

7C**Chemical Reactions****Extra Practice Problems****Types of Chemical Reactions**

This worksheet will take you through the five types of chemical reactions described in the text. The first and simplest type is a combination reaction. This type occurs when two or more substances react to form a single substance.

The opposite of the combination reaction is decomposition. In this reaction, a single compound is broken down into two or more simpler products. This type of reaction typically requires some form of energy, usually heat.

The next type of chemical reaction is the single replacement reaction. In this type, atoms of an element replace the atoms of a second element in a compound. You may need to refer to Table 7-2 on page 155 of your text to determine which metal is the most active one in the given reaction. Remember that the halogens have their own activity series, decreasing as you go down the periodic table.

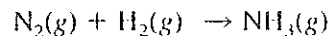
A double replacement reaction involves an exchange of positive ions between two compounds. The reactants are two ionic compounds in aqueous solution.

The fifth type of chemical reaction is combustion. In this type of reaction, oxygen reacts with another substance, producing energy in the form of heat and light.

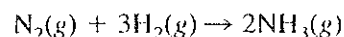
Example A

Write the equation for the combination of nitrogen and hydrogen to form ammonia, NH_3 . 7-3

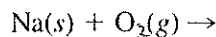
Solution The two elements combine (as reactants) to form the single product, NH_3 . The skeleton equation for this reaction is as follows.



Add coefficients as needed to balance the equation.

**You Try It**

1. Complete and balance the equation for the following combination reaction. 7-3

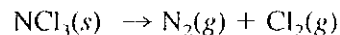


Your Solution

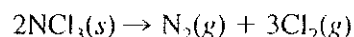
Example B

Write the equation for the decomposition of nitrogen trichloride. 7-4

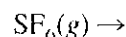
Solution The compound NCl_3 breaks down (decomposes) to form the products, N_2 and Cl_2 . The skeleton equation is thus:



Then, to balance the equation, add coefficients as needed.

**You Try It**

2. Complete and balance the equation for the following decomposition reaction. 7-4



Your Solution

Example C

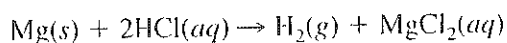
Write the balanced chemical equation for the single replacement reaction involving magnesium metal and hydrochloric acid.

7·5

Solution The magnesium metal is more active than hydrogen on the activity series (Table 7·2). Thus magnesium will replace hydrogen in the compound.



A 2 is needed in front of the HCl to balance the equation.



You Try It

3. Write the balanced equation for this single replacement reaction:

7·5



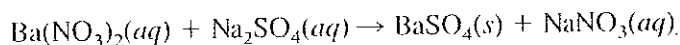
Your Solution

Example D

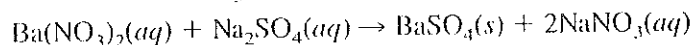
Write the balanced chemical equation for the double replacement reaction involving barium nitrate and sodium sulfate.

7·6

Solution The barium and sodium ions will exchange places.



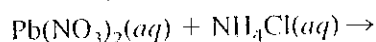
A 2 is needed in front of the NaNO₃ to balance atoms.



You Try It

4. Write the balanced equation for this double replacement reaction:

7·6



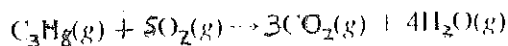
Your Solution

Example E

Write the balanced chemical equation for the combustion of propane, C₃H₈.

7·7

Solution Combustion means combining with oxygen. The products of complete combustion are carbon dioxide and water vapor. Thus:



You Try It

5. Write the equation for the burning (combustion) of hexane, C₆H₁₄.

7·7

Your Solution

Problems For You To Try

6. Write the equation for the combination reaction which produces aluminum hydroxide from aluminum oxide and water. 7·3
7. Write the equation for the decomposition of iron (III) oxide. 7·4
8. Write the equation for the single replacement reaction involving zinc and tin (II) chloride. 7·5
9. Write the equation for the single replacement reaction involving fluorine and potassium iodide. 7·5
10. Write the equation for the double replacement reaction involving copper (II) nitrate and sodium sulfide. 7·6
11. Complete (where necessary) and balance the following reactions. Then determine the reaction type for each. Use C for combination, D for decomposition, SR for single replacement, DR for double replacement, and COMB for combustion reactions. Write the letters in the space at the right. 7·8
- a. chlorine + potassium iodide → _____
- b. $\text{Al(OH)}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{Al}_2(\text{SO}_4)_3 + \text{H}_2\text{O}$ _____
- c. $\text{C}_2\text{H}_4 + \text{O}_2 \rightarrow$ _____

d. silver + sulfur \rightarrow silver sulfide

e. $\text{Al} + \text{Fe}_2\text{O}_3 \rightarrow \text{Fe} + \text{Al}_2\text{O}_3$

f. mercury(II) oxide \rightarrow mercury + oxygen

g. potassium chloride + silver nitrate \rightarrow

h. $\text{Ca} + \text{HCl} \rightarrow$

i. $\text{C}_2\text{H}_5\text{OH} + \text{O}_2$

j. hydrogen + $\text{Fe}_3\text{O}_4 \rightarrow$ iron + steam

k. carbon + oxygen \rightarrow carbon monoxide

l. $\text{Al}_2(\text{SO}_4)_3 + \text{Ca}(\text{OH})_2 \rightarrow$ aluminum hydroxide + CaSO_4
