

Important Concepts from Chapter 1: Chemical Reactions and Equations

1. Chemical Reaction

- Definition: A process in which one or more substances (reactants) are transformed into new substances (products) with different chemical properties.
- Indicators of a Chemical Reaction:
 - Change in state (e.g., solid to gas)
 - Change in colour
 - Evolution of gas (bubbles)
 - Change in temperature (exothermic/endothermic)
 - Formation of a precipitate

NCERT Reference: Page 1, Section 1.1 – “Chemical Equations”

2. Chemical Equation

- Word Equation: Uses names of substances (e.g., Magnesium + Oxygen → Magnesium oxide)
- Skeleton Equation: Uses chemical formulas but not balanced (e.g., $\text{Mg} + \text{O}_2 \rightarrow \text{MgO}$)
- Balanced Chemical Equation: Follows the Law of Conservation of Mass – atoms of each element are equal on both sides.

Example:

Unbalanced: $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$

Balanced: $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

NCERT Reference: Page 2–3, Section 1.2 – “Balanced Chemical Equations”

3. Steps to Balance a Chemical Equation

1. Write the unbalanced equation.
2. Count atoms of each element on both sides.
3. Use coefficients (not subscripts!) to balance atoms—start with metals, then non-metals, leave H and O for last.
4. Check all atoms are balanced.

Tip: For complex reactions (e.g., combustion), use the hit-and-trial method or algebraic method.

4. Types of Chemical Reactions

(a) Combination Reaction

- Two or more substances combine to form a single product.

General form: $A + B \rightarrow AB$

Example: $\text{CaO(s)} + \text{H}_2\text{O(l)} \rightarrow \text{Ca(OH)}_2\text{(aq)} + \text{Heat (Exothermic)}$

(b) Decomposition Reaction

- A single compound breaks down into two or more simpler substances.

Requires energy (heat, light, electricity).

General form: $AB \rightarrow A + B$

Examples:

- Thermal: $2\text{FeSO}_4\text{(s)} \rightarrow \text{Fe}_2\text{O}_3\text{(s)} + \text{SO}_2\text{(g)} + \text{SO}_3\text{(g)}$
- Electrolytic: $2\text{H}_2\text{O(l)} \rightarrow 2\text{H}_2\text{(g)} + \text{O}_2\text{(g)}$ (with electricity)
- Photolytic: $2\text{AgBr(s)} \rightarrow 2\text{Ag(s)} + \text{Br}_2\text{(g)}$ (in sunlight)

(c) Displacement Reaction

- More reactive element displaces a less reactive one from its compound.

General form: $A + BC \rightarrow AC + B$

Example: $\text{Zn(s)} + \text{CuSO}_4\text{(aq)} \rightarrow \text{ZnSO}_4\text{(aq)} + \text{Cu(s)}$

(d) Double Displacement Reaction

- Ions exchange between two compounds. Often forms a precipitate, gas, or water.

General form: $AB + CD \rightarrow AD + CB$

Example: $\text{Na}_2\text{SO}_4\text{(aq)} + \text{BaCl}_2\text{(aq)} \rightarrow \text{BaSO}_4\text{(s)}\downarrow + 2\text{NaCl(aq)}$

(e) Redox Reactions (Oxidation & Reduction)

- Oxidation: Loss of electrons / gain of oxygen / loss of hydrogen
- Reduction: Gain of electrons / loss of oxygen / gain of hydrogen
- Occur simultaneously $\rightarrow$ Redox reaction

Example: $\text{CuO} + \text{H}_2 \rightarrow \text{Cu} + \text{H}_2\text{O}$

- CuO is reduced (loses O), H_2 is oxidized (gains O)

MCQs 1–50

1. Which of the following is not a physical change?

(a) Boiling of water
(b) Melting of ice
(c) Burning of paper
(d) Dissolving sugar in water

Answer: (c)

Explanation: Burning of paper produces new substances (ash, CO_2), so it's a chemical change.

Ref: NCERT Pg 1, Section 1.1

2. The reaction: $2\text{Pb}(\text{NO}_3)_2 \rightarrow 2\text{PbO} + 4\text{NO}_2 + \text{O}_2$ is an example of:

(a) Combination
(b) Displacement
(c) Thermal decomposition
(d) Double displacement

Answer: (c)

Explanation: Lead nitrate decomposes on heating. Brown NO_2 gas is evolved.

