

YOUR SCHOOL / COLLEGE NAME

REVISION NOTES

Chemical Reactions and Equations

Complete notes with solved examples

SUBJECT **Science (Chemistry)**

CLASS / COURSE **Class 10 • CBSE**

PREPARED BY **Subject Teacher**

CHAPTER 1: CHEMICAL REACTIONS AND EQUATIONS

A chemical reaction is a process in which one or more substances change into new substances with different properties. We recognise reactions by changes in state, colour, temperature or the evolution of a gas, and we represent them with balanced chemical equations.

Key Definitions

Term	Meaning
Reactant	A substance that takes part in a chemical reaction
Product	A new substance formed in the reaction
Chemical equation	A symbolic representation of a reaction using formulae
Balanced equation	An equation with equal numbers of atoms of each element on both sides
Law of conservation of mass	Mass can neither be created nor destroyed in a chemical reaction

Signs of a Chemical Reaction

Most reactions show at least one observable change. Burning magnesium ribbon, for example, gives a dazzling white flame and leaves a white powder of magnesium oxide.

- Change in state
- Change in colour
- Evolution of a gas
- Change in temperature (heat given out or absorbed)

Writing and Balancing Equations

A word equation is first converted into a skeletal equation using formulae. Coefficients are then placed in front of formulae — never changing the subscripts — until each element has the same number of atoms on both sides.

State symbols (s), (l), (g) and (aq) show the physical state, and conditions such as heat or a catalyst are written above the arrow.

- Write the skeletal equation

- Count atoms of each element on both sides
- Balance the element that appears in the fewest formulae first
- Check the final count; add state symbols

Solved Examples

Q1. Balance: $\text{Fe} + \text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + \text{H}_2$

Place 3 before Fe and 4 before H_2O , then 4 before H_2 : $3\text{Fe} + 4\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$. Each side now has 3 Fe, 8 H and 4 O atoms.

Q2. Why is a magnesium ribbon cleaned before burning?

It is covered with a layer of magnesium oxide; rubbing with sandpaper removes the layer so that the metal can react directly with oxygen.

Exam tip

In balancing questions, always show the atom count in a small table — examiners award a step mark for it even if the final coefficient is wrong.

Practice Questions

A. Multiple choice

1. Which of these is a chemical change?
(a) Melting of ice (b) Rusting of iron (c) Dissolving sugar (d) Boiling water
2. The law of conservation of mass was given by
(a) Dalton (b) Lavoisier (c) Newton (d) Bohr
3. The state symbol (aq) means
(a) Solid (b) Gas (c) Dissolved in water (d) Liquid
4. In a balanced equation, what is changed to balance it?
(a) Subscripts (b) Coefficients (c) Formulae (d) State symbols

B. Short answer

1. Why should a chemical equation be balanced?
2. Write two observations when lead nitrate is heated.
3. What is a skeletal equation?

C. Long answer

4. Explain the steps of balancing a chemical equation with a suitable example.
5. Describe four observable signs of a chemical reaction with one example each.

CHAPTER 2: TYPES OF CHEMICAL REACTIONS

Reactions are classified by what happens to the reactants: whether they combine, break apart, swap partners, or gain and lose oxygen or electrons. Recognising the type helps predict products.

Key Definitions

Term	Meaning
Combination reaction	Two or more substances combine to form a single product
Decomposition reaction	A single substance breaks into two or more simpler substances
Displacement reaction	A more reactive element displaces a less reactive one from its compound
Double displacement	Two compounds exchange ions to form two new compounds
Precipitate	An insoluble solid formed in a solution
Exothermic reaction	A reaction that releases heat

Combination and Decomposition

Burning of coal ($C + O_2 \rightarrow CO_2$) and the formation of slaked lime from quicklime are combination reactions. Both release heat, so they are also exothermic.

Decomposition needs energy in the form of heat (thermal), light (photolytic) or electricity (electrolytic). Silver chloride turning grey in sunlight is a photolytic decomposition used in black-and-white photography.

Displacement and Double Displacement

When an iron nail is dipped in copper sulphate solution, the blue colour fades and a brown coating appears, because iron is more reactive than copper.

Mixing sodium sulphate and barium chloride solutions forms a white precipitate of barium sulphate — a double displacement or precipitation reaction.

- $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$
- $Na_2SO_4 + BaCl_2 \rightarrow BaSO_4 \downarrow + 2NaCl$

Solved Examples

Q1. Identify the type: $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ (on heating)

Thermal decomposition — one reactant breaks into two products when heated.

Q2. Why does the colour of copper sulphate solution change when an iron nail is dipped in it?

Iron displaces copper from copper sulphate, forming pale green iron sulphate; the blue colour of Cu^{2+} ions fades.

Exam tip

Learn one standard example for every reaction type, with its balanced equation — most 3-mark questions ask for exactly that.

Practice Questions

A. Multiple choice

- Electrolysis of water is an example of
(a) Combination (b) Decomposition (c) Displacement (d) Neutralisation
- A white precipitate forms when Na_2SO_4 reacts with
(a) NaCl (b) BaCl_2 (c) KNO_3 (d) HCl
- Respiration is
(a) Endothermic (b) Exothermic (c) A displacement reaction (d) Physical change
- Which metal can displace copper from CuSO_4 ?
(a) Silver (b) Gold (c) Zinc (d) Platinum

B. Short answer

- Give one example each of photolytic and electrolytic decomposition.
- Why is respiration considered an exothermic reaction?
- What is a precipitation reaction?

C. Long answer

- Explain combination, decomposition and displacement reactions with balanced equations.
- Describe an activity to show a displacement reaction and state the observations.

QUICK REVISION SHEET

Chapter	Term	Remember
Chemical Reactions and Equations	Reactant	A substance that takes part in a chemical reaction

Chapter	Term	Remember
Chemical Reactions and Equations	Product	A new substance formed in the reaction
Chemical Reactions and Equations	Chemical equation	A symbolic representation of a reaction using formulae
Types of Chemical Reactions	Combination reaction	Two or more substances combine to form a single product
Types of Chemical Reactions	Decomposition reaction	A single substance breaks into two or more simpler substances
Types of Chemical Reactions	Displacement reaction	A more reactive element displaces a less reactive one from its compound

ANSWER KEY

Chapter	Question	Answer
1	1	b
1	2	b
1	3	c
1	4	b
2	1	b
2	2	b
2	3	b
2	4	c