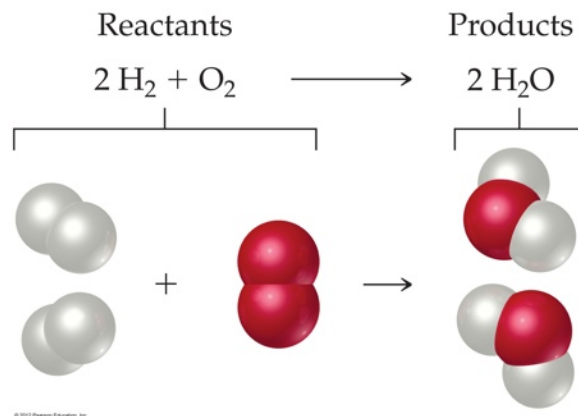


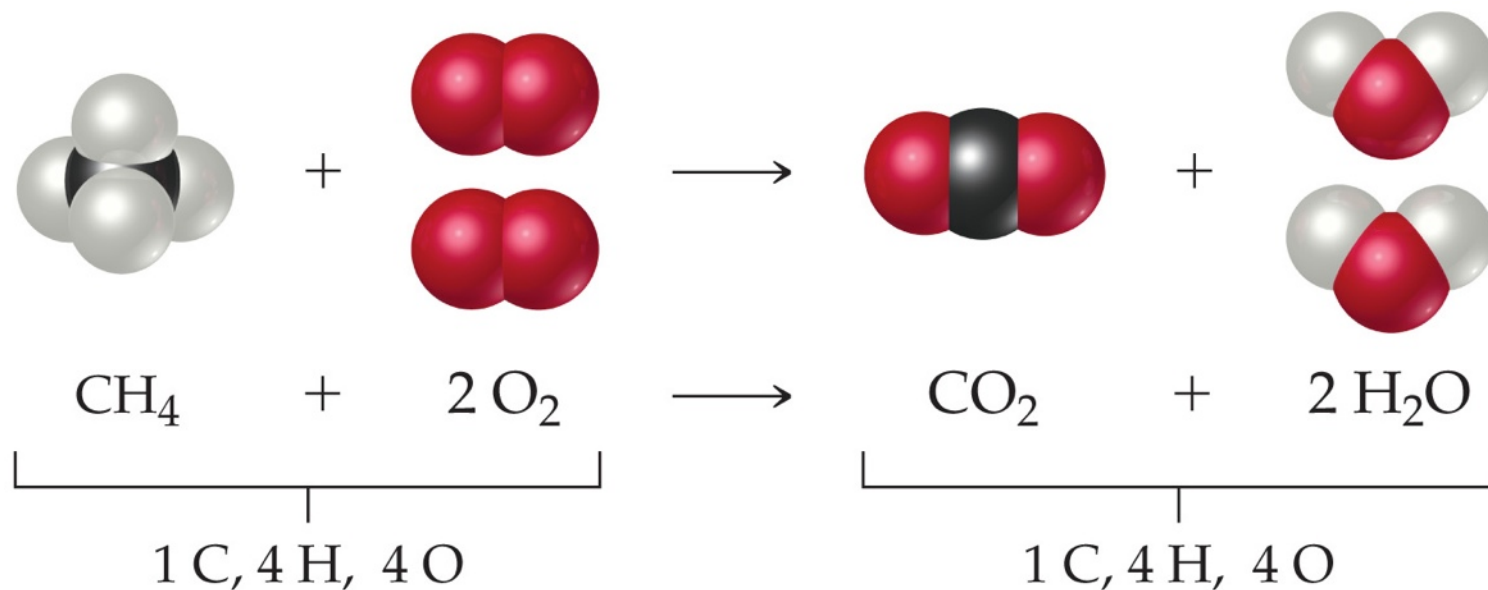
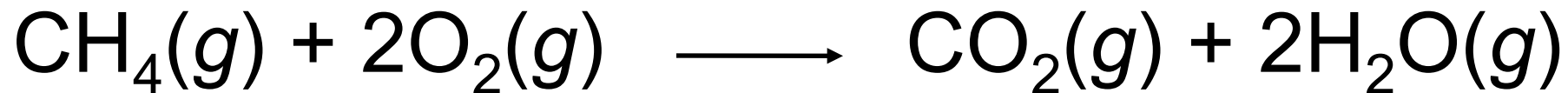
# Chemical Equations

