____ mol aspirin

Answer _____ mol sodium bicarbonate

Answer _____ mol citric acid

b. If you take one tablet, how many molecules of aspirin are you consuming?

Answer _____ molecules of aspirin

13. Boron hydrides, compounds containing only boron and hydrogen, form a large class of compounds. One consists of 78.3% B and 21.7% H. Its molar mass is 27.6g/mol. What are the empirical and molecular formulas for this compound?

Empirical formula _____

Molecular formula _____

14. Compounds consisting of carbon, hydrogen, and metals are called "organometallic" compounds. One of the best known is called "ferrocene", a molecule containing C, H, and Fe. If 0.652g of ferrocene is burned in oxygen, 1.542g of CO_2 and 0.315g of H_2O are produced. The iron is converted to Fe_2O_3 . What is the empirical formula of ferrocene and what is its empirical formula weight?

Empirical formula _____

Empirical mass _____ g/mol