

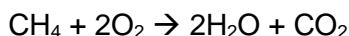


Vocabulary: Chemical Equations



Vocabulary

- Avogadro's number – the number of atoms or molecules in a *mole* of a substance.
 - Avogadro's number is equal to 6.0221415×10^{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 (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), H_2O (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 (H_2) combines with oxygen (O_2) to form water (H_2O).
- 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 (Cl₂).
- Double replacement – a chemical reaction in which two compounds exchange elements or molecules with one another.
 - For example, sodium sulfide (Na₂S) and hydrochloric acid (HCl) react to form salt (NaCl) and hydrogen sulfide (H₂S).
- 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 (O₂) 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.”
- Molecular mass – (M) the mass of a molecule of a substance, as measured in universal mass units (u).
- Molecule – a stable particle made of two or more atoms.
 - A water molecule (H₂O) 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 (AlCl₃) and hydrogen gas (H₂).
- 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 H₂O indicates that there are two hydrogen atoms in a water molecule.

