

TYPES OF CHEMICAL REACTIONS

Section Review

Objectives

- Describe the five general types of reactions
- Predict the products of the five general types of reactions

Vocabulary

- combination reaction
- decomposition reaction
- single-replacement reaction
- activity series
- double-replacement reaction
- combustion reaction

Part A Completion

Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.

- It is possible to _____ the products of some chemical reactions. In order to do this, you must be able to recognize at least _____ five general types of reactions. For example, in a _____ reaction, the reactants are two or more _____ and/or compounds and there is always a _____ product. In a _____ reaction, a single compound is broken down into two or more simpler substances.
- In a _____ reaction, the reactants and products are an element and a compound. The _____ can be used to predict whether most single-replacement reactions will take place.
- A _____ reaction involves the exchange of ions between two compounds. This reaction generally takes place between two ionic compounds in _____ solution. One of the reactants in a combustion reaction is _____ 10. The products of the complete combustion of a hydrocarbon are _____ 11 and _____ 12.

Part B True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

- In a decomposition reaction, there is a single reactant.
- The activity series of metals can be used to predict products in double-replacement reactions.
- Carbon dioxide and water are the products of the combustion of hexane (C₆H₁₄).
- A nonmetal can replace another nonmetal from a compound in a single-replacement reaction.
- One of the products of a double-replacement reaction is a gas that bubbles out of the mixture.

Part C Matching

Match each description in Column B to the correct term in Column A.

Column A

- combination reaction
- decomposition reaction
- single-replacement reaction
- combustion reaction

Column B

- reaction in which atoms of one element replace atoms of a second element in a compound
- a reaction in which two or more substances combine to form a single substance
- reaction of a compound with oxygen to produce energy
- reaction in which a single compound is broken down into two or more products

Part D Questions and Problems

Answer the following in the space provided.

- Identify the type of each of the following reactions.
 - $2C_8H_{18}(l) + 19O_2(g) \rightarrow 12CO_2(g) + 14H_2O(g)$
 - $2Fe(s) + 3Br_2(l) \rightarrow 2FeBr_3(s)$
- Complete and balance the following equation. What must be true of one of the products?

$$Li_3PO_4 + Zn(NO_3)_2 \rightarrow$$

Name _____
Date _____

Balancing Chemical Equations

Balance the equations below:

- $\text{N}_2 + \text{H}_2 \rightarrow \text{NH}_3$
- $\text{KClO}_3 \rightarrow \text{KCl} + \text{O}_2$
- $\text{NaCl} + \text{F}_2 \rightarrow \text{NaF} + \text{Cl}_2$
- $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$
- $\text{Pb}(\text{OH})_2 + \text{HCl} \rightarrow \text{H}_2\text{O} + \text{PbCl}_2$
- $\text{AlBr}_3 + \text{K}_2\text{SO}_4 \rightarrow \text{KBr} + \text{Al}_2(\text{SO}_4)_3$
- $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
- $\text{C}_3\text{H}_8 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
- $\text{C}_6\text{H}_{18} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
- $\text{FeCl}_3 + \text{NaOH} \rightarrow \text{Fe}(\text{OH})_3 + \text{NaCl}$
- $\text{P} + \text{O}_2 \rightarrow \text{P}_2\text{O}_5$
- $\text{Na} + \text{H}_2\text{O} \rightarrow \text{NaOH} + \text{H}_2$
- $\text{Ag}_2\text{O} \rightarrow \text{Ag} + \text{O}_2$
- $\text{S}_8 + \text{O}_2 \rightarrow \text{SO}_3$
- $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$
- $\text{K} + \text{MgBr} \rightarrow \text{KBr} + \text{Mg}$
- $\text{HCl} + \text{CaCO}_3 \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$
- $\text{HNO}_3 + \text{NaHCO}_3 \rightarrow \text{NaNO}_3 + \text{H}_2\text{O} + \text{CO}_2$
- $\text{H}_2\text{O} + \text{O}_2 \rightarrow \text{H}_2\text{O}_2$
- $\text{NaBr} + \text{CaF}_2 \rightarrow \text{NaF} + \text{CaBr}_2$
- $\text{H}_2\text{SO}_4 + \text{NaNO}_2 \rightarrow \text{HNO}_2 + \text{Na}_2\text{SO}_4$

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Name _____ Class _____ Date _____
Chapter 8 Using Science Skills: Classifying chemical reactions

Identifying and Balancing Chemical Equations

Identify each of the equations below as synthesis, decomposition, single replacement, or double replacement.

- $\text{HgO} \rightarrow \text{Hg} + \text{O}_2$
- $\text{NaCl} + \text{AgNO}_3 \rightarrow \text{NaNO}_3 + \text{AgCl}$
- $\text{Mg} + \text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$
- $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2$
- $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
- $\text{Al}_2(\text{SO}_4)_3 + \text{Ca}(\text{OH})_2 \rightarrow \text{Al}(\text{OH})_3 + \text{CaSO}_4$
- $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$
- $\text{Cl}_2 + \text{NaBr} \rightarrow \text{NaCl} + \text{Br}_2$
- $\text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu}$
- $\text{KClO}_3 \rightarrow \text{KCl} + \text{O}_2$
- $\text{H}_2\text{O} + \text{Fe} \rightarrow \text{Fe}_2\text{O}_3 + \text{H}_2$
- $\text{Ca}(\text{OH})_2 + \text{HNO}_3 \rightarrow \text{Ca}(\text{NO}_3)_2 + \text{H}_2\text{O}$
- $\text{Na}_2\text{O} + \text{CO}_2 \rightarrow \text{Na}_2\text{CO}_3$
- $\text{H}_2 + \text{N}_2 \rightarrow \text{NH}_3$

Balance the following chemical equations.

- $\text{HgO} + \text{Cl}_2 \rightarrow \text{HgCl}_2 + \text{O}_2$
- $\text{Na} + \text{Br}_2 \rightarrow \text{NaBr}$
- $\text{KClO}_3 \rightarrow \text{KCl} + \text{O}_2$
- $\text{Ca}(\text{OH})_2 + \text{HNO}_3 \rightarrow \text{Ca}(\text{NO}_3)_2 + \text{H}_2\text{O}$
- $\text{Al}_2\text{O}_3 \rightarrow \text{Al} + \text{O}_2$
- $\text{CuCl}_2 + \text{H}_2\text{S} \rightarrow \text{CuS} + \text{HCl}$
- $\text{Cl}_2 + \text{NaBr} \rightarrow \text{NaCl} + \text{Br}_2$
- $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
- $\text{Na}_2\text{O} + \text{CO}_2 \rightarrow \text{Na}_2\text{CO}_3$
- $\text{H}_2\text{O} + \text{Fe} \rightarrow \text{Fe}_2\text{O}_3 + \text{H}_2$

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