

Chemistry MCQ Practice

+2 2nd Year (Class XII)

48 questions · 10 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.

Solutions

- Molality is defined as moles of solute per
 - litre of solution
 - kg of solvent
 - kg of solution
 - litre of solvent
- Which is a colligative property?
 - vapour pressure
 - osmotic pressure
 - density
 - colour
- The van't Hoff factor (i) for NaCl, assuming complete dissociation, is
 - 1
 - 2
 - 3
 - 0.5
- A solution showing positive deviation from Raoult's law is
 - benzene + toluene
 - ethanol + water
 - chloroform + acetone
 - nitric acid + water
- Henry's law relates the solubility of a gas to its
 - temperature
 - partial pressure
 - volume
 - molar mass

Electrochemistry

- In a galvanic cell, oxidation occurs at the
 - cathode
 - anode
 - salt bridge
 - electrolyte
- The standard hydrogen electrode has an electrode potential of
 - 1 V
 - 0 V
 - 1 V
 - 0.76 V
- The unit of molar conductivity is
 - S cm^{-1}
 - $\text{S cm}^2 \text{ mol}^{-1}$
 - $\Omega \text{ cm}$
 - S
- 1 faraday of charge is about
 - 96 500 C
 - 9650 C
 - 1 C
 - $6.022 \times 10^{23} \text{ C}$

10. ΔG° and E°_{cell} are related by

(a) $\Delta G^\circ = nFE^\circ$

(c) $\Delta G^\circ = -E^\circ/nF$

(b) $\Delta G^\circ = -nFE^\circ$

(d) $\Delta G^\circ = nF/E^\circ$

Chemical Kinetics

11. The unit of the rate constant of a first-order reaction is

(a) $\text{mol L}^{-1} \text{s}^{-1}$

(c) $\text{L mol}^{-1} \text{s}^{-1}$

(b) s^{-1}

(d) mol L^{-1}

12. The half-life of a first-order reaction

(a) depends on initial concentration

(b) is independent of initial concentration

(c) doubles each time

(d) is zero

13. A catalyst increases the rate of reaction by

(a) increasing activation energy

(c) increasing ΔH

(b) lowering activation energy

(d) shifting equilibrium

14. The Arrhenius equation is

(a) $k = A e^{(-E_a/RT)}$

(c) $k = E_a/RT$

(b) $k = A e^{(E_a/RT)}$

(d) $k = A RT$

15. If $k = 0.693 \text{ min}^{-1}$ for a first-order reaction, its half-life is

(a) 0.693 min

(c) 2 min

(b) 1 min

(d) 10 min

d- and f-Block Elements

16. Transition metals show variable oxidation states because

(a) they have large atoms

(b) $(n-1)d$ and ns electrons have similar energies

(c) they are metals

(d) they have full d-shells

17. The lanthanoid contraction is the steady decrease in

(a) density

(c) melting point

(b) atomic and ionic size

(d) colour

18. Zn^{2+} salts are colourless because

(a) d-orbitals are empty

(b) the d-subshell is completely filled (d^{10})

(c) they are ionic

(d) zinc is a non-metal

19. The colour of KMnO_4 is

(a) orange

(c) green

(b) purple

(d) blue

20. Transition metals and their compounds are good catalysts because they
- (a) are coloured
 - (b) show variable oxidation states and form complexes
 - (c) are heavy
 - (d) are soft

Coordination Compounds

21. The coordination number of Fe in $[\text{Fe}(\text{CN})_6]^{4-}$ is
- (a) 4
 - (b) 6
 - (c) 2
 - (d) 3
22. The oxidation state of Co in $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$ is
- (a) +2
 - (b) +3
 - (c) +6
 - (d) 0
23. EDTA is a
- (a) monodentate ligand
 - (b) bidentate ligand
 - (c) hexadentate ligand
 - (d) tridentate ligand
24. The IUPAC name of $\text{K}_4[\text{Fe}(\text{CN})_6]$ is
- (a) potassium hexacyanoferrate(II)
 - (b) potassium hexacyanoiron(III)
 - (c) potassium ferricyanide(III)
 - (d) potassium cyanoferrate

