

Lesson
Question

Lesson Goals

Explain what it means for a
chemical to be balanced.

Demonstrate how to
a chemical equation.

Relate balanced chemical equations to
the law of conservation of .



Words to Know

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

balance	the state of being in <input type="text"/> amounts
system	a <input type="text"/> of related objects that <input type="text"/> and form a complex whole
ammonia	a <input type="text"/> used in cleaning products; made up of one <input type="text"/> atom and three <input type="text"/> atoms
law of conservation of mass	natural law that states the <input type="text"/> amount of <input type="text"/> is present before and after a chemical <input type="text"/>



Chemical Equations

- are on the left.
- Products are on the .
- Subscripts indicate the number of of each element in a molecule.
- Coefficients indicate how many of each type are in a chemical reaction.
- The of atoms for each element must be the same in both the reactant and product sides of the .

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Balance

For a chemical equation to be , the number of each type of atom must be the same for the reactants and the products.

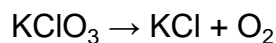
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How to Balance a Chemical Equation: Strategy

Steps for equations:

Step 1:

- Identify the on each side.
- the atoms of each element on each side.



Fill in the number of atoms in the reactants and the products in the chemical equation.

Reactants	Products
K = <input type="text"/>	K = <input type="text"/>
Cl = <input type="text"/>	Cl = <input type="text"/>
O = <input type="text"/>	O = <input type="text"/>

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How to Balance a Chemical Equation: Strategy**Step 2:**

- Use coefficients to the number of each type of atom one at a time.
- Double-check the .



Update the coefficients and the number of atoms in the reactants and the products. Then update the coefficients in the chemical equation above.

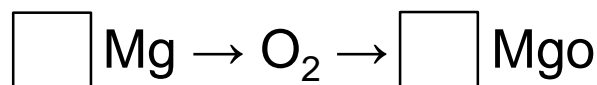
Reactants	Products
K = 1 × 2 = <input type="text"/>	K = 1 × 2 = <input type="text"/>
Cl = 1 × 2 = <input type="text"/>	Cl = 1 × 2 = <input type="text"/>
O = 3 × 2 = <input type="text"/>	O = 3 × 2 = <input type="text"/>

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Balancing Chemical Equations: Example

- Magnesium burns in the presence of to produce magnesium oxide.



Fill in the type of atoms and numbers of atoms in the reactants and products in the original chemical equation.

Then balance the chemical equation by changing coefficients.

Reactants		Products	
Original equation	Balanced equation	Original equation	Balanced equation
Mg = <input type="text"/>	Mg = <input type="text"/>	Mg = <input type="text"/>	Mg = <input type="text"/>
O = <input type="text"/>	O = <input type="text"/>	O = <input type="text"/>	O = <input type="text"/>

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Conservation of Mass

- According to the law of , the total mass of all the substances going into a chemical reaction must be the same as the total mass of all the substances coming out of a chemical reaction.
 - Balanced chemical express the law of conservation of mass.

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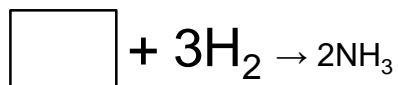
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Balancing Out Chemical Reactions

- Before :
 - flask + balloon + vinegar + baking soda =
- reaction:
 - flask + + vinegar + baking soda + gas = 430 g

Haber Process

- Nitrogen gas and hydrogen gas react to form , a chemical used in cleaning products.
- Based on the balanced equation, 3 hydrogen atoms are for 1 nitrogen atom.



Summary

Balancing Chemical Equations

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**Lesson
Question**

How are chemical equations balanced?

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Answer

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Review: Key Concepts

- Steps to equations:
 - Identify and count the number of each type of in the reactants and products.
 - Use to balance the number of each type of atom one at a time.
 - Double-check the coefficients to make sure the number of each type of atom is the same on sides of the equation.
- Chemical must be balanced because they are an expression of the of conservation of mass.

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