

Chapter 11:Chemical Reactions

Section 11.1:Describing Chemical Reactions

Section 11.2:Types of Chemical Reactions

Section 11.3:Reactions in an Aqueous Solution

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VOCABULARY

- activity series
- balanced equation
- catalyst
- chemical equation
- coefficients
- combustion reaction
- combination reaction
- complete ionic equation
- decomposition reaction
- double displacement reaction
- net ionic equation
- single replacement reaction
- skeleton equation
- spectator ion

Section 11.1:Describing Chemical Reactions

Word Equations

Iron reacts with oxygen to produce iron (III) oxide

reactants \longrightarrow products

iron + oxygen \longrightarrow iron (III) oxide

Write the **names** of the reactants to the left of an arrow separated by plus signs, write the names of the products to the right of an arrow separated by plus signs.

Chemical Equations

$\text{Fe (s)} + \text{O}_2 \text{ (g)} \longrightarrow \text{Fe}_2\text{O}_3 \text{ (s)}$ 'skeleton equation'

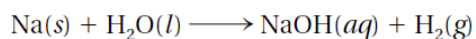
Write the **formula** of the reactants to the left of the yields sign (arrow) and the formula of the products to the right.

Symbols Used in Chemical Equations

Symbol	Explanation
+	Used to separate two reactants or two products
\longrightarrow	"Yields," separates reactants from products
\rightleftharpoons	Used in place of \longrightarrow for reversible reactions
(s)	Designates a reactant or product in the solid state; placed after the formula
(l)	Designates a reactant or product in the liquid state; placed after the formula
(g)	Designates a reactant or product in the gaseous state; placed after the formula
(aq)	Designates an aqueous solution; the substance is dissolved in water; placed after the formula
$\xrightarrow[\text{heat}]{\Delta}$	Indicates that heat is supplied to the reaction
$\xrightarrow{\text{Pt}}$	A formula written above or below the yield sign indicates its use as a catalyst (in this example, platinum).

Practice Problems

1. Write a sentence that describes this chemical reaction.



2. Sulfur burns in oxygen to form sulfur dioxide. Write a skeleton equation for this chemical reaction. Include appropriate symbols from Table 11.1.

Practice Problems

3. Balance each equation.
 - a. $\text{AgNO}_3 + \text{H}_2\text{S} \longrightarrow \text{Ag}_2\text{S} + \text{HNO}_3$
 - b. $\text{Zn}(\text{OH})_2 + \text{H}_3\text{PO}_4 \longrightarrow \text{Zn}_3(\text{PO}_4)_2 + \text{H}_2\text{O}$
4. Rewrite these word equations as balanced chemical equations.
 - a. hydrogen + sulfur \longrightarrow hydrogen sulfide
 - b. iron(III) chloride + calcium hydroxide \longrightarrow iron(III) hydroxide + calcium chloride
5. Balance each equation.
 - a. $\text{FeCl}_3 + \text{NaOH} \longrightarrow \text{Fe}(\text{OH})_3 + \text{NaCl}$
 - b. $\text{CS}_2 + \text{Cl}_2 \longrightarrow \text{CCl}_4 + \text{S}_2\text{Cl}_2$
6. Write and balance this equation.
calcium hydroxide + sulfuric acid \longrightarrow
calcium sulfate + water

Section 11.2: Types of Chemical Reactions

Section 11.3: Reactions in an Aqueous Solution