Chapter 7 Practice

7.1 Formula Mass and Percent Composition

1. Calculate the formula mass for $BaSO_4$.

2. What is the percent by mass of oxygen in sodium nitrate?

7.2 Connecting Atomic Mass to Large-Scale Mass: The Mole Concept

3. Convert the following from grams to moles:
   a. 3.21 grams Fe b. 50.34 grams CS_2

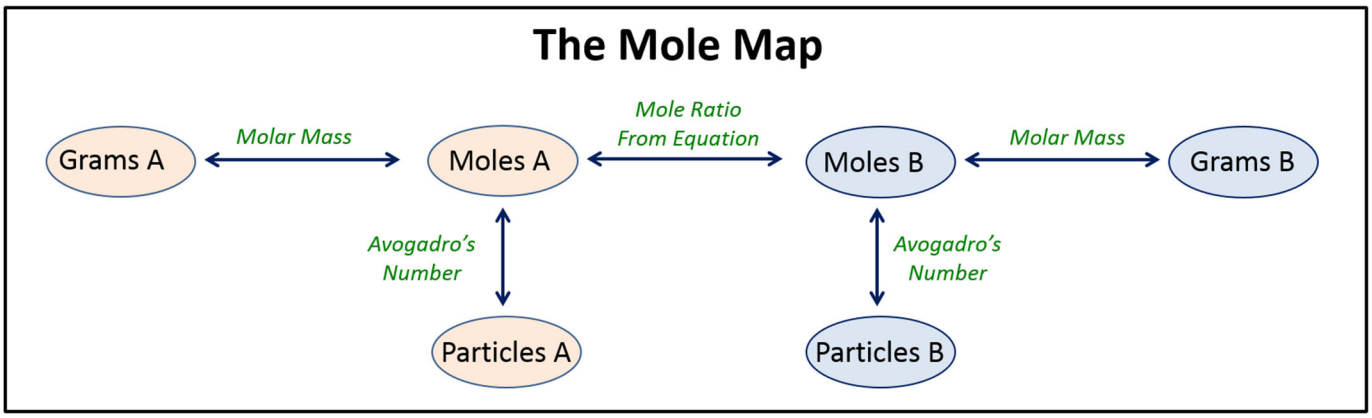
4. Convert the following from moles to grams:
   a. 7.39 moles Cu b. 4.35 moles $MgCl_2$

5. Convert the following from particles to moles:
   a. 5.93×10^{26} zinc atoms b. 6.92×10^{22} CO_2 molecules

6. Find the number of atoms in each of the following:
   a. 55.3 moles of titanium b. 3.13 moles of helium

7. How many atoms are in a 5.05-gram sample of iron?

7.3 The Mole Concept in Balanced Equations



8. Consider the following generic reaction: **3 A + B → 2 C**
   If a chemist carries out this reaction using 11.0 moles of **A**,
   a. how many moles of **B** are needed?
   b. how many moles of **C** can form?

9. Potassium metal reacts with water according to the balanced equation shown: **$2\ K + 2\ H_2O \rightarrow 2\ KOH + H_2$**

   a. If one mole of potassium reacts in this manner, how many moles of water are consumed?
   b. If one mole of potassium reacts in this manner, how many moles of H_2 will form?
   c. How many moles of potassium are required to produce 14.0 moles of H_2?
   d. How many moles of KOH would be produced if 3,014.2 moles of H_2O are consumed?

10. Copper(I) bromide reacts with magnesium metal: **$2\ CuBr + Mg \rightarrow 2\ Cu + MgBr_2$**
    If 0.253 moles of magnesium react in this way,

    a. how many grams of CuBr are consumed?
    b. how many grams of Cu are produced?
    c. how many grams of $MgBr_2$ are produced?

11. Consider the following generic reaction: **3 A + B → C + D**
    A chemist carries out this reaction using 8.0 moles of **A** and 3.0 moles of **B**.

    a. What is the limiting reagent in the reaction?
    b. How many moles of C can form from this reaction?

12. Potassium reacts aggressively with water, as shown in this equation: **$2\ K + 2\ H_2O \rightarrow 2\ KOH + H_2$**
    If 0.200 grams of potassium are added to 15.0 grams of water, what mass of KOH can form in this reaction?

7.4 Theoretical and Percent Yield

13. A chemist carries out the following reaction: **$C_6H_6 + Br_2 \rightarrow C_6H_5Br + HBr$**

    a. If he reacts 14.2 grams of C_6H_6 with an excess of Br_2, what is the theoretical yield of C_6H_5Br?
    b. If he isolated 16.3 grams of C_6H_5Br, what is his percent yield for this reaction?