

Balancing Equations by Using Models

OBJECTIVE

Use models as a means for balancing chemical equations.

MATERIALS

For each group of 2 to 3 students:

- gumdrops of at least four different colors
- toothpicks



Always wear safety goggles and a lab apron to protect your eyes and clothing. If you get a chemical in your eyes, immediately flush the chemical out at the eyewash station while calling to your teacher. Know the location of the emergency lab shower and eyewash station and the procedures for using them.

Procedure

1. Use toothpicks and gumdrops of at least four different colors (representing atoms of different elements) to make models of the substances in each equation below.
2. For each reaction below, use your models to determine the products needed (if not already indicated), and then balance the equation.
 - a. $\text{H}_2 + \text{Cl}_2 \rightarrow \text{HCl}$
 - b. $\text{Mg} + \text{O}_2 \rightarrow \text{MgO}$
 - c. $\text{C}_2\text{H}_6 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
 - d. $\text{KI} + \text{Br}_2 \rightarrow \text{KBr} + \text{I}_2$
 - e. $\text{H}_2\text{CO}_3 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
 - f. $\text{Ca} + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2 + \text{H}_2$
 - g. $\text{KClO}_3 \rightarrow \text{KCl} + \text{O}_2$
 - h. $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
 - i. $\text{Zn} + \text{HCl} \rightarrow \underline{\hspace{2cm}}$
 - j. $\text{H}_2\text{O} \xrightarrow{\text{electricity}} \underline{\hspace{2cm}}$
 - k. $\text{C}_3\text{H}_8 + \text{O}_2 \rightarrow \underline{\hspace{2cm}}$
 - i. $\text{BaO} + \text{H}_2\text{O} \rightarrow \underline{\hspace{2cm}}$

Analysis

1. Use your models to classify each reaction by type.
 - a. $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$; synthesis
 - b. $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$; synthesis
 - c. $2\text{C}_2\text{H}_6 + 7\text{O}_2 \rightarrow 4\text{CO}_2 + 6\text{H}_2\text{O}$; combustion
 - d. $2\text{KI} + \text{Br}_2 \rightarrow 2\text{KBr} + \text{I}_2$; displacement
 - e. $\text{H}_2\text{CO}_3 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$; decomposition
 - f. $\text{Ca} + 2\text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2 + \text{H}_2$; displacement
 - g. $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$; decomposition
 - h. $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$; combustion
 - i. $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$; displacement
 - j. $2\text{H}_2\text{O} \xrightarrow{\text{electricity}} 2\text{H}_2 + \text{O}_2$; decomposition
 - k. $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$; combustion
 - i. $\text{BaO} + \text{H}_2\text{O} \rightarrow \text{Ba(OH)}_2$; synthesis

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Name _____ Class _____ Date _____

Balancing Equations by Using Models *continued*

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