

Chemistry MCQ Practice

+2 1st Year (Class XI)

47 questions · 9 chapters · answers with explanations

How to use: attempt each chapter's questions without looking, then check the Answer Key at the end. Read the one-line explanation for every question you got wrong, and revise that topic in your notes.

Some Basic Concepts of Chemistry

- One mole of any substance contains
 - 6.022×10^{23} particles
 - 6.022×10^{22} particles
 - 3.011×10^{23} particles
 - 1000 particles
- The molar mass of H_2O is
 - 16 g/mol
 - 18 g/mol
 - 20 g/mol
 - 10 g/mol
- The volume occupied by 1 mole of an ideal gas at STP (273 K, 1 atm) is
 - 11.2 L
 - 22.4 L
 - 1 L
 - 44.8 L
- Molarity is defined as moles of solute per
 - kg of solvent
 - litre of solution
 - litre of solvent
 - 100 g of solution
- The empirical formula of glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) is
 - CHO
 - CH_2O
 - $\text{C}_2\text{H}_4\text{O}_2$
 - $\text{C}_6\text{H}_{12}\text{O}_6$
- How many moles are there in 44 g of CO_2 ?
 - 0.5
 - 1
 - 2
 - 44

Structure of Atom

- The maximum number of electrons in a shell with principal quantum number n is
 - n^2
 - $2n^2$
 - $2n$
 - n
- The number of orbitals in a d-subshell is
 - 1
 - 3
 - 5
 - 7
- The electronic configuration of sodium ($Z = 11$) is
 - $1s^2 2s^2 2p^6 3s^1$
 - $1s^2 2s^2 2p^7$
 - $1s^2 2s^2 2p^5 3s^2$
 - $1s^2 2s^2 3s^1$

10. Hund's rule deals with the filling of
(a) orbitals in order of energy (b) degenerate orbitals singly first
(c) two electrons with opposite spin (d) the nucleus
11. The Heisenberg uncertainty principle applies mainly to
(a) large bodies
(b) microscopic particles such as electrons
(c) planets
(d) cars
12. For $l = 1$, the subshell is
(a) s (b) p
(c) d (d) f

Classification of Elements and Periodicity

13. The modern periodic law is based on
(a) atomic mass (b) atomic number
(c) number of neutrons (d) density
14. Which element has the highest electronegativity?
(a) oxygen (b) fluorine
(c) chlorine (d) nitrogen
15. Across a period from left to right, atomic radius generally
(a) increases (b) decreases
(c) stays the same (d) first decreases then increases
16. Noble gases are placed in group
(a) 1 (b) 17
(c) 18 (d) 2
17. Which has the highest first ionisation enthalpy?
(a) Na (b) Mg
(c) Ne (d) Li

Chemical Bonding and Molecular Structure

18. The shape of the methane (CH_4) molecule is
(a) square planar (b) tetrahedral
(c) trigonal planar (d) linear
19. The bond angle in the water molecule is about
(a) 109.5° (b) 104.5°
(c) 120° (d) 180°
20. The hybridisation of carbon in ethyne (C_2H_2) is
(a) sp (b) sp^2
(c) sp^3 (d) dsp^2
21. The bond order of the O_2 molecule is
(a) 1 (b) 2
(c) 3 (d) 2.5

22. Which molecule is paramagnetic?

- (a) N_2
- (b) O_2
- (c) H_2
- (d) F_2

23. Hydrogen bonding explains the high boiling point of

- (a) H_2S
- (b) H_2O
- (c) CH_4
- (d) HCl

Chemical Thermodynamics

24. For a spontaneous process at constant T and P

- (a) $\Delta G > 0$
- (b) $\Delta G < 0$
- (c) $\Delta G = 0$
- (d) $\Delta H = 0$

25. Hess's law is a consequence of the fact that enthalpy is a

- (a) path function
- (b) state function
- (c) intensive property
- (d) vector

26. An exothermic reaction has

- (a) $\Delta H > 0$
- (b) $\Delta H < 0$
- (c) $\Delta H = 0$
- (d) $\Delta S = 0$ always