# Chemical Equations

**Chemical equations** are concise representations of chemical reactions.

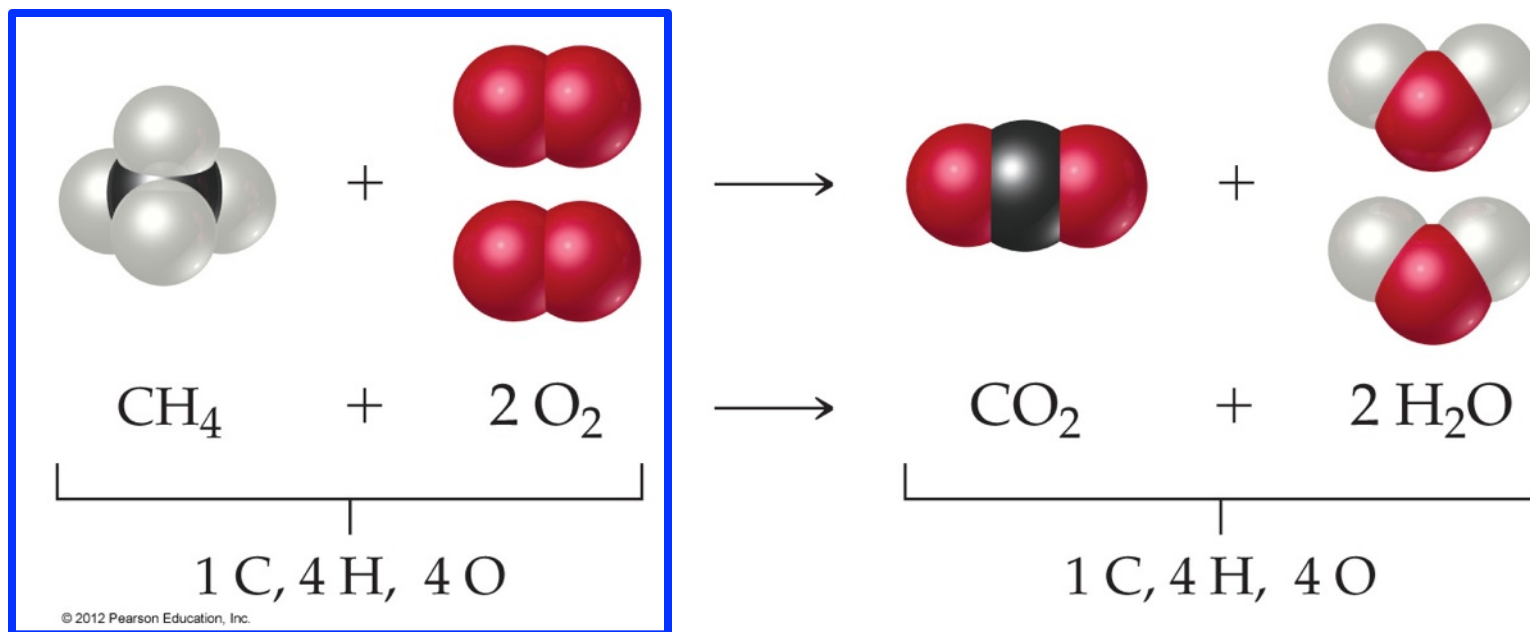
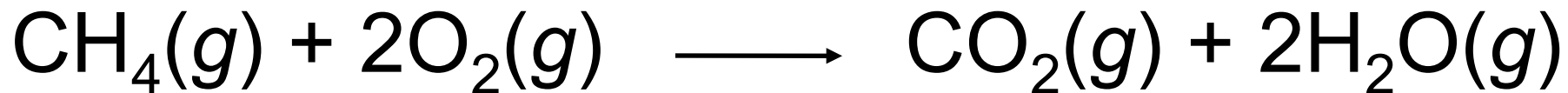


