

CHAPTER

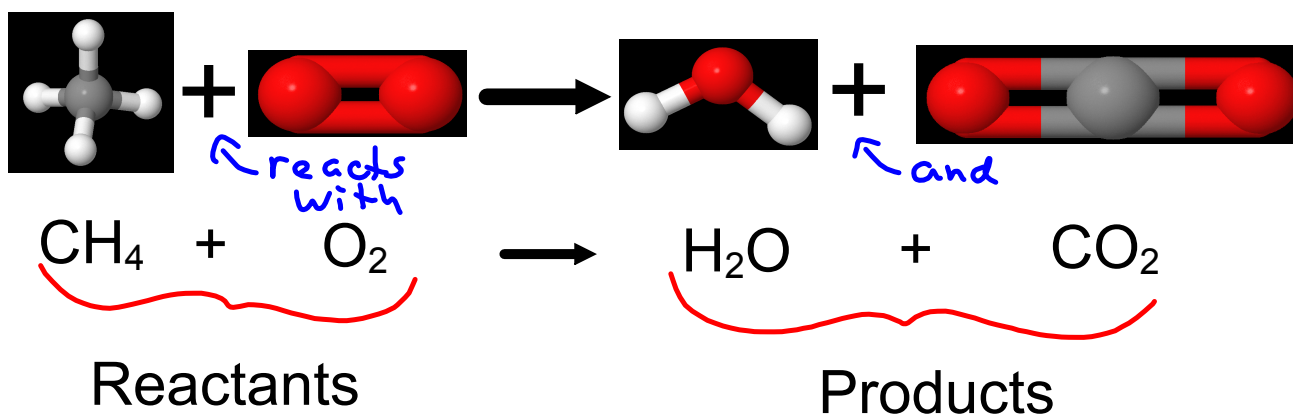
6

Understanding Chemical Reactions

- Chemical reactions are what happens when new compounds are produced.
- They are represented by a chemical equation.

Methane reacts with oxygen producing water and carbon dioxide

Methane + Oxygen \longrightarrow Water + Carbon Dioxide



6.1

Word Equations

all the reactants \rightarrow all the products

The reactants, as well as the products, are separated by a plus sign (+):

reactant 1 + reactant 2 \rightarrow product 1 + product 2

Examples

Iron reacts with oxygen to form iron (III) oxide

iron + oxygen \rightarrow iron(III) oxide



Copper is placed in a beaker of silver nitrate solution:

copper + silver nitrate \rightarrow silver + copper(II) nitrate

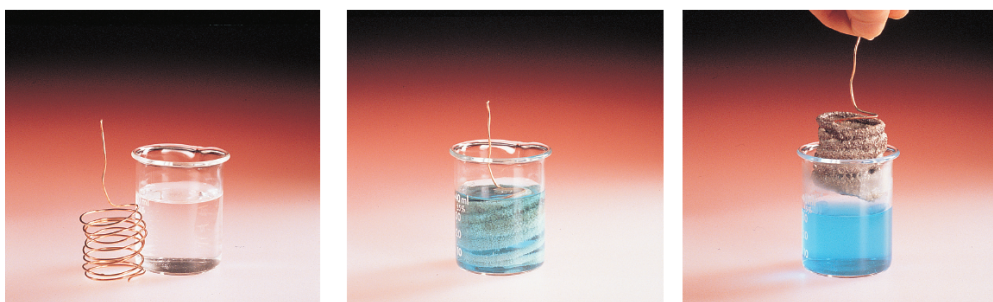


Figure 2

When a coil of copper is dipped in silver nitrate solution, a furry deposit of silver metal forms on the coil. The solution also turns blue as a copper(II) nitrate solution forms.

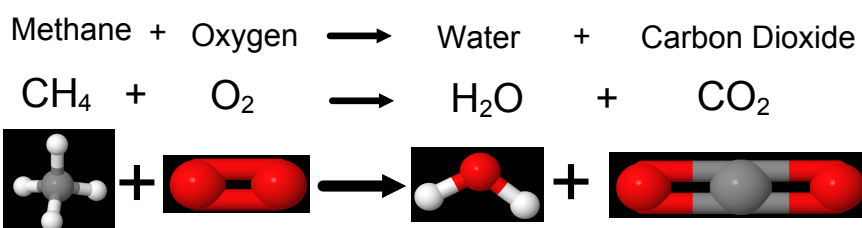
6.3

Conserving Mass

Law of Conservation of Mass:

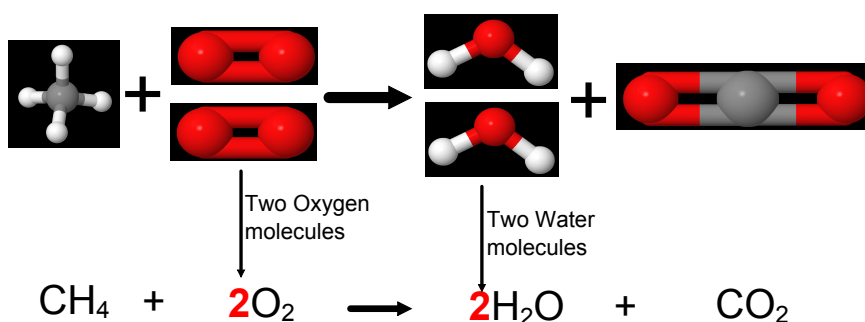
- In a (non-nuclear) chemical reaction, the total mass of the reactants is always equal to the total mass of the products.
- Atoms are not destroyed, just rearranged.

Consider the burning of methane, is mass conserved in the chemical reaction shown below?



It is not possible to "lose" two hydrogen atoms and gain a third oxygen. So if we only have one molecule of methane and oxygen the reaction can't take place.

To conserve mass we need the following:



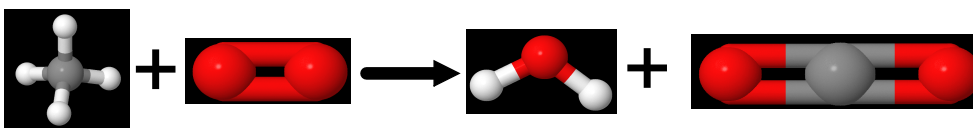
The above chemical reaction is now called **balanced** because mass (or the number of atoms) is conserved - there are the same number of a specific atom in the reactants and products.

6.5

Balancing Chemical Equations

- Balancing a chemical equation refers to the act of conserving mass.
- Word equations describe the reactants and products, but do not communicate the number of atoms involved.
- We use a **skeleton equation** to represent the reaction. This uses chemical formulas for the reactants and products.

Consider, for example our reaction of methane and oxygen:



Word Equation:



Skeleton Equation:



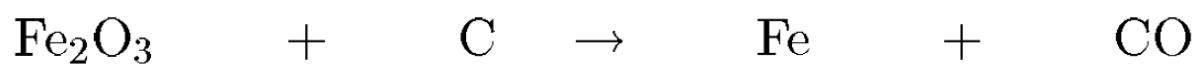
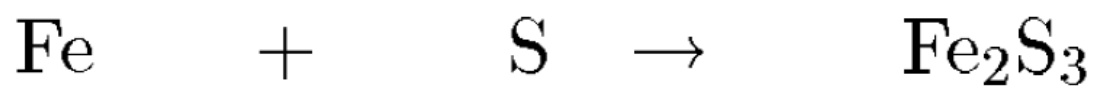
Balanced Equation:



coefficients

Skeleton equations are balanced by changing the coefficients until there are the same number of atoms in the reactants and products.

Examples



Attachments

Balancing Chemical Equations.jar

Build Atom.jar

Build Molecule.jar