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Warm-Up | Writing and Balancing Chemical Equations

Lesson Objectives

By the end of this lesson, you should be able to:

- Describe chemical reactions by writing _____ equations and _____ equations.
- Use the law of conservation of mass to _____ chemical equations.
- **Science Practice:** Identify and use special symbols properly in chemical equations.

Words to Know

Fill in this table as you work through the lesson. You may also use the glossary to help you.

chemical equation	a group of chemical formulas and symbols that represent the _____ and _____ in a chemical reaction

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Lesson Question

Writing chemical equations:

- Words
- [ ]

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Word Equations

Components of a chemical equation include:

- [ ], which are the substances that enter into a chemical reaction.
- [ ], which are the substances that form.

Hydrogen + nitrogen → ammonia

A **chemical equation** is a group of chemical formulas and [ ] that represent the reactants and products in a chemical reaction.

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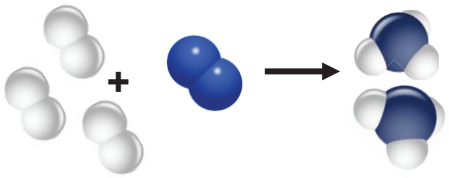
Formula Equations

Fill in this table with the type of equation shown.

	
	hydrogen + nitrogen → ammonia
	$3H_2(g) + N_2(g) \rightarrow 2NH_3(g)$

Coefficients

- A chemical formula shows how many atoms go into a reaction. A chemical formula also shows what the reactants form .
- A coefficient is the number in front of the molecule. It represents the number of molecules in the equation.

$$\mathbf{3H_2(g) + N_2(g) \rightarrow 2NH_3(g)}$$

Record the number of each type of molecule in the equation shown.

	H_2
	NH_3
	N_2

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States of Matter

A chemical formula can also show the state of matter of the reactants and products.

- Matter in a gas state is represented by a [ ].
- Matter in a solid state is represented by an [ ].
- Matter dissolved in a liquid state is represented by an [ ].
- Matter in a liquid state is represented by an [ ].

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Symbols in Chemical Equations

Symbols provide more information about reactions.

- State symbols are added [ ] formulas.
- Reaction conditions are added [ ] the arrow.
- [ ] are added above the arrow because they are not used up.

Symbol	Meaning
(*s*)	Solid
(*l*)	Liquid
(*g*)	Gas
(*aq*)	Aqueous
↔	Reversible reaction
$\xrightarrow{\Delta}$	Heated
$\xrightarrow{25°C}$	Temperature of reaction
$\xrightarrow{2\ atm}$	Pressure of reaction
$\xrightarrow{Pt}$	Catalyst used

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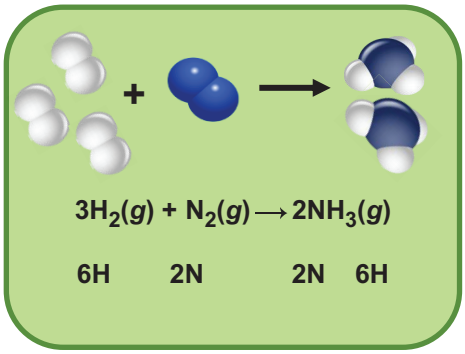
Balanced Equations

Balanced chemical equations:

- have the same types of _____ on both sides of equations.
- have the _____ number of each type of atom.
- show _____ of mass.



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How to Balance Equations

When you balance a chemical equation:

Write the _____ equation.

Count each type of atom.

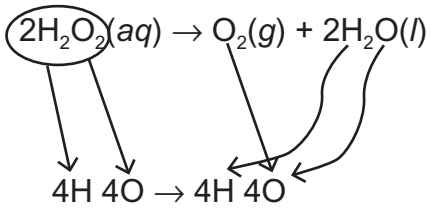
Use _____ to balance.

Count _____ again.

Reactant Product

$H_2O_2(aq) \rightarrow O_2(g) + H_2O(l)$

2H 2O → 2H 3O



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Balancing Atoms

O_2 CO_2 H_2O

Acetylene, $C_2H_2(g)$, burns in oxygen to produce [ ] and water.

What is the balanced chemical equation for this reaction?

1) $C_2H_2(g) + O_2(g) \rightarrow CO_2(g) + H_2O(g)$

2C 2H 2O → 1C 2H 3O

2) $C_2H_2(g) + O_2(g) \rightarrow$ [ ] $CO_2(g) + 2H_2O(g)$

2C 2H 2O → 2C 2H 5O

3) $C_2H_2(g) +$ [ ] $O_2(g) \rightarrow$ [ ] $CO_2(g) +$ [ ] $H_2O(g)$

2C 2H 10O → 4C 4H 10O

4) [ ] $C_2H_2(g) + 5O_2(g) \rightarrow 4CO_2(g) + 2H_2O(g)$

4C 4H 10O → 4C 4H 10O

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Summary

Writing and Balancing Chemical Equations

Lesson Question

What is the proper method for writing and balancing chemical equations?

Answer

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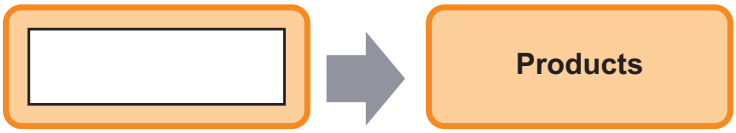
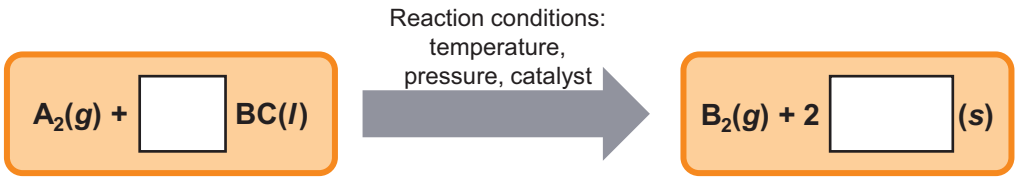
How to Write a Chemical Equation

Chemical equations use chemical formulas and symbols to represent chemical reactions.





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Slide 2

How to Balance a Chemical Equation

- Balanced chemical equations show the conservation of mass.
- The _____ and types of atoms in the products and reactants are the same.

Count each type of atom in the formula equation.

↓

Use coefficients to _____ one type of atom.

↓

_____ atoms again.

Use this space to write any questions or thoughts about this lesson.

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