Name _____ Section _____ Date _____

8B Chemical Reactions
Extra Practice Problems

Chemical Equations

In past worksheets you have learned that chemists use formulas to represent compounds. Similarly, they use equations to represent chemical reactions. Several examples of equation writing and balancing will be shown here, and you will write equations on your own.

Example A

Write a balanced equation representing the reaction of magnesium with oxygen gas to produce magnesium oxide. *7.4*

Solution We first write the symbols for the elements Mg and O_2 on the left side of the arrow. (Recall from the text that oxygen gas is diatomic.) These are called the reactants.

$$Mg + O_2 \rightarrow$$

Next we add the formula for the product to the right of the arrow. Magnesium is in column 2A on the periodic table and has a +2 charge, and oxygen is in column 6A and has a −2 charge. They combine in a 1:1 ratio to form MgO.

$$Mg + O_2 \rightarrow MgO$$

A chemical equation must obey the Law of Conservation of Mass. Both sides must contain equal numbers of atoms of each element. Right now we have two oxygen atoms on the left side of the equation, while on the right there is only one. Thus the equation is not yet balanced and is referred to as a skeleton equation. In order to balance it we need to add an oxygen atom to the right. Unfortunately, the oxygen atom on the right is contained in a formula unit of MgO. If we want to add an O, we will have to add an entire MgO unit. We do this by placing a "2" in front of the formula MgO on the right.

$$Mg + O_2 \rightarrow 2MgO$$

This 2 is called a coefficient. We can balance equations only by changing coefficients, never by changing subscripts, such as the 2 in O_2. (Recall that changing subscripts in a compound's formula changes the very structure of that compound and thus changes the entire meaning of the equation.) Now we have two oxygen atoms on each side of the equation, and the oxygen is thus balanced. By doing this, we have unbalanced the magnesium. We now have two Mg atoms on the right and only 1 on the left. So we must place a 2 in front of the Mg on the left.

$$2Mg + O_2 \rightarrow 2MgO$$

The equation now contains two atoms of magnesium and two atoms of oxygen on each side of the arrow. The equation is balanced.

You Try It

1. Write the equation for the reaction that occurs between aluminum and fluorine. *7.4*

Your Solution

Example B

Write the equation for the production of oxygen gas and potassium chloride from the breakdown of potassium chlorate. *7.4*

Solution First determine the formulas for the reactant and products and write them in their proper positions to form a skeleton equation.

$$KClO_3 \rightarrow KCl + O_2$$

Next note that the number of oxygen atoms is not equal on both sides. Since we have an odd number on the left and an even number on the right, we use the lowest common multiple—6. We need 2 $KClO_3$'s and 3 O_2's to give 6 oxygen atoms on each side.

$$2KClO_3 \rightarrow KCl + 3O_2$$

Now we have 2 K's and 2 Cl's on the left, but only 1 of each on the right. To put 2 of each on both sides, we place a 2 in front of the KCl.

$$2KClO_3 \rightarrow 2KCl + 3O_2$$

Two K's, 2 Cl's, and 6 O's on each side show that this equation is balanced.

You Try It

2. Write the equation for the reaction between hydrochloric acid and calcium metal. The products are hydrogen gas and calcium chloride. *7.4*

Your Solution

Problems For You To Try

3. Write the equation for the reaction that occurs when a solution of silver nitrate reacts with copper metal to produce silver metal and copper nitrate. *7.4*

4. Write the equation for the burning of propane (C_3H_8) in the presence of oxygen to produce carbon dioxide and water vapor. *7.4*

5. Write the equation describing the reaction between iron(III) chloride and sodium hydroxide. The products are iron(III) hydroxide and sodium chloride. *7.4*