Haloalkanes and Haloarenes

25. An $\text{S}_{\text{N}}2$ reaction proceeds with
- (a) retention of configuration
 - (b) inversion of configuration
 - (c) racemisation
 - (d) no change
26. The reactivity of haloalkanes in $\text{S}_{\text{N}}1$ reactions is highest for
- (a) primary
 - (b) secondary
 - (c) tertiary
 - (d) methyl
27. Chloroform is stored in dark bottles because in light and air it forms
- (a) methane
 - (b) phosgene
 - (c) ethanol
 - (d) chlorine only
28. Grignard reagent has the general formula
- (a) RMgX
 - (b) RNaX
 - (c) R_2Mg
 - (d) RX
29. Haloarenes are less reactive than haloalkanes towards nucleophiles due to
- (a) weak C–X bond
 - (b) partial double-bond character of C–X
 - (c) large size
 - (d) low melting point

Alcohols, Phenols and Ethers

30. Phenol is more acidic than ethanol because
- (a) phenol is heavier
 - (b) the phenoxide ion is resonance-stabilised
 - (c) ethanol has more H atoms
 - (d) phenol is a gas

31. Lucas test distinguishes between
(a) alcohols and phenols
(b) primary, secondary and tertiary alcohols
(c) aldehydes and ketones
(d) acids and bases
32. Williamson synthesis is used to prepare
(a) alcohols
(b) ethers
(c) esters
(d) aldehydes
33. The oxidation of a primary alcohol first gives a
(a) ketone
(b) aldehyde
(c) ether
(d) alkene
34. Phenol with bromine water gives a white precipitate of
(a) bromobenzene
(b) 2,4,6-tribromophenol
(c) benzoic acid
(d) picric acid

Aldehydes, Ketones and Carboxylic Acids

35. Tollens' reagent gives a silver mirror with
(a) ketones
(b) aldehydes
(c) alcohols
(d) ethers
36. The iodoform test is given by compounds containing the group
(a) $\text{CH}_3\text{CO}-$
(b) $-\text{CHO}$
(c) $-\text{COOH}$
(d) $-\text{OH}$ only
37. Cannizzaro reaction is shown by aldehydes that have
(a) α -hydrogen
(b) no α -hydrogen
(c) a double bond
(d) an $-\text{OH}$ group
38. Which acid is the strongest?
(a) CH_3COOH
(b) ClCH_2COOH
(c) Cl_2CHCOOH
(d) Cl_3CCOOH
39. The IUPAC name of acetone is
(a) propanal
(b) propanone
(c) ethanal
(d) butanone

Amines

40. Which is the most basic in aqueous solution?
(a) NH_3
(b) CH_3NH_2
(c) $(\text{CH}_3)_2\text{NH}$
(d) $\text{C}_6\text{H}_5\text{NH}_2$
41. The Hinsberg reagent is
(a) benzenesulphonyl chloride
(b) benzoyl chloride
(c) acetyl chloride
(d) nitrous acid
42. Aniline is less basic than methylamine because
(a) its lone pair is delocalised into the ring
(b) it is heavier
(c) it is a liquid
(d) it has no nitrogen

43. The carbylamine test gives a foul smell with
- (a) primary amines
 - (b) secondary amines
 - (c) tertiary amines
 - (d) all amines

Biomolecules

44. Glucose is an example of an
- (a) aldohexose
 - (b) ketohexose
 - (c) aldopentose
 - (d) disaccharide
45. Sucrose on hydrolysis gives
- (a) glucose + glucose
 - (b) glucose + fructose
 - (c) glucose + galactose
 - (d) fructose only
46. Proteins are polymers of
- (a) nucleotides
 - (b) α -amino acids
 - (c) glucose
 - (d) fatty acids
47. The deficiency of vitamin C causes
- (a) rickets
 - (b) scurvy
 - (c) night blindness
 - (d) beriberi
48. Which base is found in RNA but not in DNA?
- (a) thymine
 - (b) uracil
 - (c) adenine
 - (d) guanine

Answer Key with Explanations

Solutions

1. (b) kg of solvent — $m = \text{moles of solute} / \text{mass of solvent in kg}$; it does not change with temperature.
2. (b) osmotic pressure — It depends only on the number of solute particles.
3. (b) 2 — $\text{NaCl} \rightarrow \text{Na}^+ + \text{Cl}^-$.
4. (b) ethanol + water — Hydrogen bonds between ethanol molecules are partly broken.
5. (b) partial pressure — $p = K_H \times x$.

