

SCIENCE • CLASS 10

CHAPTER 1

Chemical Reactions and Equations

CHAPTER NOTES



HOW TO RECOGNISE A CHEMICAL REACTION

A chemical reaction forms one or more new substances.

EVERYDAY EXAMPLES

- Milk turns sour



- Iron rusts in moist air



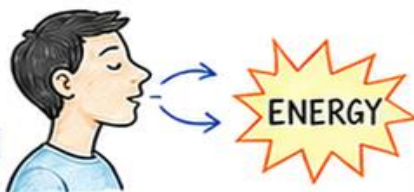
- Grapes ferment



- Food cooks and is digested



- Respiration releases energy



MAIN SIGNS

- change in state
- change in colour
- evolution of a gas
- change in temperature

These observations show that a chemical reaction may have occurred.

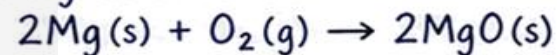
THREE NCERT OBSERVATIONS

①



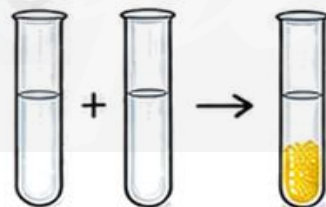
MAGNESIUM BURNS

Clean the magnesium ribbon with sandpaper to remove its oxide coating. Dazzling white flame → white magnesium oxide



Wear eye protection; keep the burning ribbon away from your eyes.

②



YELLOW PRECIPITATE

Lead nitrate + potassium iodide → yellow lead iodide precipitate.

③



ZINC + DILUTE ACID

Bubbles of hydrogen form; the flask becomes warm.



CAUTION: Handle dilute acid carefully.

KEY IDEA: A chemical change means the identity of the substance changes.

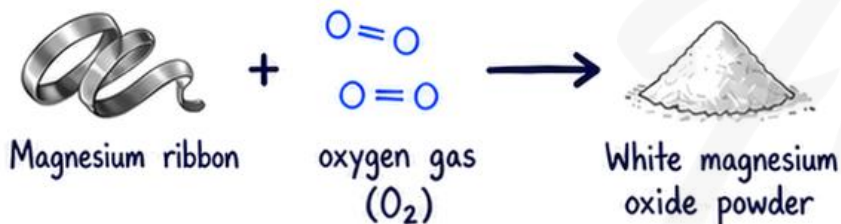
CHEMICAL EQUATIONS: THE LANGUAGE OF REACTIONS

WORD EQUATION

Magnesium + Oxygen → Magnesium oxide

Reactants (LHS) → Product (RHS)

- Reactants undergo chemical change.
- Products are the new substances formed.
- The arrow shows the direction of the reaction.



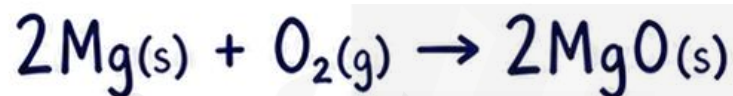
SIGNS AND SIDES

- “+” separates two reactants or two products.
- LHS = reactant side
- RHS = product side
- Never change a chemical formula to balance an equation.

FORMULA EQUATION



Skeletal equation: atom numbers are not equal.



Balanced equation: atom numbers are equal.



PHYSICAL STATE SYMBOLS

(s) solid

(l) liquid

(g) gas

(aq) dissolved in water

State symbols make an equation more informative. They are shown when needed.

CONDITIONS OVER THE ARROW

heat

light

electricity

catalyst / pressure



KEY IDEA: A chemical equation represents a chemical reaction using symbols and formulae.

WHY BALANCE ?

The number of atoms of each element must be the same on the LHS and RHS.



BALANCING A CHEMICAL EQUATION

Law of conservation of mass: mass can neither be created nor destroyed.

HIT-AND-TRIAL METHOD

1. WRITE THE SKELETAL EQUATION



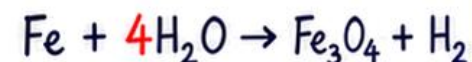
2. DO NOT CHANGE FORMULAE



Put boxes around each formula.
Change coefficients only, never subscripts.



3. BALANCE OXYGEN



$$\text{O: } 4 = 4$$



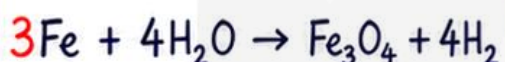
4. BALANCE HYDROGEN



$$\text{H: } 8 = 8$$



5. BALANCE IRON

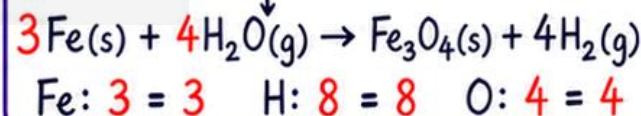


$$\text{Fe: } 3 = 3$$



6. ADD STATES AND CHECK

$\text{H}_2\text{O(g)}$ means steam.



$$\text{Fe: } 3 = 3 \quad \text{H: } 8 = 8 \quad \text{O: } 4 = 4$$

RULES TO REMEMBER

- Start with the compound having the most atoms.
- Use the smallest whole-number coefficients.
- A balanced equation must obey conservation of mass.
- Balance one element at a time.
- Recount every atom at the end.

KEY IDEA: Coefficients balance atoms; subscripts define substances.

COMBINATION REACTIONS AND WHITEWASHING

COMBINATION REACTION

Two or more reactants combine to form a single product.



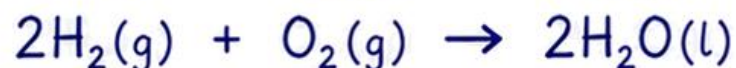
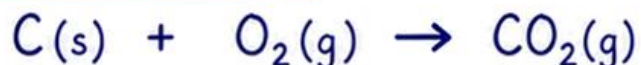
Atoms rearrange as old bonds break and new bonds form.

QUICKLIME + WATER



The reaction is vigorous and the beaker becomes warm.

MORE EXAMPLES



WHITEWASHING



Quicklime and water

Slaked-lime whitewash



Slaked lime slowly reacts with carbon dioxide in air.



A shiny calcium carbonate layer forms after 2–3 days.

Marble formula: CaCO_3

KEY IDEA: A combination reaction makes one product.



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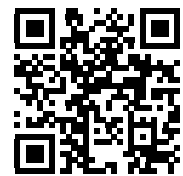


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