

# 3 • What Happens When Chemicals Are Put Together?

## STUDY LIST

### What Happens When Fuels Burn?

I can...

- state that burning is called combustion
- write the reactants and products for a complete combustion reaction of a hydrocarbon fuel
- balance combustion equations
- include “heat” as a product of combustion

### How Do We Symbolize A Chemical Reaction?

I can...

- define and give examples of “reactants,” “products,” and “coefficients”
- explain the difference between a chemical reaction and a chemical equation
- write a chemical equation given a word equation for a chemical reaction
- balance chemical equations making certain that each side of the equation has the same number and kind of atoms
- explain that chemical equations are balanced because the number and kind of atoms do not change during a chemical reaction, they are merely rearranged. Mass is conserved.
- use the symbols (s), (l), (g), and (aq) to describe the reactants and products

(s)	solid
(l)	liquid, melted, “molten”
(g)	gas
(aq)	“aqueous”, dissolved in water

### Can We Classify Reactions?

I can...

- state four types of chemical reactions (besides combustion) and show their patterns:  
 double replacement     $(XY + AB \rightarrow XB + AY)$   
 single replacement      $(XY + A \rightarrow AY + X)$   
 synthesis                     $(X + Y \rightarrow XY)$   
 decomposition             $(XY \rightarrow X + Y)$
- match actual chemical equations to these four types and combustion

- make, collect, and identify three gases,  $H_2$ ,  $O_2$ , and  $CO_2$ . Additionally, I can classify the chemical reactions used to make and test these gases according to the four types studied in class.
- state that active metals and acids form  $H_2$  gas
- define “precipitate” as a solid product in a double replacement reaction
- write the molecular, ionic, and net ionic equations for a precipitation reaction
- identify “spectator ions” in a precipitation reaction
- use a solubility chart to predict whether an ionic compound is a precipitate

### What Are Ionic Compounds Made Of?

I can...

- define an ion as an atom or group of atoms with a charge
- state that a positive ion results when an atom loses electrons while a negative ion results when an atom gains electrons
- memorize 40 common ions so I can give the symbol and charge when given the name and vice versa
- state the charges of some ions because of their position on the periodic table
- write an ionic compound from any positive and negative ion
- use parentheses appropriately when writing compound that involve polyatomic ions
- use the terms “anion” for a negative ion and “cation” for a positive ion

### What is Oxidation-Reduction?

I can...

- state that oxidation means a chemical is losing electrons and reduction means a chemical is gaining electrons
- recognize oxidation and reduction given a chemical equation

## Are All Compounds Ionic?

I can...

- recognize molecular compounds formed between two non-metals
- name molecular compounds using the prefixes mono-, di-, tri-, tetra-, penta-, hexa-, hepta-, octa-, nona-, and deca-, etc.
- recognize acids as ionic compounds where the positive ion is  $H^+$
- name acids according to the ending of the negative ion

ending	acid name	example
ide	hydro___ic acid	HCl hydrochloric acid
ate	___ic acid	HClO <sub>3</sub> chloric acid

- add "ur" or "or" when sulfur or phosphorus are part of the ion

## What Is Stoichiometry?

I can...

- use the coefficients in a balanced as a conversion factor for calculations
- calculate the mass, volume, or number of particles of any substance in a chemical reaction given the mass, volume, or number of particles of any other substance in the chemical reaction
- identify the limiting reactant (the reactant that runs out first) when amounts of two reactants are mixed
- solve limiting reactant problems in which two given values are supplied