

NEET Chemistry Sample Paper 04

A) **Subject:** Chemistry

B) **Total Questions:** 45 Questions (All Compulsory)

C) **Marking Scheme & Rules:**

- Correct Answer: +4 marks
- Incorrect Answer: -1 mark (Negative marking)
- Unattempted Question: 0 marks
- Multiple Answers: Treated as incorrect, attracting -1 mark

Q1. The dissociation constant of a weak acid HA is 1×10^{-5} . The pH of a 0.1 M solution of this acid is:

- A. 2
- B. 3
- C. 5
- D. 1

Q2. In a first-order reaction, the time taken for the reactant concentration to decrease from 1.0 M to 0.25 M is 20 minutes. The rate constant k is:

- A. $0.693/20 \text{ min}^{-1}$
- B. $0.693/10 \text{ min}^{-1}$
- C. $2.303/10 \text{ min}^{-1}$
- D. 0.1 min^{-1}

Q3. Which of the following statements is true for an ideal solution?

- A. $\Delta H_{\text{mix}} > 0$
- B. $\Delta V_{\text{mix}} = 0$
- C. $\Delta S_{\text{mix}} = 0$
- D. $\Delta G_{\text{mix}} = 0$

Q4. The molar solubility of AgCl ($K_{sp} = 1.6 \times 10^{-10}$) in 0.1 M NaCl solution is:

- A. $1.26 \times 10^{-5} \text{ M}$
- B. $1.6 \times 10^{-9} \text{ M}$
- C. $1.6 \times 10^{-11} \text{ M}$
- D. $4 \times 10^{-5} \text{ M}$

Q5. The oxidation state of Iron in $[Fe(H_2O)_5NO]SO_4$ (Brown ring complex) is:

- A. +1
- B. +2
- C. +3
- D. 0

Q6. Which of the following is the correct expression for the Freundlich adsorption isotherm?

- A. $x/m = kP^n$
- B. $x/m = kP^{1/n}$

- C. $x/m = k/P$
- D. $x/m = P/k$

Q7. A reaction has $\Delta H = -10$ kcal and $\Delta S = -20$ cal/K. The reaction is spontaneous at:

- A. 500 K
- B. 400 K
- C. 600 K
- D. 1000 K

Q8. The number of atoms per unit cell in a simple cubic lattice is:

- A. 1
- B. 2
- C. 4
- D. 6

Q9. The unit of equivalent conductivity is:

- A. $S\text{ cm}^2\text{ eq}^{-1}$
- B. $S\text{ cm}^{-2}\text{ eq}^{-1}$
- C. $S^{-1}\text{ cm}^2\text{ eq}^{-1}$
- D. $S\text{ cm eq}$

Q10. For the reaction $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$, the equilibrium constant K_p is related to K_c as:

- A. $K_p = K_c(RT)$
- B. $K_p = K_c(RT)^2$
- C. $K_p = K_c$
- D. $K_p = K_c/RT$

Q11. The efficiency of packing in a face-centered cubic (FCC) structure is:

- A. 52.4%
- B. 68%
- C. 74%
- D. 80%

Q12. Which of the following is a buffer solution?

- A. $CH_3COOH + CH_3COONa$
- B. $HCl + NaCl$
- C. $NH_4OH + NH_4Cl$
- D. Both (A) and (C)

Q13. In the cell $Zn | Zn^{2+} || Cu^{2+} | Cu$, the negative electrode (anode) is:

- A. Cu
- B. Zn
- C. Cu^{2+}
- D. Zn^{2+}

Q14. The specific conductance of a 0.1 N KCl solution is $0.012\text{ ohm}^{-1}\text{ cm}^{-1}$. The resistance of the cell containing this solution is 60 ohms. The cell constant is:

- A. 0.72 cm^{-1}

- B. 0.12 cm^{-1}
- C. 5.0 cm^{-1}
- D. 0.36 cm^{-1}

Q15. Half-life period of a zero-order reaction is:

- A. Directly proportional to initial concentration
- B. Inversely proportional to initial concentration
- C. Independent of initial concentration
- D. Proportional to the square of initial concentration

Q16. Which of the following has the highest bond order?

- A. O_2
- B. O_2^-
- C. O_2^+
- D. O_2^{2-}

Q17. The shape of IF_7 molecule is:

- A. Octahedral
- B. Pentagonal bipyramidal
- C. Trigonal bipyramidal
- D. Square pyramidal

Q18. Which of the following is a greenhouse gas?