Ref: NCERT Pg 8, Activity 1.5

3. Magnesium ribbon is rubbed before burning because:

(a) It removes moisture
(b) It removes oxide layer
(c) It makes it shiny
(d) It increases reactivity

Answer: (b)

Explanation: Mg forms MgO coating in air; rubbing exposes pure Mg.

Ref: NCERT Pg 6, Activity 1.2

4. Which gas turns lime water milky?

(a) H_2
(b) O_2
(c) CO_2
(d) N_2

Answer: (c)

Explanation: $\text{CO}_2 + \text{Ca}(\text{OH})_2 \rightarrow \text{CaCO}_3\downarrow (\text{white ppt}) + \text{H}_2\text{O}$

Ref: NCERT Pg 10, Activity 1.8

5. In the reaction $\text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu}$, zinc is:

(a) Reduced
(b) Oxidized
(c) Neither oxidized nor reduced
(d) A catalyst

Answer: (b)

Explanation: Zn loses electrons ($\text{Zn} \rightarrow \text{Zn}^{2+} + 2\text{e}^-$), so oxidized.

Ref: NCERT Pg 12, Section 1.5

6. Rancidity of food can be prevented by:

- (a) Adding salt
- (b) Storing in sunlight
- (c) Flushing with nitrogen
- (d) Heating regularly

Answer: (c)

Explanation: Nitrogen prevents oxidation of oils.

Ref: NCERT Pg 14, Para 1.6

7. The brown gas evolved during thermal decomposition of copper nitrate is:

- (a) O_2
- (b) NO
- (c) NO_2
- (d) Cl_2

Answer: (c)

Explanation: $2\text{Cu}(\text{NO}_3)_2 \rightarrow 2\text{CuO} + 4\text{NO}_2\uparrow + \text{O}_2\uparrow$

Ref: NCERT Pg 8

8. Which of the following is a double displacement reaction?

- (a) $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
- (b) $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2$
- (c) $\text{Na}_2\text{SO}_4 + \text{BaCl}_2 \rightarrow \text{BaSO}_4 + 2\text{NaCl}$
- (d) $2\text{AgCl} \rightarrow 2\text{Ag} + \text{Cl}_2$

Answer: (c)

Explanation: Ions exchange; BaSO_4 is a white precipitate.

Ref: NCERT Pg 10, Activity 1.9

9. Photosynthesis is:

- (a) Exothermic
- (b) Endothermic
- (c) Displacement
- (d) Redox only

Answer: (b)

Explanation: Absorbs solar energy $\rightarrow$ endothermic.

Ref: NCERT Pg 6

10. Balanced equation for: $\text{Al} + \text{HCl} \rightarrow \text{AlCl}_3 + \text{H}_2$ is:

- (a) $\text{Al} + \text{HCl} \rightarrow \text{AlCl}_3 + \text{H}_2$
- (b) $2\text{Al} + 6\text{HCl} \rightarrow 2\text{AlCl}_3 + 3\text{H}_2$
- (c) $\text{Al} + 3\text{HCl} \rightarrow \text{AlCl}_3 + \text{H}_2$
- (d) $3\text{Al} + 2\text{HCl} \rightarrow 3\text{AlCl}_2 + \text{H}_2$

Answer: (b)

Explanation: Al = 2, H = 6, Cl = 6 on both sides.

Ref: NCERT Pg 5, Exercise Q6

11. Tarnishing of silver is due to formation of:

- (a) AgCl

- (b) Ag₂O
- (c) Ag₂S
- (d) AgNO₃

Answer: (c)

Explanation: $4\text{Ag} + 2\text{H}_2\text{S} + \text{O}_2 \rightarrow 2\text{Ag}_2\text{S} + 2\text{H}_2\text{O}$

Ref: NCERT Pg 13

12. Which is an exothermic process?

- (a) Electrolysis of water
- (b) Decomposition of CaCO₃
- (c) Respiration
- (d) Photosynthesis

Answer: (c)

Explanation: Releases energy.

