NEST Chemistry Sample Paper – 9

Duration: 45 Minutes **Maximum Marks: 60**

Instructions

- This paper contains **20 Multiple Choice Questions (single correct answer)**, modelled on the Chemistry section of **NEST 2026**.
- Each correct answer carries **+3 marks**. There is a deduction of -1 **mark** for each incorrect answer; **no marks** are deducted for an unattempted question.
- Every question has exactly **four options**, of which only **one** is correct. Choose carefully.
- Personal calculators, log tables, mobile phones, and other electronic gadgets are strictly prohibited in the examination hall.
- A simple on-screen (virtual) calculator is provided in the computer-based test interface and may be used; blank sheets for rough work are supplied at the exam centre.

Q1. Boron occurs naturally as two isotopes: ^{10}B (atomic mass 10.013 u, abundance 19.9%) and ^{11}B (atomic mass 11.009 u, abundance 80.1%). The average atomic mass of boron is closest to

(A) 10.01 u

(B) 10.51 u

(C) 10.81 u

(D) 11.01 u

Q2. A photon has a frequency of $\nu = 6.0 \times 10^{14}$ s^{-1}. Using Planck's relation $E = h\nu$ with $h = 6.626 \times 10^{-34}$ J s, the energy of one such photon is closest to

(A) 1.1×10^{-19} J

(B) 4.0×10^{-19} J

(C) 6.6×10^{-19} J

(D) 2.4×10^{-18} J

Q3. For the second-period elements C, N, O and F, the outermost electrons experience an increasing effective nuclear charge across the period because added electrons enter the same shell and screen one another poorly. The correct order of electronegativity is

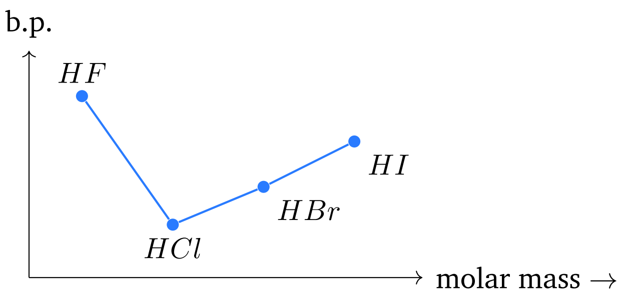
(A) $F > O > N > C$

(B) $C > N > O > F$

(C) $O > F > N > C$

(D) $N > O > C > F$

Q4. The boiling points of the hydrogen halides do not follow a simple molar-mass trend, as shown in the sketch below. The anomalously high boiling point of HF is due to intermolecular hydrogen bonding. The correct order of boiling points is



(A) $HCl > HBr > HI > HF$

(B) $HF > HCl > HBr > HI$

(C) $HI > HBr > HCl > HF$

(D) $HF > HI > HBr > HCl$

Q5. Water boils at 373 K with a molar enthalpy of vaporization $\Delta H_{\text{vap}} = 40.7$ kJ mol^{-1}. For the reversible phase change at this temperature, $\Delta S = \dfrac{\Delta H}{T}$ gives the molar entropy of vaporization as

(A) $0.109\ \mathrm{J\,K^{-1}\,mol^{-1}}$

(B) $40.7\ \mathrm{J\,K^{-1}\,mol^{-1}}$

(C) $109\ \mathrm{J\,K^{-1}\,mol^{-1}}$

(D) $151\ \mathrm{J\,K^{-1}\,mol^{-1}}$

Q6. For the reaction $A(g) \rightleftharpoons B(g)$, the equilibrium constant is $K_c = 4$. If 1.0 mol of A is taken in a 1 L vessel and no B is present initially, the equilibrium concentration of B is

(A) $0.20\ \mathrm{mol\,L^{-1}}$

(B) $0.80\ \mathrm{mol\,L^{-1}}$

(C) $0.50\ \mathrm{mol\,L^{-1}}$

(D) $0.25\ \mathrm{mol\,L^{-1}}$

Q7. The average oxidation number of sulfur in the thiosulphate ion $S_2O_3^{2-}$ is

(A) $+6$

(B) $+4$

(C) 0

(D) $+2$

Q8. In the van der Waals equation $\left(P + \frac{an^2}{V^2}\right)(V - nb) = nRT$, the constants a and b correct for departures from ideal behaviour. The correct interpretation of a and b is

