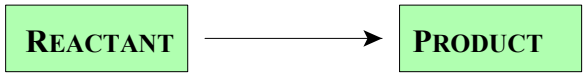
Describing Reactions Using Chemical Equations

Aim

- write and interpret a chemical equation

Notes

Format: Reactant yields Product (Reactant → Product)



★ Reactant (substances reacting) on left
★ Yield sign (→) at center
★ Products (new substances formed) on right

Symbols

★ solid precipitate - (*s*) or ↓
★ liquid - (ℓ)
★ gas - (*g*) or ↑
★ dissolved in water or aqueous — (*aq*)
★ heat - Δ
★ electricity - elec.
★ light - ↑|

What the equation shows

★ identity of reactants and products using chemical formulas and symbols
★ phases of the reactants and products
★ any energy changes involved
★ the mole ratios of all the substances or conservation of mass

Equations using formulas and symbols

★ Example 1

$AgNO_3(aq) + NaCl(aq) \rightarrow NaNO_3(aq) + AgCl(s)$

☆ reactants: dissolved silver nitrate reacts with dissolved sodium chloride
☆ products: dissolved sodium nitrate and a solid precipitate consisting of silver chloride forms
★ the *Table of Solubilities in Water* shows which product is the precipitate

★ Example 2

$$2KClO_3(s) \xrightarrow[\Delta]{\mathbf{MnO_2}(s)} 2KCl(s) + 3O_2(g)$$

☆ reactants: solid potassium chlorate
☆ products: solid potassium chloride and oxygen gas
☆ other: manganese dioxide is a catalyst and the reaction is endothermic. Symbols for manganese dioxide and heat are shown above and below the yield sign because they are neither reactants nor products.

Answer the questions below by circling the number of the correct response

1. The symbol (aq) after a chemical formula means (1) solid or precipitate, (2) liquid, (3) gas, (4) aqueous or dissolved.

2. In the reaction, $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$, the reactants are (1) AgCl and $NaNO_3$, (2) $AgNO_3$ and NaCl, (3) Ag and Na, (4) Cl and NO_3.

3. In the reaction, $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$, which of the four substances involved is a precipitate? [*HINT: Refer to Chart C*] (1) $AgNO_3$ (2) NaCl (3) AgCl (4) $NaNO_3$

Answer questions 4–5 by referring to the equation below:

$$2KClO_3(s) \xrightarrow[\Delta]{MnO_2(s)} 2KCl(s) + 3O_2(g)$$

4. The symbol Δ under the yield sign indicates that (1) the reaction is exothermic, (2) the reaction is endothermic, (3) a solid precipitate forms, (4) heat is a product of the reaction.

5. $MnO_2(s)$ is written above the yield sign because $MnO_2(s)$ is (1) a reactant, (2) a product, (3) neither a reactant nor a product, (4) both a reactant and a product.