

Classifying Chemical Reactions

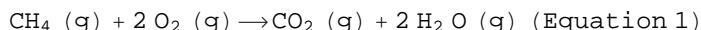
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Introduction

The power of chemical reactions to transform our lives is visible all around us--in our homes, in our cars, even in our bodies. Chemists try to make sense of the great variety of chemical reactions the same way that biologists organize their knowledge of life, by sorting reactions into groups and classifying them. Classifying chemical reactions allows us to predict what chemical reactions will occur when different substances are mixed.

Background

A chemical reaction is defined as any process in which one or more substances are converted into new substances with different properties. Chemical reactions change the identity of the reacting substance(s) and produce new substances. Observing the properties of the reactants and products is therefore a key step in identifying chemical reactions. Some of the observations that may be associated with a chemical reaction include: (1) release of a gas; (2) formation of a precipitate; (3) color changes; (4) temperature changes; (5) emission or absorption of light. As these observations suggest, chemical reactions can be dynamic and exciting events. The essence of any chemical reaction--reactions being transformed into products--is summarized in the form of a chemical equation. Consider the reaction represented by Equation 1, the burning of natural gas (methane, CH₄) in a Bunsen burner.



The reactants--or, more specifically, their formulas--are written on the left side of the equation, the products on the right side of the equation. An arrow represents the direction of the reaction and is read as "yields" or "produces." Other symbols are used to describe the physical state of the reactants and products and to describe the reaction conditions (see Table 1).

Table 1

Symbol	Translation	Mathematica Code
→	Yields or produces (separates reactants from products)	"-" ">" "space" ("esc" "-" "-" ">"
+	Reacts with or forms alongside	"+"
$\xrightarrow{\text{heat}}$	Reaction mixture is heated	"→" "control 7"
(s)	Pure substance (reactant or product) is a solid	typed
(l)	Pure substance (reactant or product) is a liquid	typed
(g)	Pure substance (reactant or product) is a gas	typed
(aq)	Aqueous solution (reactant or product is dissolved in water)	typed

Evidence of Chemical Change (from video)

[Click Here for Evidence of Chemical Change Video](#)

■ #1

■ #2

■ #3

■ #4

Directions

- Watch the video about the reaction type. Take notes in the correct section of the lab.
- Follow the directions for the chemical reactions at the station.
- Record your observations of the reaction
- Write the correct equation that describes the chemical reactions your saw
- Clean up the area so another group can use it

Combustion

[Click Here for Combustion Video](#)

■ Video Notes:

■ General Form of Reaction

■ Special notes about this type of reaction

■ Clues to recognizing this type of reaction

■ Example

■ Observations of chemical reaction #8

- **Balanced chemical equation for reaction #8**

Decomposition

[Click Here for Decomposition Video](#)

- **Video Notes:**
- **General Form of Reaction**

- **Special notes about this type of reaction**

- **Clues to recognizing this type of reaction**

- **Example**

- **Observations of chemical reaction #3**

- **Balanced chemical equation or reaction #3**

Single Displacement

[Click Here for Single Displacement Video](#)

- **Video Notes:**
- **General Form of Reaction**

- **Special notes about this type of reaction**

- Clues to recognizing this type of reaction

- Example

- Observations of chemical reaction #2

- Balanced chemical equation for reaction #2

- Observations of chemical reaction #5

- Balanced chemical equation for reaction #5

Double Displacement

- Video Notes:

[Click Here for Double Displacement Video](#)

- General Form of Reaction

- Special notes about this type of reaction

- Clues to recognizing this type of reaction

- Example

- Observations of chemical reaction #6

- Balanced chemical equation #6

Neutralization

[Click Here for Neutralization Video](#)

- Video Notes:

- General Form of Reaction

- Special notes about this type of reaction

- Clues to recognizing this type of reaction

- Example

- Observations of chemical reaction #4

- Balanced chemical equation #4

- Observations of chemical reaction #7

- **Balanced chemical equation #7**

Synthesis

[Click Here for Synthesis Video](#)

- **Video Notes:**
- **General Form of Reaction**

- **Special notes about this type of reaction**

- **Clues to recognizing this type of reaction**

- **Example**

- **Observations of chemical reaction #1**

- **Balanced chemical equation #1**