# Anatomy of a Chemical Equation



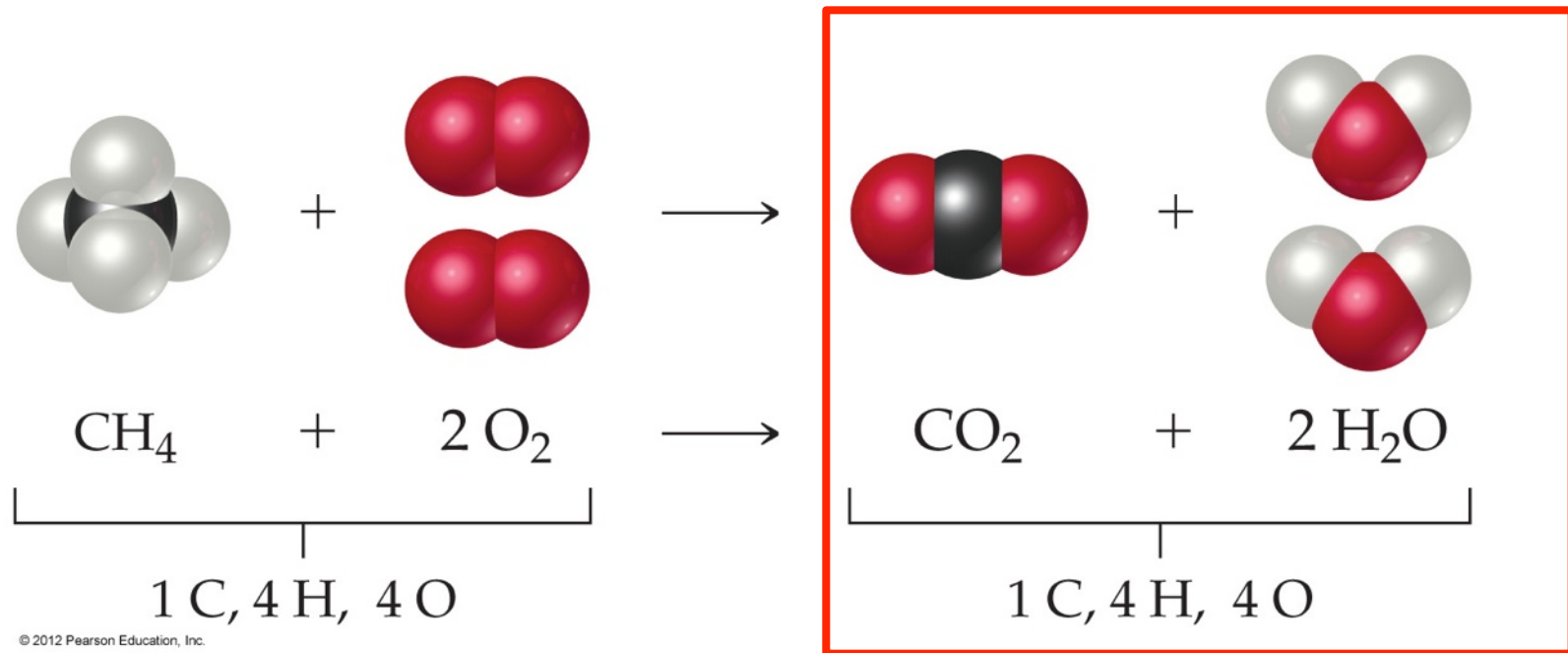
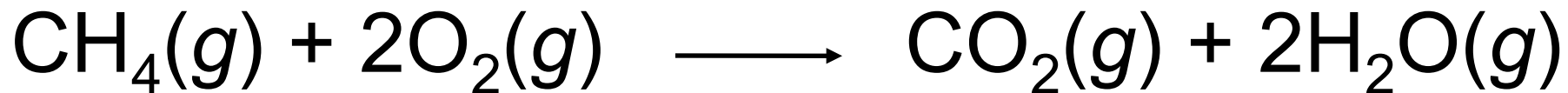
© 2012 Pearson Education, Inc.