- A. N_2
- B. O_2
- C. CH_4
- D. Ar

Q19. The coordination number of Co in $[Co(en)_3]Cl_3$ is:

- A. 3
- B. 4
- C. 6
- D. 2

Q20. Permanent hardness of water is due to the presence of:

- A. Bicarbonates of Ca and Mg
- B. Chlorides and Sulfates of Ca and Mg
- C. Carbonates of Na and K
- D. Phosphates of Ca and Mg

Q21. Which of the following elements has the highest electronegativity?

- A. F
- B. Cl
- C. O
- D. N

Q22. In the extraction of Iron from Hematite, the limestone added acts as:

- A. Flux
- B. Slag
- C. Reducing agent

D. Oxidizing agent

Q23. Which of the following ions is paramagnetic?

- A. Cu^+
- B. Zn^{2+}
- C. Ti^{4+}
- D. Ni^{2+}

Q24. The total number of lone pairs in XeF_4 is:

- A. 0
- B. 1
- C. 2
- D. 3

Q25. Which of the following is an outer orbital complex?

- A. $[Fe(CN)_6]^{4-}$
- B. $[Fe(H_2O)_6]^{2+}$
- C. $[Co(NH_3)_6]^{3+}$
- D. $[Mn(CN)_6]^{3-}$

Q26. The diagonal relationship of Li is with:

- A. Mg
- B. Al
- C. Be
- D. Na

Q27. What is the geometry of $[Ni(CN)_4]^{2-}$?

- A. Tetrahedral
- B. Square Planar
- C. Octahedral
- D. Trigonal Pyramidal

Q28. Which of the following is known as 'Inorganic Benzene'?

- A. $B_3N_3H_6$
- B. B_2H_6
- C. H_3BO_3
- D. BN

Q29. The oxidation state of P in $Ba(H_2PO_2)_2$ is:

- A. +3
- B. +1
- C. -1
- D. +5

Q30. Which of the following is a 'd-block' but not a 'transition' element?

- A. Fe
- B. Cu
- C. Zn
- D. Mn

- Q31.** Which of the following compounds will give a positive Fehling's test?
- Benzaldehyde
 - Acetaldehyde
 - Acetone
 - Ethyl methyl ketone
- Q32.** The reagent used in the dehydrohalogenation of alkyl halides is:
- Alcoholic KOH
 - Aqueous KOH
 - Zn/HCl
 - $LiAlH_4$
- Q33.** Which of the following is the strongest acid?
- CH_3COOH
 - $ClCH_2COOH$
 - $Cl_2CHCOOH$
 - Cl_3CCOOH
- Q34.** The reaction of Phenol with $CHCl_3/NaOH$ to give Salicylaldehyde is:
- Kolbe's reaction
 - Reimer-Tiemann reaction
 - Wurtz reaction
 - Friedel-Crafts reaction
- Q35.** Which of the following is a thermoplastic polymer?
- Bakelite
 - Polythene
 - Melamine
 - Urea-formaldehyde resin
- Q36.** Amino acids are the building blocks of:
- Carbohydrates
 - Fats
 - Proteins
 - Vitamins
- Q37.** When Ethylamine reacts with $CHCl_3$ and alcoholic KOH, the product formed is:
- Ethyl cyanide
 - Ethyl isocyanide
 - Ethyl nitrite
 - Nitroethane
- Q38.** The conversion of $R - CO - NH_2$ to $R - NH_2$ can be done by:
- $LiAlH_4$
 - $Br_2/NaOH$
 - H_2/Pd
 - PCl_5
- Q39.** Which of the following is an example of an addition polymer?
- Nylon-6

- B. Terylene
C. PVC
D. Bakelite
- Q40.** The IUPAC name of the compound $(CH_3)_2CH - CH_2 - Cl$ is:
A. 1-chloro-2-methylpropane
B. 2-methyl-3-chloropropane
C. Isobutyl chloride
D. 1-chlorobutane
- Q41.** Which of the following contains an ester linkage?
A. Nylon
B. Terylene
C. Bakelite
D. PVC
- Q42.** Glucose on oxidation with Bromine water gives:
A. Gluconic acid
B. Saccharic acid
C. Sorbitol
D. Glucaric acid
- Q43.** Which of the following is a broad-spectrum antibiotic?
A. Penicillin G
B. Chloramphenicol
C. Aspirin
D. Paracetamol
- Q44.** The functional group present in nitroalkanes is:
A. $-NO_2$
B. $-NO$
C. $-NH_2$
D. $-CN$
- Q45.** Which of the following does not have α -hydrogen?
A. CH_3CHO
B. CH_3COCH_3
C. C_6H_5CHO
D. CH_3CH_2CHO
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Solutions & Explanations