Ref: NCERT Pg 6

13. The reaction: $\text{Fe}_2\text{O}_3 + 2\text{Al} \rightarrow \text{Al}_2\text{O}_3 + 2\text{Fe}$ is called:

- (a) Combination
- (b) Displacement
- (c) Double displacement
- (d) Decomposition

Answer: (b)

Explanation: Al displaces Fe (more reactive).

Ref: NCERT Pg 9, Activity 1.7

14. In the reaction: $\text{CuO} + \text{H}_2 \rightarrow \text{Cu} + \text{H}_2\text{O}$, the reducing agent is:

- (a) CuO
- (b) H₂
- (c) Cu
- (d) H₂O

Answer: (b)

Explanation: H₂ reduces CuO → reducing agent.

Ref: NCERT Pg 12

15. Which metal does not react with dilute HCl?

- (a) Zn
- (b) Mg
- (c) Cu
- (d) Fe

Answer: (c)

Explanation: Cu is below H in reactivity series.

Ref: NCERT Pg 9

16. Corrosion of iron is called:

- (a) Tarnishing
- (b) Rusting
- (c) Rancidity
- (d) Oxidation

Answer: (b)

Explanation: Hydrated iron oxide ($\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$).

Ref: NCERT Pg 13

17. Antioxidants are added to food to prevent:

- (a) Corrosion
- (b) Fermentation
- (c) Rancidity
- (d) Decomposition

Answer: (c)

Ref: NCERT Pg 14

18. Which reaction is used in black and white photography?

- (a) $2\text{AgCl} \rightarrow 2\text{Ag} + \text{Cl}_2$
- (b) $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$
- (c) $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2$
- (d) $\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^{2+} + \text{Cu}$

Answer: (a)

Explanation: Photodecomposition of AgCl.

Ref: NCERT Pg 9, Activity 1.6

19. The correct balanced equation for combustion of methane is:

- (a) $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
- (b) $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
- (c) $2\text{CH}_4 + \text{O}_2 \rightarrow 2\text{CO}_2 + 2\text{H}_2\text{O}$
- (d) $\text{CH}_4 + \text{O}_2 \rightarrow \text{C} + 2\text{H}_2\text{O}$

Answer: (b)

Ref: NCERT Pg 5

20. When CO_2 is passed in excess through lime water, milkiness disappears because:

- (a) CaCO_3 dissolves
- (b) $\text{Ca(HCO}_3)_2$ forms (soluble)
- (c) No reaction occurs
- (d) CO_2 is absorbed

Answer: (b)

Explanation: $\text{CaCO}_3 + \text{H}_2\text{O} + \text{CO}_2 \rightarrow \text{Ca(HCO}_3)_2$ (soluble)

Ref: NCERT Pg 10

21. Which is not a redox reaction?

- (a) $\text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu}$
- (b) $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
- (c) $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$
- (d) $\text{CuO} + \text{H}_2 \rightarrow \text{Cu} + \text{H}_2\text{O}$

Answer: (b)

Explanation: Neutralization – no change in oxidation state.

Ref: NCERT Pg 12

22. Galvanization prevents rusting by coating iron with:

- (a) Copper
- (b) Zinc

- (c) Silver
- (d) Chromium

Answer: (b)

Ref: NCERT Pg 13

23. The colour of ferrous sulphate crystals is:

- (a) Blue
- (b) Green
- (c) White
- (d) Brown

Answer: (b)

Explanation: $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ is green. Turns white on heating.

Ref: NCERT Pg 7, Activity 1.4

24. Which gas has a pungent smell of burning sulphur?

- (a) H_2
- (b) O_2
- (c) SO_2
- (d) CO_2

Answer: (c)

Ref: NCERT Pg 7

25. In the reaction: $\text{Pb} + \text{CuCl}_2 \rightarrow \text{PbCl}_2 + \text{Cu}$, lead is:

- (a) More reactive than Cu
- (b) Less reactive than Cu
- (c) Equally reactive
- (d) Not reactive

Answer: (a)

Ref: NCERT Pg 9

26. The substance that gets oxidized in a reaction is called:

- (a) Oxidizing agent
- (b) Reducing agent
- (c) Catalyst
- (d) None

Answer: (b)

Ref: NCERT Pg 12

27. Which reaction is endothermic?

- (a) Burning of LPG
- (b) Respiration
- (c) Decomposition of limestone
- (d) Neutralization

Answer: (c)

