Chemistry 20

Unit D: Quantities in chemical change

Ionic and net ionic equations

A precipitate in solution

- Two clear solutions can mix and produce a white solid while the liquid around that solid stays clear.
- The solid is one new sub-stance, and dissolved ions can remain in the liquid.



Split the solution, then keep the change

- Aqueous strong electrolytes are written as separate ions, and solids stay as complete formulas.
- Ions that match on both sides are set aside so the written change shows the new substance.

Key terms

spectator ion

An ion that stays aqueous and appears unchanged on both sides of an ionic equation. (Na^+ and NO_3^-)

net ionic equation

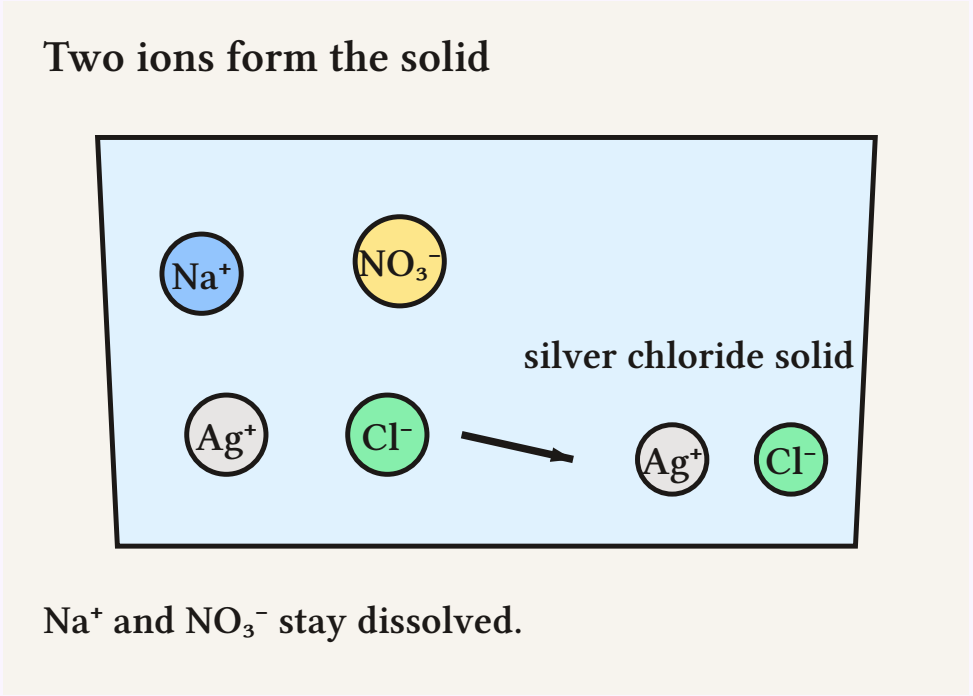
The balanced equation that remains after spectator ions are removed, with state symbols kept. ($Ag^+(aq) + Cl^-(aq) \longrightarrow AgCl(s)$)

full ionic equation

A balanced equation that shows aqueous strong electrolytes as separate ions. ($Ag^+(aq) + Cl^-(aq) + Na^+(aq) + NO_3^-(aq)$)

Sodium and nitrate stay in solution

- The formula equation is $AgNO_3(aq) + NaCl(aq) \longrightarrow AgCl(s) + NaNO_3(aq)$.
- Silver chloride remains a solid formula, and the other three salts are strong electrolytes in water.



Hydronium and hydroxide become water

- The formula equation is $HCl(aq) + NaOH(aq) \longrightarrow NaCl(aq) + H_2O(l)$.
- Water stays a liquid formula, and the aqueous acid, base, and salt can be written as ions.

Carbonate ions meet calcium ions

- The formula equation is $CaCl_2(aq) + Na_2CO_3(aq) \longrightarrow CaCO_3(s) + 2\ NaCl(aq)$.
- Calcium carbonate stays a solid, and the soluble salts are written as ions.

Aqueous changes

- A precipitation and a strong-acid neutralization each leave some ions unchanged.
- The net ionic equation keeps state symbols on the ions and on the new substance.

Image credits

Dr.T, AgCl-neerslag, CC BY-SA 3.0