1. (B) For a weak acid, $[H^+] = \sqrt{K_a C} = \sqrt{10^{-5} \times 0.1} = 10^{-3}$. $pH = -\log(10^{-3}) = 3$.
2. (B) The concentration reduces to 1/4th (from 1M to 0.25M), which indicates two half-lives. $2t_{1/2} = 20 \text{ min} \implies t_{1/2} = 10 \text{ min}$. For 1st order, $k = 0.693/10$.
3. (B) Ideal solutions show zero volume change and zero enthalpy change upon mixing.
4. (B) Solubility $s = K_{sp}/[\text{Common Ion}] = 1.6 \times 10^{-10}/0.1 = 1.6 \times 10^{-9} \text{ M}$.
5. (A) In the brown ring complex, Nitrosyl exists as NO^+ , making Iron have an oxidation state of +1.
6. (B) Represents the relationship between gas pressure and amount adsorbed at constant temperature.
7. (B) $\Delta G = \Delta H - T\Delta S$. At 400 K, $\Delta G = -10,000 - (400 \times -20) = -2,000$ (Spontaneous since $\Delta G < 0$).
8. (A) 8 corners \times 1/8 contribution = 1 atom per unit cell.
9. (A) Specific units used to describe conductivity per equivalent of solute.
10. (C) For reactions where moles of gaseous reactants equal moles of products ($\Delta n_g = 0$), $K_p = K_c$.
11. (C) FCC and HCP have the highest packing efficiency.
12. (D) (A) is an acidic buffer; (C) is a basic buffer.
13. (B) Oxidation occurs at the anode; Zinc loses electrons to become Zn^{2+} .
14. (A) Cell constant = $\kappa \times R = 0.012 \times 60 = 0.72 \text{ cm}^{-1}$.
15. (A) $t_{1/2} = [A]_0/2k$.
16. (C) O_2^+ has 15 electrons, B.O. = 2.5 (Highest among options).
17. (B) Iodine uses sp^3d^3 hybridization with zero lone pairs.
18. (C) Methane is a major greenhouse gas causing global warming.
19. (C) 'en' is a bidentate ligand. 3 ligands \times 2 bonds each = 6 coordination sites.
20. (B) Temporary hardness is caused by bicarbonates.
21. (A) Electronegativity decreases down the group and increases across the period.
22. (A) $CaCO_3$ produces CaO, which reacts with acidic impurities (SiO_2) to form slag.
23. (D) Ni^{2+} has a d^8 configuration with 2 unpaired electrons. Others are d^0 or d^{10} .
24. (C) 4 bonding electrons + 4 non-bonding electrons = 2 lone pairs.

25. (B) Weak field ligands (H_2O) fail to pair electrons, using outer d-orbitals for bonding.
26. (A) Diagonal relationship is due to similar charge/size ratio.
27. (B) Strong field CN^- causes pairing and dsp^2 hybridization.
28. (A) Borazine is called inorganic benzene due to its cyclic, planar structure.
29. (B) Ba^{2+} $(+2) + 2 \times [2(+1) + x + 2(-2)] = 0 \implies x = +1$.
30. (C) Zinc has a completely filled d-subshell in its ground and common ionic states.
31. (B) Fehling's test is specific to aliphatic aldehydes.
32. (A) Base-catalyzed elimination of hydrogen and halogen from adjacent carbons.
33. (D) Inductive effect: $-I$ effect of three chlorine atoms strongly stabilizes the carboxylate ion.
34. (B) Ortho-formylation of phenol.
35. (B) Long-chain addition polymer that can be remolded.
36. (C) Condensation polymers of amino acids.
37. (B) Characteristic test for primary amines using $CHCl_3/KOH$.
38. (B) Degradation of amides to primary amines with one less carbon.
39. (C) Formed by repeated addition of vinyl chloride monomers without loss of small molecules.
40. (A) Numbering priority starts from the carbon bonded to the halogen.
41. (B) Polyesters like terylene contain many ester bonds.
42. (A) Mild oxidation of the terminal aldehyde to carboxylic acid.
43. (B) Effective against both gram-positive and gram-negative bacteria.
44. (A) The $-NO_2$ group is the functional identifier.
45. (C) The carbon adjacent to the carbonyl group in benzaldehyde is part of a ring and has no hydrogen.