Ref: NCERT Pg 6

28. The chemical formula of slaked lime is:

- (a) CaO
- (b) Ca(OH)_2
- (c) CaCO_3

(d) $\text{Ca}(\text{HCO}_3)_2$

Answer: (b)

Ref: NCERT Pg 6

29. Which is a precipitation reaction?

(a) $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$

(b) $\text{AgNO}_3 + \text{NaCl} \rightarrow \text{AgCl}\downarrow + \text{NaNO}_3$

(c) $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$

(d) $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$

Answer: (b)

Ref: NCERT Pg 10

30. The number of molecules of water in $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ is:

(a) 1

(b) 3

(c) 5

(d) 7

Answer: (c)

Ref: NCERT Pg 10

31. Quicklime reacts vigorously with water to form:

(a) Slaked lime

(b) Limestone

(c) Gypsum

(d) Plaster of Paris

Answer: (a)

Ref: NCERT Pg 6

32. Which is not observed in a chemical reaction?

(a) Change in temperature

(b) Evolution of gas

(c) Change in mass

(d) Formation of precipitate

Answer: (c)

Explanation: Mass is conserved (Law of Conservation of Mass).

Ref: NCERT Pg 2

33. The reaction between an acid and a base is called:

(a) Displacement

(b) Neutralization

(c) Decomposition

(d) Combination

Answer: (b)

Ref: NCERT Pg 10

34. In the equation: $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$, the catalyst used is:

(a) Fe

(b) MnO_2

(c) Cu

(d) Zn

Answer: (b)

Ref: NCERT Pg 8

35. Which metal displaces copper from CuSO_4 ?

- (a) Ag
- (b) Au
- (c) Zn
- (d) Pt

Answer: (c)

Ref: NCERT Pg 9

36. The oxidation state of oxygen in most compounds is:

- (a) +1
- (b) -1
- (c) -2
- (d) 0

Answer: (c)

Ref: NCERT Pg 12

37. Food items containing oil and fat become rancid due to:

- (a) Hydrolysis
- (b) Oxidation
- (c) Reduction
- (d) Fermentation

Answer: (b)

Ref: NCERT Pg 14

38. Which is a physical change?

- (a) Rusting
- (b) Cooking
- (c) Sublimation of camphor
- (d) Burning

Answer: (c)

Ref: NCERT Pg 1

39. The reaction: $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ is:

- (a) Combination
- (b) Thermal decomposition
- (c) Displacement
- (d) Redox

Answer: (b)

Ref: NCERT Pg 8

40. In the reaction: $2\text{AgBr} \rightarrow 2\text{Ag} + \text{Br}_2$, silver bromide is:

- (a) Oxidized
- (b) Reduced
- (c) Both oxidized and reduced
- (d) Neither

Answer: (b)

Explanation: $\text{Ag}^+ \rightarrow \text{Ag}$ (reduction), $\text{Br}^- \rightarrow \text{Br}_2$ (oxidation) $\rightarrow$ redox. But AgBr is

reduced overall.

Ref: NCERT Pg 9

41. Which is used to test hydrogen gas?

- (a) Lime water
- (b) Burning splinter
- (c) Litmus paper
- (d) Moist starch iodide paper

Answer: (b)

Explanation: Burns with pop sound.

Ref: NCERT Pg 9

42. The correct formula of iron(III) oxide is:

- (a) FeO
- (b) Fe₂O₃
- (c) Fe₃O₄
- (d) FeO₂

Answer: (b)

Ref: NCERT Pg 13

43. Which reaction is used in fire extinguishers?

- (a) $\text{NaHCO}_3 + \text{H}^+ \rightarrow \text{CO}_2$
- (b) $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
- (c) $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2$
- (d) $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2$

Answer: (a)

Ref: NCERT Pg 10

44. The symbol (aq) stands for:

- (a) Aqueous
- (b) Aquatic
- (c) Acidic
- (d) Alkaline

Answer: (a)

Ref: NCERT Pg 2

45. Which is not a type of chemical reaction?

- (a) Combination
- (b) Substitution
- (c) Decomposition
- (d) Displacement

Answer: (b)

Explanation: In Class 10, it's called "displacement", not substitution.

