

## Chapters 6 &amp; 7 Study Questions

- Glycerol ( $C_3H_8O_3$ ) is sold in drug stores as glycerine and is commonly found in soaps and shampoos.
  - What is the molar mass of glycerol?
  - What is the mass in grams of 1.00 mole of glycerol?
  - How many molecules are in one mole of glycerol?
  - How many grams are in 0.217 moles of glycerol?
  - How many moles are in 783 grams of glycerol?
- Ammonia ( $NH_3$ ) is the active ingredient in many kitchen cleansers. How many atoms are in
  - one molecule of ammonia?
  - one mole of ammonia?
  - 3.40 grams of ammonia?
- Sodium nitrite is a controversial food preservative added to processed meat and thought to form cancer-causing compounds when heated. What are the mass percentages of each element in sodium nitrite?
- A compound consists of 40.7% C, 5.1% H, and 54.2% O?
  - What is its empirical formula?
  - The molar mass of this compound is 118 grams/mole. What is the molecular formula of this compound?
- A 25.0 gram sample of a compound made up of magnesium, carbon and oxygen contains 7.20 grams magnesium and 3.55 grams carbon.
  - Find the empirical formula of this compound.
  - Find the mass percentage of each element in this compound.
  - What is the mass of magnesium in a 13.9 gram sample of this compound?
  - What is the mass of this compound that contains 0.290 moles of carbon?
- Describe three observations that frequently accompany chemical reactions and explain why they might indicate that a chemical reaction is occurring.
- Balance the following equations:
  - the reaction between iron and oxygen to form iron(III) oxide,
$$Fe(s) + O_2(g) \rightarrow Fe_2O_3(s)$$
  - the combustion of the rocket fuel diborane,
$$B_2H_6(l) + O_2(g) \rightarrow B_2O_3(s) + H_2O(l)$$
  - the combustion of the poisonous gas,  $PH_3$ ,
$$PH_3(g) + O_2(g) \rightarrow H_2O(l) + P_4O_{10}(s)$$
- In the balanced equation for 7c above
  - What are the reactants?
  - What are the products?
  - What is the coefficient for water?

9. Write a balanced equation for each of the following reactions:
- the reaction of lithium with nitrogen gas to form lithium nitride.
  - the reaction of propane ( $C_3H_8$ ) gas with oxygen to form carbon dioxide and water.
10. A sample of zinc is heated in air to form zinc oxide. Assuming all of the zinc is converted to the oxide, use the data table below to calculate the empirical formula of zinc oxide.
- |  |           |
|--|-----------|
| mass of crucible                         | = 32.00 g |
| mass of crucible + zinc (before heating) | = 33.64 g |
| mass of crucible + oxide (after heating) | = 34.04 g |

### Summary of Chapter 6: Chemical Composition

atomic mass

mole

Avogadro's number

molar mass (molecular mass, formula weight)

calculations: # particles  $\leftrightarrow$  moles  $\leftrightarrow$  mass

percent composition (mass percent)

empirical formula

molecular formula

percent composition  $\leftrightarrow$  empirical formula

finding molecular formula from empirical formula and molar mass

empirical formula from experimental data

### Summary of Chapter 7: Introduction to Chemical Reactions

chemical reactions

chemical equations

reactants, products

coefficients

writing and balancing chemical equations