27. The relation between ΔG , ΔH and ΔS is

- (a) $\Delta G = \Delta H + T\Delta S$
- (b) $\Delta G = \Delta H - T\Delta S$
- (c) $\Delta G = T\Delta S - \Delta H$
- (d) $\Delta G = \Delta H \times \Delta S$

28. Which of these is an extensive property?

- (a) temperature
- (b) pressure
- (c) volume
- (d) density

Equilibrium

29. The pH of a 0.001 M HCl solution is

- (a) 1
- (b) 2
- (c) 3
- (d) 11

30. Adding a catalyst to a reaction at equilibrium

- (a) shifts it forward
- (b) shifts it backward
- (c) does not shift it
- (d) stops the reaction

31. For $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$, increasing the pressure shifts the equilibrium

- (a) to the left
- (b) to the right
- (c) nowhere
- (d) first left then right

32. A buffer solution resists changes in

- (a) temperature
- (b) pH
- (c) volume
- (d) colour

33. At 25 °C, the ionic product of water K_w is

- (a) 10^{-7}
- (b) 10^{-14}
- (c) 10^7
- (d) 10^{14}

Redox Reactions

34. Oxidation is
 (a) gain of electrons
 (b) loss of electrons
 (c) gain of hydrogen
 (d) loss of oxygen
35. The oxidation number of Mn in KMnO_4 is
 (a) +2
 (b) +4
 (c) +7
 (d) +6
36. The oxidation number of oxygen in H_2O_2 is
 (a) -2
 (b) -1
 (c) 0
 (d) +1
37. In $\text{Zn} + \text{Cu}^{2+} \rightarrow \text{Zn}^{2+} + \text{Cu}$, the reducing agent is
 (a) Cu^{2+}
 (b) Zn
 (c) Zn^{2+}
 (d) Cu

Organic Chemistry – Basic Principles

38. The IUPAC name of $\text{CH}_3\text{CH}_2\text{OH}$ is
 (a) methanol
 (b) ethanol
 (c) propanol
 (d) ethanal
39. Which is the most stable carbocation?
 (a) methyl
 (b) primary
 (c) secondary
 (d) tertiary
40. Isomers have the same
 (a) structural formula
 (b) molecular formula
 (c) physical properties
 (d) boiling point
41. Lassaigne's test is used to detect
 (a) carbon and hydrogen
 (b) N, S and halogens
 (c) oxygen
 (d) metals
42. The $-\text{CHO}$ functional group is called
 (a) ketone
 (b) aldehyde
 (c) carboxylic acid
 (d) ester

Hydrocarbons

43. The general formula of alkanes is
 (a) C_nH_{2n}
 (b) $\text{C}_n\text{H}_{2n+2}$
 (c) $\text{C}_n\text{H}_{2n-2}$
 (d) C_nH_n
44. Markovnikov's rule applies to the addition of HBr to
 (a) symmetrical alkenes
 (b) unsymmetrical alkenes
 (c) alkanes
 (d) benzene
45. Benzene undergoes mainly
 (a) addition reactions
 (b) electrophilic substitution reactions
 (c) elimination reactions
 (d) nucleophilic addition

46. The test for unsaturation uses

- (a) bromine water
- (c) Fehling's solution

- (b) limewater
- (d) Tollens' reagent

47. Wurtz reaction is used to prepare

- (a) alkenes
- (c) alkynes

- (b) alkanes
- (d) alcohols

Answer Key with Explanations

Some Basic Concepts of Chemistry

1. (a) 6.022×10^{23} particles — This is Avogadro's number, N_A .
2. (b) 18 g/mol — $2 \times 1 + 16 = 18$.
3. (b) 22.4 L — Molar volume at STP is 22.4 L.
4. (b) litre of solution — $M = \text{moles of solute} / \text{volume of solution in L}$.
5. (b) CH_2O — Divide all subscripts by 6.
6. (b) 1 — Molar mass of $\text{CO}_2 = 44 \text{ g/mol}$.