Ref: NCERT Pg 9

46. The reaction: $\text{NH}_3 + \text{HCl} \rightarrow \text{NH}_4\text{Cl}$ is:

- (a) Decomposition
- (b) Combination
- (c) Displacement
- (d) Double displacement

Answer: (b)

Ref: NCERT Pg 6

47. Which gas is produced when sodium carbonate reacts with HCl?

- (a) H_2
- (b) O_2
- (c) CO_2
- (d) Cl_2

Answer: (c)

Explanation: $\text{Na}_2\text{CO}_3 + 2\text{HCl} \rightarrow 2\text{NaCl} + \text{H}_2\text{O} + \text{CO}_2\uparrow$

Ref: NCERT Pg 10

48. The colour of copper after displacement from CuSO_4 is:

- (a) Blue
- (b) Green
- (c) Brown
- (d) White

Answer: (c)

Ref: NCERT Pg 9

49. Which is a balanced equation?

- (a) $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$
- (b) $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
- (c) $\text{H}_2 + 2\text{O}_2 \rightarrow \text{H}_2\text{O}$
- (d) $2\text{H}_2 + 2\text{O}_2 \rightarrow 2\text{H}_2\text{O}$

Answer: (b)

Ref: NCERT Pg 3

50. The law followed in balancing chemical equations is:

- (a) Law of constant proportion
- (b) Law of conservation of mass
- (c) Law of multiple proportions
- (d) Avogadro's law

Answer: (b)

Ref: NCERT Pg 2



Section B: 20 Short Answer Questions (2–3 marks)

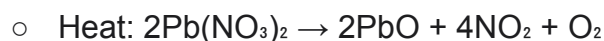
1. Why is the amount of gas collected in one test tube double that in the other during electrolysis of water?

Ans: Water (H_2O) has 2 H atoms and 1 O atom. So, $\text{H}_2:\text{O}_2 = 2:1$ by volume.

Ref: NCERT Pg 8, Activity 1.5

2. Write one equation each for decomposition reactions where energy is supplied as heat, light, and electricity.

Ans:



- Light: $2\text{AgBr} \rightarrow 2\text{Ag} + \text{Br}_2$
- Electricity: $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$

Ref: NCERT Pg 8–9

3. What do you mean by exothermic and endothermic reactions? Give examples.

Ans:

- Exothermic: Releases heat (e.g., burning LPG)
- Endothermic: Absorbs heat (e.g., photosynthesis)

Ref: NCERT Pg 6

4. Why is respiration considered an exothermic reaction? Explain.

Ans: Glucose breaks down to release energy for body functions.

Equation: $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{Energy}$

Ref: NCERT Pg 6

5. Why do we apply paint on iron articles?

Ans: To prevent contact with air and moisture, thus preventing rusting.

Ref: NCERT Pg 13

6. Oil and fat-containing food items are flushed with nitrogen. Why?

Ans: Nitrogen prevents oxidation of oils, thus avoiding rancidity.

Ref: NCERT Pg 14

7. Explain the term “corrosion” with an example.

Ans: Gradual destruction of metals by reaction with environment.

Example: Rusting of iron: $4\text{Fe} + 3\text{O}_2 + 2\text{H}_2\text{O} \rightarrow 2\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$

Ref: NCERT Pg 13

8. What is a balanced chemical equation? Why should it be balanced?

Ans: An equation with equal atoms of each element on both sides. It follows the Law of Conservation of Mass.

Ref: NCERT Pg 2

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

Ans: $3\text{Fe} + 4\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$

Ref: NCERT Pg 5, Exercise Q6

10. What is rancidity? How can it be prevented?

Ans: Oxidation of fats/oils causing bad smell. Prevented by antioxidants, refrigeration, nitrogen flushing.

Ref: NCERT Pg 14

11. Give an example of a double displacement reaction.

Ans: $\text{Na}_2\text{SO}_4(\text{aq}) + \text{BaCl}_2(\text{aq}) \rightarrow \text{BaSO}_4(\text{s})\downarrow + 2\text{NaCl}(\text{aq})$

Ref: NCERT Pg 10

12. Identify the substances oxidized and reduced in: $4\text{Na} + \text{O}_2 \rightarrow 2\text{Na}_2\text{O}$

Ans: Na is oxidized ($0 \rightarrow +1$), O_2 is reduced ($0 \rightarrow -2$).

