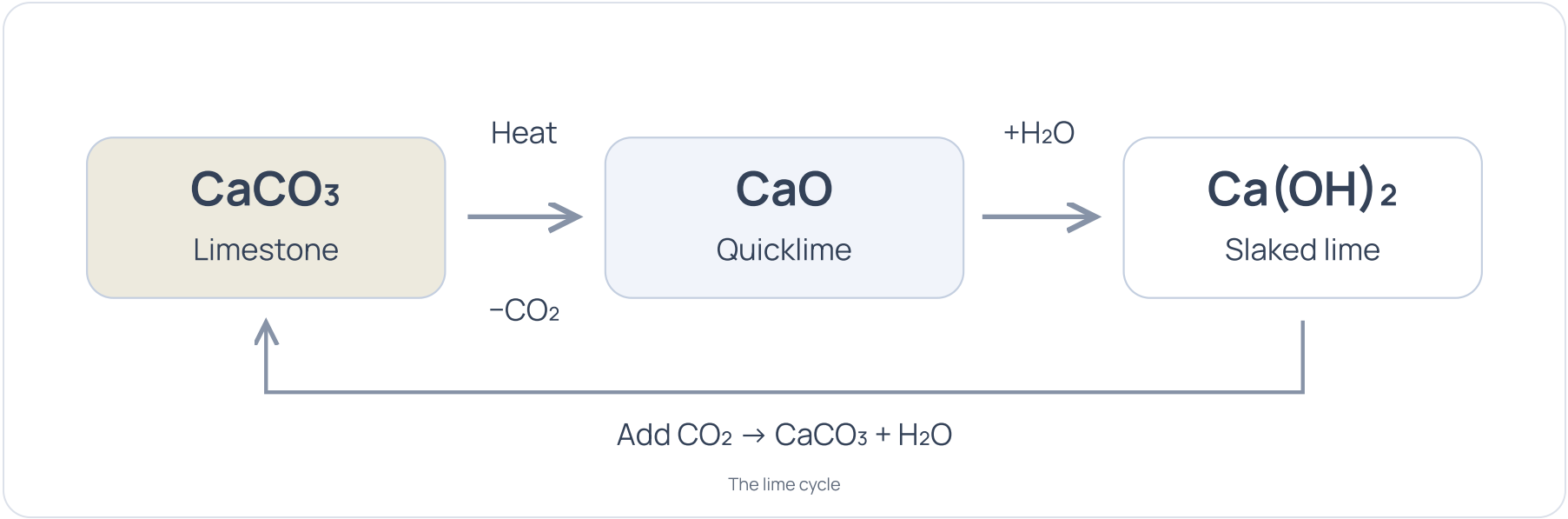


Common salts: formula and transformation

Keep calcium and sodium compounds straight by formula and water of crystallisation

• Household and industrial compounds



◆ The lime transformations

- Quicklime is calcium oxide (CaO), made by heating limestone ($\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$).
- Adding water slakes CaO exothermically to slaked lime: $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2$.
- Whitewash Ca(OH)_2 reacts slowly with air's CO₂ to form a shiny CaCO₃ layer.

○ Baking soda and washing soda

- Baking soda is sodium hydrogen carbonate (NaHCO₃), a mild non-corrosive base.
- Heating NaHCO₃ releases CO₂ gas ($2\text{NaHCO}_3 \rightarrow \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2$), leavening dough.
- Washing soda is hydrated sodium carbonate (Na₂CO₃·10H₂O), used to soften hard water.

◇ Gypsum and plaster of Paris

- Gypsum is calcium sulphate dihydrate (CaSO₄·2H₂O).
- Controlled heating near 373 K converts gypsum to plaster of Paris by removing 1½ H₂O.
- Plaster of Paris is calcium sulphate hemihydrate (CaSO₄·½H₂O).

□ Water of crystallisation

- Water of crystallisation is the fixed number of H₂O molecules in one formula unit.
- Adding water to plaster of Paris reforms gypsum and produces a hard set mass.
- Two CaSO₄ units share one H₂O molecule in CaSO₄·½H₂O; store it in moisture-proof bags.

REMEMBER Common names hide different formulas; remember the ion and the water of crystallisation.