Structure of Atom

7. (b) $2n^2$ — $n = 1, 2, 3$ give 2, 8, 18 electrons.
8. (c) 5 — $l = 2$ gives $m = -2$ to $+2$.
9. (a) $1s^2 2s^2 2p^6 3s^1$ — $2 + 2 + 6 + 1 = 11$.
10. (b) degenerate orbitals singly first — Electrons occupy equal-energy orbitals singly, with parallel spins, before pairing.
11. (b) microscopic particles such as electrons — Its effect is negligible for large objects.
12. (b) p — $l = 0, 1, 2, 3$ stand for s, p, d, f.

Classification of Elements and Periodicity

13. (b) atomic number — Properties are periodic functions of atomic number (Moseley).
14. (b) fluorine — $F = 4.0$ on the Pauling scale.
15. (b) decreases — Nuclear charge rises while electrons enter the same shell.
16. (c) 18 — Group 18 has completely filled valence shells.
17. (c) Ne — Noble gases have stable, full shells.

Chemical Bonding and Molecular Structure

18. (b) tetrahedral — sp^3 hybridisation, bond angle 109.5° .
19. (b) 104.5° — Two lone pairs push the bond pairs closer.
20. (a) sp — A triple bond leaves two σ -bonds per carbon $\rightarrow$ sp, linear.
21. (b) 2 — $(\text{Bonding} - \text{antibonding})/2 = (10 - 6)/2 = 2$.
22. (b) O_2 — O_2 has two unpaired electrons in π^* orbitals (MO theory).
23. (b) H_2O — O-H bonds form strong intermolecular H-bonds.

Chemical Thermodynamics

24. (b) $\Delta G < 0$ — Gibbs energy must decrease.
25. (b) state function — ΔH depends only on initial and final states.
26. (b) $\Delta H < 0$ — Heat is released to the surroundings.
27. (b) $\Delta G = \Delta H - T\Delta S$ — Gibbs-Helmholtz equation.
28. (c) volume — It depends on the amount of matter.

Equilibrium

29. (c) 3 — $[\text{H}^+] = 10^{-3}$, so $\text{pH} = 3$.
30. (c) does not shift it — A catalyst speeds up both directions equally.
31. (b) to the right — Le Chatelier: towards fewer gas moles ($4 \rightarrow 2$).
32. (b) pH — Example: $\text{CH}_3\text{COOH} + \text{CH}_3\text{COONa}$.
33. (b) 10^{-14} — $[\text{H}^+][\text{OH}^-] = 10^{-14}$.

Redox Reactions

34. (b) loss of electrons — OIL RIG: Oxidation Is Loss.
35. (c) +7 — $+1 + x + 4(-2) = 0 \rightarrow x = +7$.
36. (b) -1 — In peroxides, O has -1.
37. (b) Zn — Zn loses electrons, so it reduces Cu^{2+} .

Organic Chemistry – Basic Principles

38. (b) ethanol — Two carbons + –OH group.
39. (d) tertiary — Alkyl groups stabilise by +I effect and hyperconjugation.
40. (b) molecular formula — Isomers differ in the arrangement of atoms.
41. (b) N, S and halogens — Sodium fusion turns them into ionic compounds.
42. (b) aldehyde — Aldehydes have the formyl group.

Hydrocarbons

43. (b) $C_n H_{2n+2}$ — Saturated hydrocarbons.
44. (b) unsymmetrical alkenes — H goes to the carbon that already has more H atoms.
45. (b) electrophilic substitution reactions — Substitution keeps the stable aromatic ring.
46. (a) bromine water — Alkenes and alkynes decolourise bromine water.
47. (b) alkanes — $2RX + 2Na \rightarrow R-R + 2NaX$ (dry ether).