Ref: NCERT Pg 12

13. What happens when dilute HCl is added to iron filings?

Ans: $\text{Fe} + 2\text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2\uparrow$ (green solution, gas evolved)

Ref: NCERT Pg 9

14. Why is a magnesium ribbon cleaned before burning?
Ans: To remove MgO layer formed due to air exposure.
Ref: NCERT Pg 6
15. Write the balanced equation for: Barium chloride + potassium sulphate → barium sulphate + potassium chloride
Ans: $\text{BaCl}_2 + \text{K}_2\text{SO}_4 \rightarrow \text{BaSO}_4\downarrow + 2\text{KCl}$
Ref: NCERT Pg 5
16. What is a precipitation reaction? Explain with example.
Ans: Reaction forming insoluble salt. E.g., $\text{AgNO}_3 + \text{NaCl} \rightarrow \text{AgCl}\downarrow + \text{NaNO}_3$
Ref: NCERT Pg 10
17. Name the product formed when quicklime reacts with water. Is it exothermic?
Ans: Slaked lime $[\text{Ca}(\text{OH})_2]$; yes, highly exothermic.
Ref: NCERT Pg 6
18. What is the difference between displacement and double displacement reactions?
Ans:
 - Displacement: $\text{A} + \text{BC} \rightarrow \text{AC} + \text{B}$
 - Double displacement: $\text{AB} + \text{CD} \rightarrow \text{AD} + \text{CB}$Ref: NCERT Pg 9–10
19. Why is decomposition reaction considered the opposite of combination reaction?
Ans: Combination: $\text{A} + \text{B} \rightarrow \text{AB}$; Decomposition: $\text{AB} \rightarrow \text{A} + \text{B}$
Ref: NCERT Pg 6, 8
20. What happens when CO_2 is passed through lime water for a long time?
Ans: Milkiness appears (CaCO_3), then disappears (forms soluble $\text{Ca}(\text{HCO}_3)_2$).
Ref: NCERT Pg 10
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Section C: 20 Long Answer Questions (5 marks)

1. Explain the different types of decomposition reactions with suitable examples.
Ans:
 - Thermal: $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ (heat)
 - Electrolytic: $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$ (electricity)
 - Photolytic: $2\text{AgBr} \rightarrow 2\text{Ag} + \text{Br}_2$ (sunlight)Ref: NCERT Pg 8–9
2. Describe an activity to show the reaction of a metal with a salt solution. Write the chemical equation and identify the type of reaction.
Ans:
 - Activity: Add Zn granules to CuSO_4 solution.
 - Observation: Blue colour fades, brown Cu deposits.
 - Equation: $\text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu}$

- Type: Displacement (redox)
Ref: NCERT Pg 9, Activity 1.7

3. What is a redox reaction? Explain with two examples involving oxidation and reduction.

Ans:

- Definition: Simultaneous oxidation & reduction.
- Ex1: $\text{CuO} + \text{H}_2 \rightarrow \text{Cu} + \text{H}_2\text{O}$ → CuO reduced, H₂ oxidized
- Ex2: $\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^{2+} + \text{Cu}$ → Zn oxidized, Cu²⁺ reduced

Ref: NCERT Pg 12

4. Write balanced chemical equations for the following and identify the type of reaction in each case:

- (a) Potassium bromide + barium iodide → potassium iodide + barium bromide
- (b) Zinc carbonate → zinc oxide + carbon dioxide
- (c) Hydrogen + chlorine → hydrogen chloride

Ans:

- (a) $2\text{KBr} + \text{BaI}_2 \rightarrow 2\text{KI} + \text{BaBr}_2$ (Double displacement)
- (b) $\text{ZnCO}_3 \rightarrow \text{ZnO} + \text{CO}_2$ (Decomposition)
- (c) $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$ (Combination)

Ref: NCERT Pg 5–6

5. Explain corrosion and rancidity. Give two methods to prevent each.

Ans:

- Corrosion: Rusting of iron. Prevention: Painting, galvanization.
- Rancidity: Spoilage of fats. Prevention: Nitrogen flushing, antioxidants.

