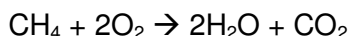


## Vocabulary: Chemical Equations



### Vocabulary

- Avogadro's number – the number of atoms or molecules in a *mole* of a substance.
  - Avogadro's number is equal to  $6.0221415 \times 10^{23}$ .
- Chemical equation – a symbolic representation of a chemical reaction.
  - In a chemical equation, reactants are shown on the left, and products are shown on the right.
  - For example, the chemical equation  $\text{Na} + \text{Cl}_2 \rightarrow \text{NaCl}$  describes the reaction of sodium (Na) and chlorine gas ( $\text{Cl}_2$ ) to form table salt.
  - In a balanced chemical equation, there are the same numbers of each type of atom on each side of the equation:  $2\text{Na} + \text{Cl}_2 \rightarrow 2\text{NaCl}$  is balanced because there are two sodium atoms and two chlorine atoms on each side of the equation.
- Chemical formula – a symbolic representation of an element or compound.
  - Chemical formulas use *subscripts* and parentheses to denote the number of atoms in a molecule of the substance.
  - Examples of chemical formulas include NaCl (table salt),  $\text{H}_2\text{O}$  (water), and  $\text{Ca}(\text{OH})_2$  (calcium hydroxide).
- Chemical reaction – a process in which one or more substances are transformed into others.
  - In a chemical reaction, bonds between atoms are broken and new bonds are formed, joining atoms into different combinations.
  - No atoms are created or destroyed in a chemical reaction.
- Coefficient – a number that multiplies a term in an equation.
  - In a chemical equation, the coefficients indicate the number of each type of molecule. For example,  $6\text{H}_2\text{O}$  means that there are six water molecules.
- Combination – a chemical reaction in which two or more reactants form a single product.
  - Combination reactions are also called *synthesis* reactions.
  - For example, hydrogen ( $\text{H}_2$ ) combines with oxygen ( $\text{O}_2$ ) to form water ( $\text{H}_2\text{O}$ ).
- Combustion – a chemical reaction in which a fuel is burned.
  - Most examples of combustion involve the burning of a hydrocarbon in oxygen, producing water and carbon dioxide.
  - For example, methane burns in oxygen to form water and carbon dioxide:



- Conservation of matter – a scientific law that states that the total amount of matter in a closed system remains constant.
  - A chemical equation satisfies conservation of matter if it is balanced.
- Decomposition – a chemical reaction in which a single substance is broken down into two or more products.
  - For example, salt (NaCl) can be decomposed into sodium (Na) and chlorine gas (Cl<sub>2</sub>).
- Double replacement – a chemical reaction in which two compounds exchange elements or molecules with one another.
  - For example, sodium sulfide (Na<sub>2</sub>S) and hydrochloric acid (HCl) react to form salt (NaCl) and hydrogen sulfide (H<sub>2</sub>S).
- Molar mass – the mass of one mole of a substance.
  - The molar mass of an element or compound in grams is equal to the atomic mass of the atom or molecule of which it is composed.
  - For example, the atomic mass of an oxygen molecule (O<sub>2</sub>) is 32 universal mass units. The molar mass of oxygen gas is 32 grams.
- Mole – a unit amount of substance.
  - A mole of a substance has the same number of particles as 12.0 grams of carbon-12.
  - The SI symbol for the mole is “mol.”
- Molecule – a stable particle made of two or more atoms.
  - A water molecule (H<sub>2</sub>O) is made of two hydrogen atoms and one oxygen atom.
- Product – a substance that is formed in a chemical reaction.
- Reactant – a substance that takes part in a chemical reaction.
- Single replacement – a chemical reaction in which an element reacts with a compound to form a new compound and a different element.
  - For example, aluminum (Al) reacts with hydrochloric acid (HCl) to form aluminum chloride (AlCl<sub>3</sub>) and hydrogen gas (H<sub>2</sub>).
- Subscript – a number in a chemical formula representing the number of atoms of a particular element in one molecule of the compound.
  - For example, the subscript “2” in H<sub>2</sub>O indicates that there are two hydrogen atoms in a water molecule.