# Anatomy of a Chemical Equation



**Reactants** appear on the left side of the equation.

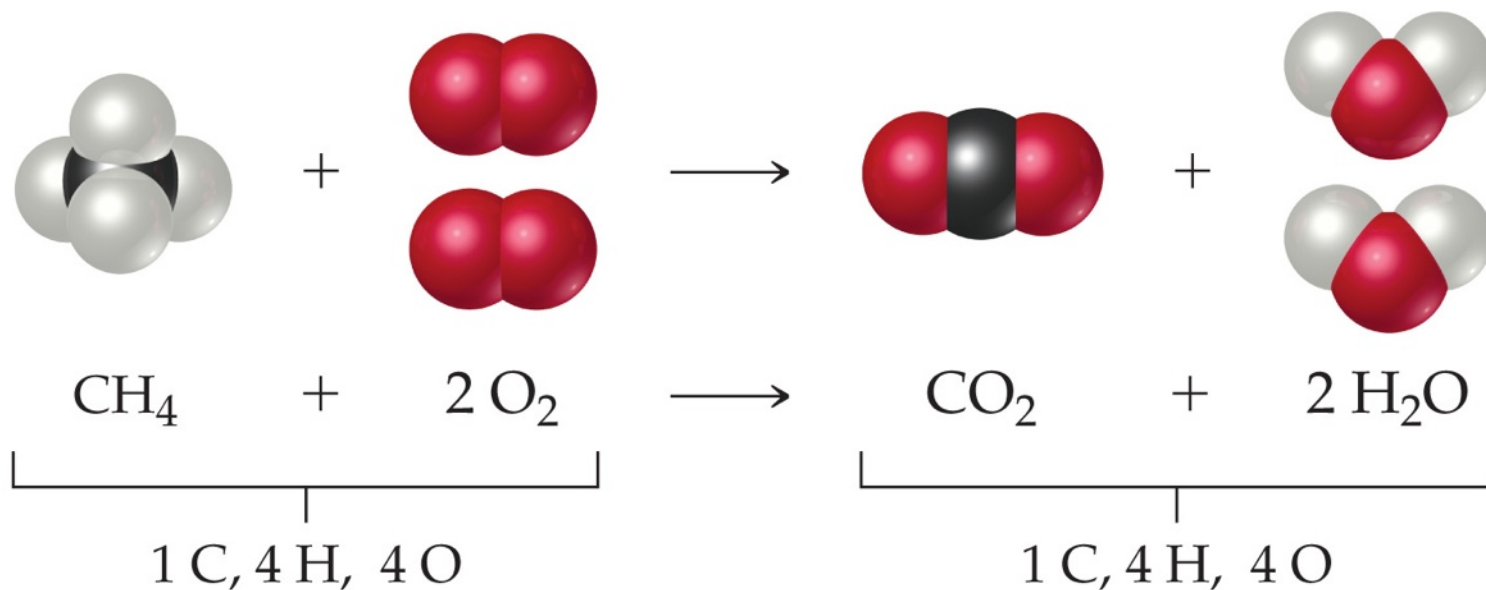
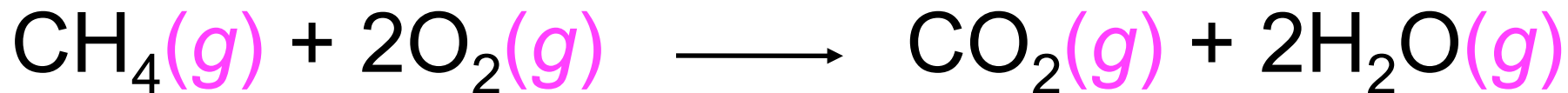
# Anatomy of a Chemical Equation