Ref: NCERT Pg 13–14

6. Balance the following equations and state the type of reaction:

- (i) $\text{Fe} + \text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + \text{H}_2$
- (ii) $\text{Pb}(\text{NO}_3)_2 \rightarrow \text{PbO} + \text{NO}_2 + \text{O}_2$

Ans:

- (i) $3\text{Fe} + 4\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$ (Displacement)
- (ii) $2\text{Pb}(\text{NO}_3)_2 \rightarrow 2\text{PbO} + 4\text{NO}_2 + \text{O}_2$ (Decomposition)

Ref: NCERT Pg 5, 8

7. Describe the observations when:

- (a) Iron nails are placed in CuSO₄ solution
- (b) Quicklime is added to water

Ans:

- (a) Blue → green, brown deposit ($\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$)
- (b) Vigorous bubbling, hissing, heat released ($\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2$)

Ref: NCERT Pg 9, 6

8. Why is respiration an exothermic reaction? Why is photosynthesis endothermic?

Ans:

- Respiration: Breaks glucose → releases energy.
- Photosynthesis: Uses solar energy to build glucose.

Ref: NCERT Pg 6

9. What is the importance of writing state symbols in chemical equations? Give examples.

Ans: Shows physical state: (s), (l), (g), (aq).

Example: $\text{CaCO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{CaCl}_2(\text{aq}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g})$

Ref: NCERT Pg 2

10. Explain the term "reactivity series". How does it help predict displacement reactions?

Ans: Metals arranged by reactivity. A more reactive metal displaces less reactive one from its salt.

Example: $\text{Zn} > \text{Cu} \rightarrow \text{Zn displaces Cu from CuSO}_4$.

Ref: NCERT Pg 9

11. Write chemical equations for:

(a) Burning of magnesium

(b) Heating of ferrous sulphate

(c) Action of steam on iron

Ans:

(a) $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$

(b) $2\text{FeSO}_4 \rightarrow \text{Fe}_2\text{O}_3 + \text{SO}_2 + \text{SO}_3$

(c) $3\text{Fe} + 4\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$

Ref: NCERT Pg 6, 7, 5

12. Differentiate between oxidation and reduction in terms of oxygen/hydrogen transfer.

Ans:

○ Oxidation: Gain of O / loss of H

○ Reduction: Loss of O / gain of H

Example: $\text{CuO} + \text{H}_2 \rightarrow \text{Cu} + \text{H}_2\text{O} \rightarrow \text{CuO reduced, H}_2 \text{ oxidized}$

Ref: NCERT Pg 12

13. How can you demonstrate that a chemical reaction has occurred? List five observations.

Ans:

○ Colour change

○ Gas evolution

○ Temperature change

○ Precipitate formation

○ Odour change

Ref: NCERT Pg 1

14. Explain the process of balancing a chemical equation with an example.

Ans:

○ Step 1: Write unbalanced eq: $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$

○ Step 2: Balance O: $\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

○ Step 3: Balance H: $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

Ref: NCERT Pg 3–5

○

15. What is the effect of oxidation in daily life? Explain with two examples.

Ans:

- Corrosion: Damage to bridges, cars
- Rancidity: Spoiled food

Ref: NCERT Pg 13–14

16. Describe an activity to show the decomposition of water. What gases are collected?

Ans:

- Activity: Electrolysis of acidified water.
- Gases: H_2 at cathode, O_2 at anode (2:1 ratio)

Ref: NCERT Pg 8

17. Why is a combustion reaction considered an oxidation reaction?

Ans: Fuel combines with oxygen $\rightarrow$ e.g., $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$. Carbon is oxidized.

Ref: NCERT Pg 12

18. Write the chemical equation for the reaction between sodium sulphate and barium chloride. What type of reaction is it?

Ans: $Na_2SO_4 + BaCl_2 \rightarrow BaSO_4\downarrow + 2NaCl$ (Double displacement, precipitation)

Ref: NCERT Pg 10

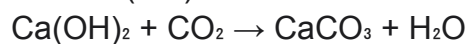
19. How is the black coating on silver ornaments formed? Write the chemical equation.

Ans: Due to H_2S in air: $4Ag + 2H_2S + O_2 \rightarrow 2Ag_2S + 2H_2O$

Ref: NCERT Pg 13

20. Explain why the walls coated with slaked lime turn white after 2–3 days.

Ans: $Ca(OH)_2$ reacts with CO_2 to form white $CaCO_3$:



Ref: NCERT Pg 6