Electrochemistry

6. (b) anode — An Ox, Red Cat.
7. (b) 0 V — It is the reference, fixed at 0.00 V.
8. (b) $\text{S cm}^2 \text{ mol}^{-1}$ — $\Lambda_m = \kappa \times 1000/M$.
9. (a) 96 500 C — The charge on one mole of electrons.
10. (b) $\Delta G^\circ = -nFE^\circ$ — A positive E° gives negative ΔG° (spontaneous).

Chemical Kinetics

11. (b) s^{-1} — $k = \text{rate}/[A] \rightarrow \text{s}^{-1}$.
12. (b) is independent of initial concentration — $t_{1/2} = 0.693/k$.
13. (b) lowering activation energy — It provides an alternative path with lower E_a .
14. (a) $k = A e^{(-E_a/RT)}$ — Rate constant rises with temperature.
15. (b) 1 min — $t_{1/2} = 0.693/0.693 = 1 \text{ min}$.

d- and f-Block Elements

16. (b) $(n-1)d$ and ns electrons have similar energies — Both sets of electrons can take part in bonding.
17. (b) atomic and ionic size — $4f$ electrons shield the rising nuclear charge poorly.
18. (b) the d -subshell is completely filled (d^{10}) — No $d-d$ transition is possible in d^{10} .
19. (b) purple — Due to charge transfer in MnO_4^- .
20. (b) show variable oxidation states and form complexes — Example: Fe in the Haber process, V_2O_5 in the contact process.

Coordination Compounds

21. (b) 6 — Six CN^- ligands are attached.
22. (b) +3 — NH_3 is neutral; three Cl^- outside balance +3.
23. (c) hexadentate ligand — It binds through 2 N and 4 O atoms.
24. (a) potassium hexacyanoferrate(II) — Anionic complex $\rightarrow$ "-ate", Fe is +2.

Haloalkanes and Haloarenes

25. (b) inversion of configuration — Backside attack (Walden inversion).
26. (c) tertiary — Tertiary carbocations are the most stable.
27. (b) phosgene — COCl_2 is a poisonous gas.
28. (a) RMgX — Made from $\text{RX} + \text{Mg}$ in dry ether.
29. (b) partial double-bond character of C-X — Resonance strengthens the C-X bond in haloarenes.

Alcohols, Phenols and Ethers

30. (b) the phenoxide ion is resonance-stabilised — The negative charge spreads over the ring.
31. (b) primary, secondary and tertiary alcohols — Tertiary alcohols turn cloudy at once, secondary in minutes, primary not at room temperature.
32. (b) ethers — $\text{R-ONa} + \text{R}'\text{-X} \rightarrow \text{R-O-R}' + \text{NaX}$.
33. (b) aldehyde — Further oxidation gives a carboxylic acid.
34. (b) 2,4,6-tribromophenol — The $-\text{OH}$ group strongly activates the ring.

Aldehydes, Ketones and Carboxylic Acids

35. (b) aldehydes — Aldehydes reduce Ag^+ to Ag.

36. (a) $\text{CH}_3\text{CO}-$ — Methyl ketones and ethanol/acetaldehyde give yellow CHI_3 .
37. (b) no α -hydrogen — Example: HCHO , $\text{C}_6\text{H}_5\text{CHO}$.
38. (d) Cl_3CCOOH — More $-I$ chlorine atoms stabilise the anion more.
39. (b) propanone — CH_3COCH_3 .

Amines

40. (c) $(\text{CH}_3)_2\text{NH}$ — Secondary amines are the most basic in water (inductive + solvation effects).
41. (a) benzenesulphonyl chloride — It distinguishes primary, secondary and tertiary amines.
42. (a) its lone pair is delocalised into the ring — Resonance makes the N lone pair less available.
43. (a) primary amines — $\text{RNH}_2 + \text{CHCl}_3 + 3\text{KOH} \rightarrow \text{isocyanide}$.

Biomolecules

44. (a) aldohexose — Six carbons with an aldehyde group.
45. (b) glucose + fructose — Invert sugar.
46. (b) α -amino acids — Joined by peptide bonds.
47. (b) scurvy — Vitamin C (ascorbic acid) keeps gums and skin healthy.
48. (b) uracil — RNA has U in place of T.