**Products** appear on the right side of the equation.



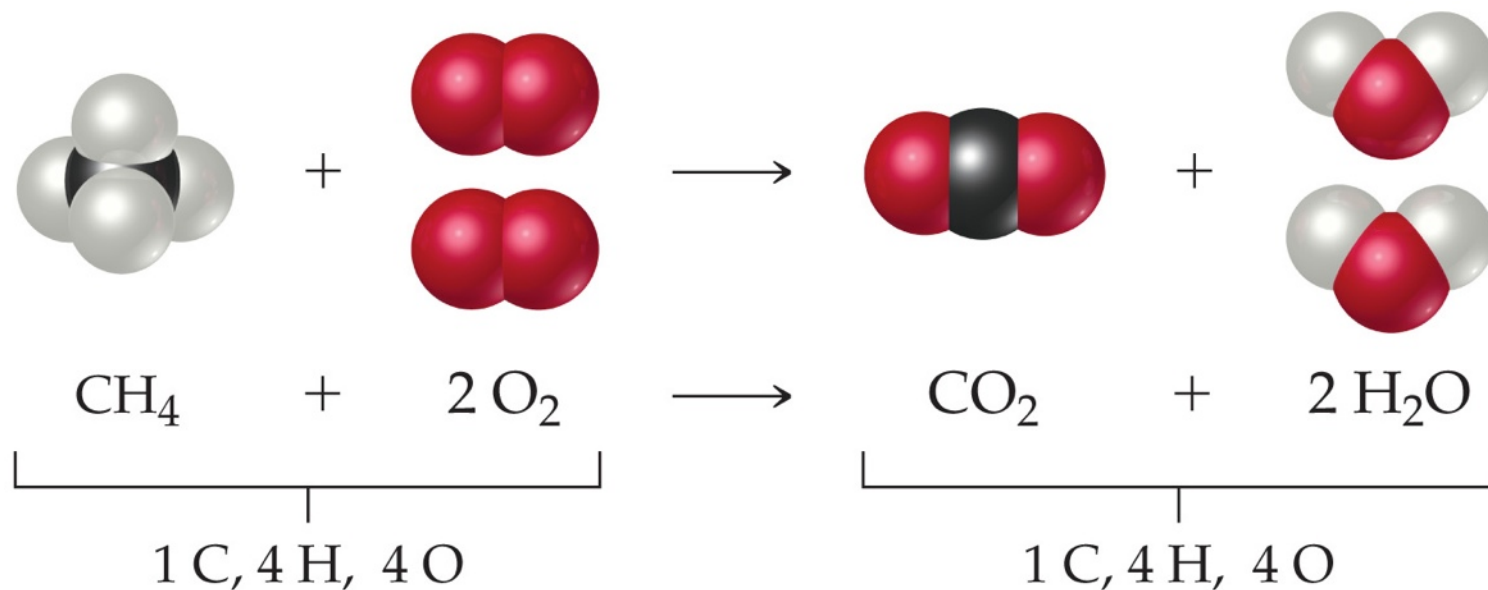
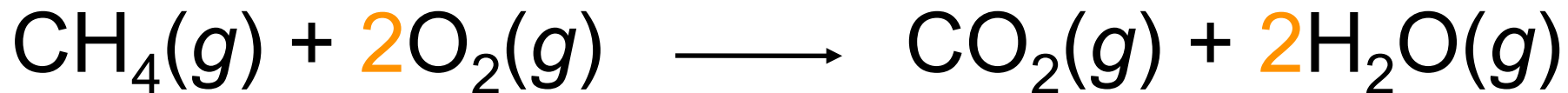
# Anatomy of a Chemical Equation



© 2012 Pearson Education, Inc.

The **states** of the reactants and products are written in parentheses to the right of each compound.

# Anatomy of a Chemical Equation

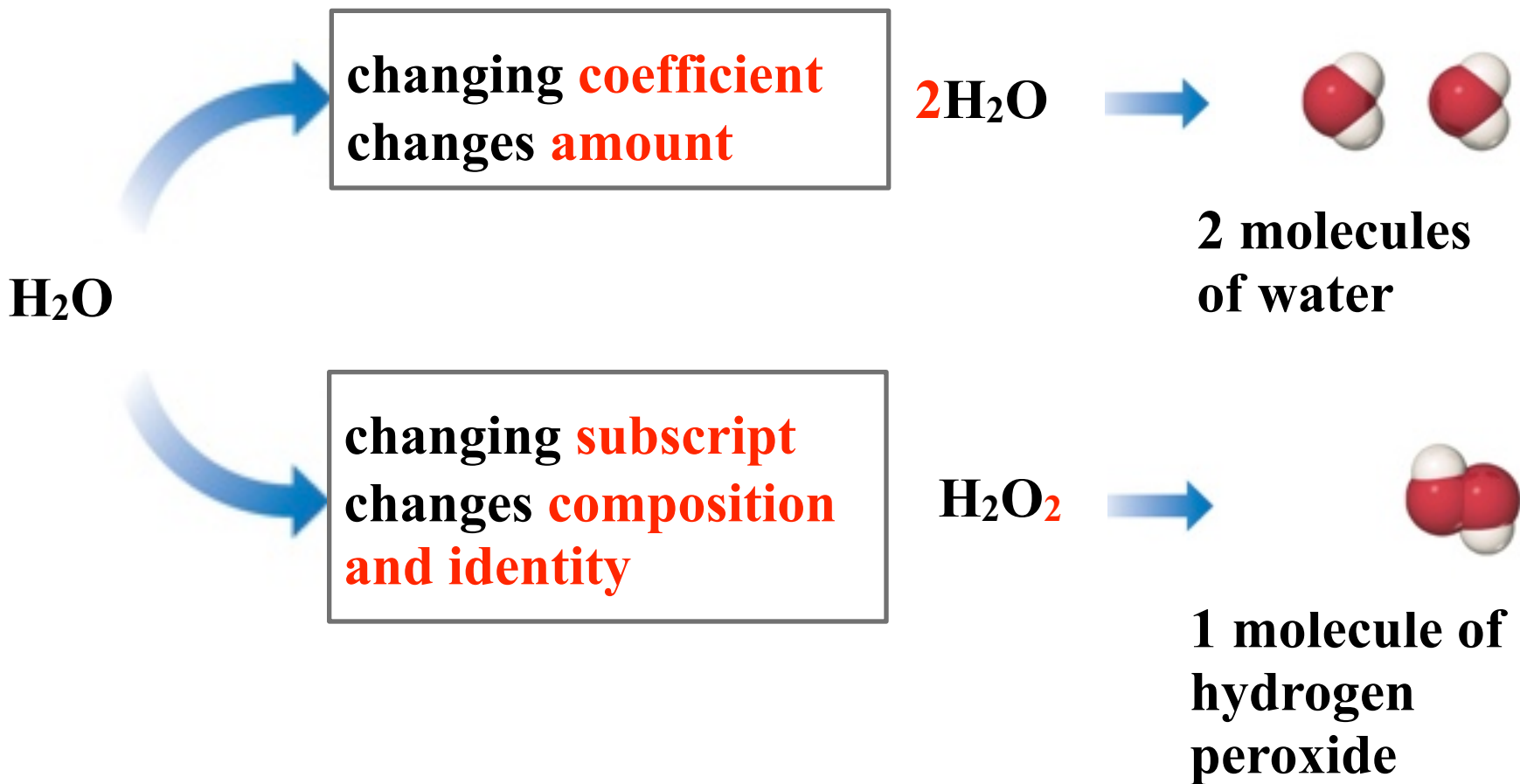


© 2012 Pearson Education, Inc.

**Coefficients** are inserted to balance the equation.



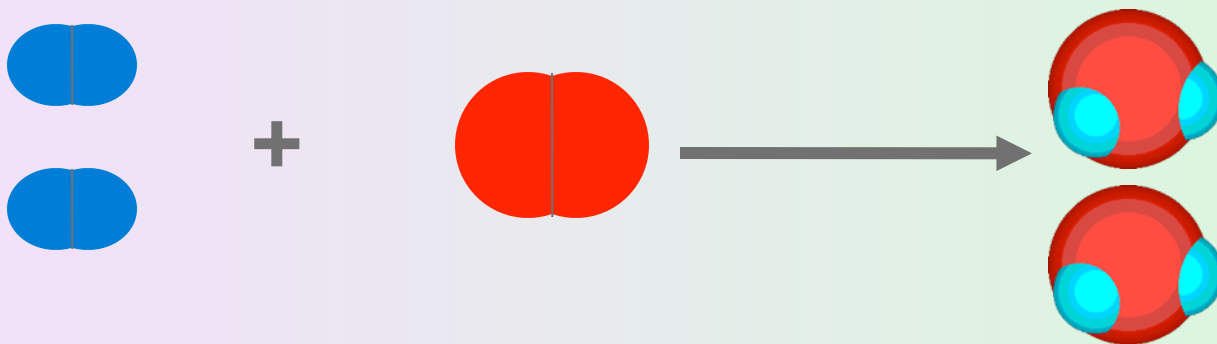
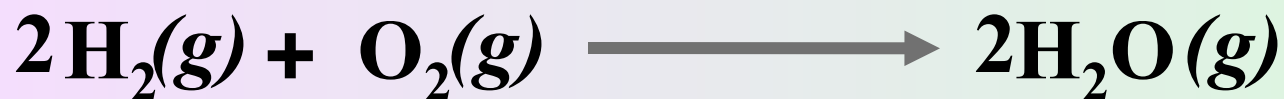
# Subscripts and Coefficients Give Different Information





# Writing Chemical Equations

---



**2 moles**

**1 mole**

**2 moles**

**4.04 g**

**32.00 g**

**36.04 g**

**Parentheses show physical state of substances**

# physical state of substances

**(s)** = solid

**(l)** = liquid

**(g)** = gas

**(aq)** = aqueous (dissolved in water)

# Example

---

## molar interpretation



**Start:**      1 mol      1 mol      0

**Finish:**      0      0      2 mol

# Example

---

## mass interpretation



**Start:**      4g            32g                    0

**Finish:**     0                0                        36 g

**The law of conservation of mass  
requires that chemical equations  
must balance.**

**What goes in**



**Must come out**

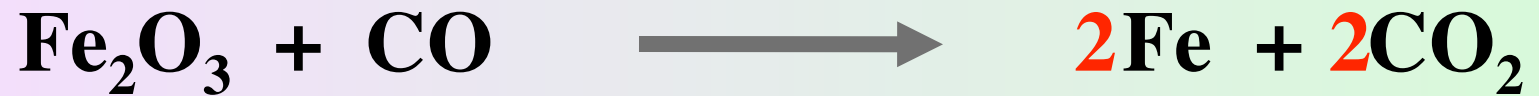
# Writing and balancing the equation for a chemical reaction

1. Identify all reactants and products and write their correct formulas on the left side and right side of the equation, respectively.
2. Begin balancing the equation by trying suitable coefficients that will give us the same number of atoms of each element on both sides of the equation. Change coefficients, but not subscripts.
3. Look for elements that appear only once on each side of the equation. Balance these first.
4. Check.

# Example

---

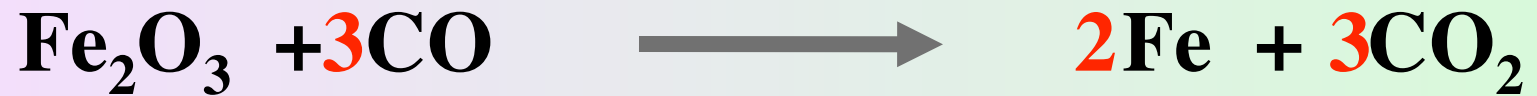
**Balance the following equation**



# Example

---

**Balance the following equation**

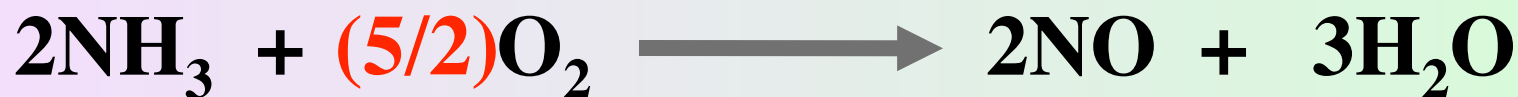
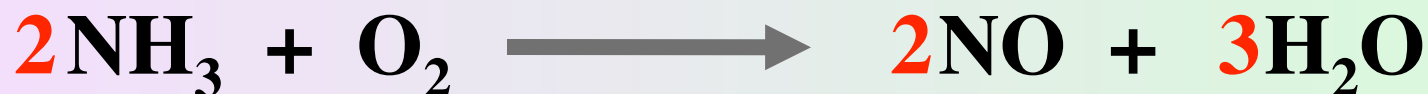
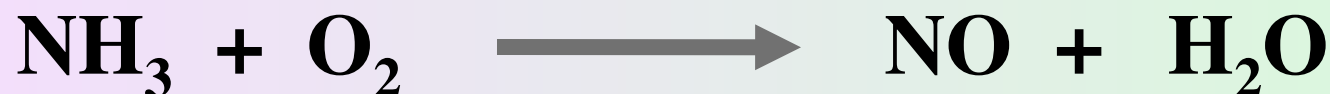




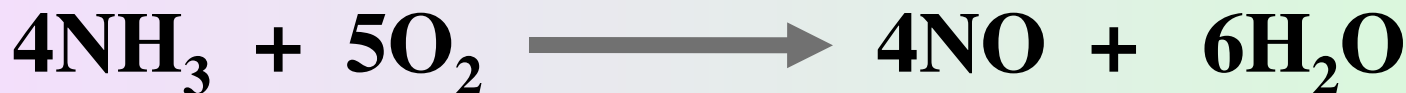
# Example

---

**Balance the following equation**



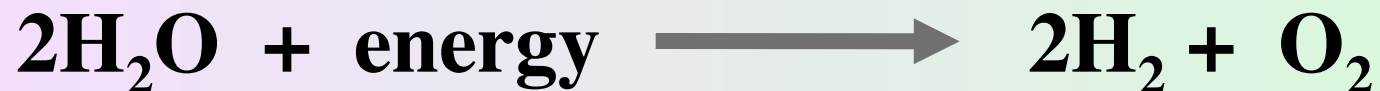
**multiply everything by 2**



# Showing energy changes in equations

---

**endothermic reaction**



**exothermic reaction**