(A) a accounts for intermolecular attractive forces; b accounts for the finite volume of the molecules

(B) a accounts for the finite volume of the molecules; b accounts for intermolecular attractions

(C) both a and b correct only for pressure

(D) both a and b correct only for temperature

Q9. An aqueous solution of glucose ($M = 180$ g mol^{-1}) is 1.0 molar and has a density of 1.10 g mL^{-1}. The molality of the solution is closest to

(A) 0.92 mol kg^{-1}

(B) 1.08 mol kg^{-1}

(C) 1.00 mol kg^{-1}

(D) 1.22 mol kg^{-1}

Q10. Using Kohlrausch's law of independent migration of ions, the limiting molar conductivity of acetic acid $\Lambda_m^\circ(CH_3COOH)$ can be obtained from $\Lambda_m^\circ(HCl) = 426$, $\Lambda_m^\circ(CH_3COONa) = 91$ and $\Lambda_m^\circ(NaCl) = 126$ (all in S cm^2 mol^{-1}). The value of $\Lambda_m^\circ(CH_3COOH)$ is

(A) 643 S cm^2 mol^{-1}

(B) 217 S cm^2 mol^{-1}

(C) 391 S cm^2 mol^{-1}

(D) 461 S cm^2 mol^{-1}

Q11. For a reaction that is *zero order* in the reactant, the half-life $t_{1/2} = \dfrac{[A]_0}{2k}$. How does the half-life of a zero-order reaction change as the initial concentration $[A]_0$ is increased?

(A) it remains constant (independent of $[A]_0$)

(B) it decreases as $[A]_0$ increases

(C) it is inversely proportional to $[A]_0$

(D) it increases in direct proportion to $[A]_0$

Q12. Transition metals and their compounds are widely used as catalysts (for example, finely divided iron in the Haber process). The most appropriate reason for the catalytic activity of transition metals is

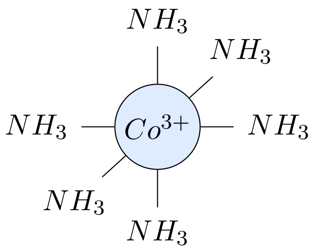
(A) they provide variable oxidation states and surface sites that adsorb reactants, lowering the activation energy

(B) they are always diamagnetic and therefore unreactive

(C) they have fully filled d orbitals that repel reactant molecules

(D) they can only act as catalysts in their highest oxidation state

Q13. For the complex $[Co(NH_3)_6]^{3+}$ (Co, $Z = 27$), the effective atomic number (EAN) is the total electron count of the central metal after accepting lone pairs from the ligands, EAN $= Z -$ (oxidation state) $+ 2 \times$ (number of ligands), as illustrated below. The EAN of cobalt in this complex is



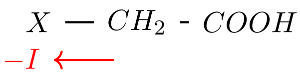
(A) 30

(B) 36

(C) 27

(D) 24

Q14. The strength of the $-I$ (electron-withdrawing inductive) effect of a halogen depends on its electronegativity. For the carbon framework $X - CH_2 - COOH$ shown, arrange the substituents F, Cl and Br in decreasing order of their $-I$ effect.



(A) $Br > Cl > F$

(B) $Cl > F > Br$

(C) $F > Cl > Br$

(D) $F > Br > Cl$

Q15. Propene is subjected to *hydroboration–oxidation* (i.e. B_2H_6 followed by H_2O_2/OH^-), as shown. This sequence adds water in an anti-Markovnikov fashion. The major product is

$$CH_3 - CH = CH_2 \xrightarrow{B_2H_6;\ H_2O_2/OH^-}$$

(A) propan-2-ol

(B) 2-bromopropane

(C) propanal

(D) propan-1-ol

Q16. Methylmagnesium bromide (CH_3MgBr) is added to acetone (CH_3COCH_3), and the adduct is then hydrolysed with dilute acid. The organic product is

(A) 2-methylpropan-2-ol ($(CH_3)_3COH$)

(B) propan-2-ol ($(CH_3)_2CHOH$)

(C) butan-2-ol

(D) propan-1-ol

Q17. When methyl ethyl ether ($CH_3 - O - CH_2CH_3$) is heated with one equivalent of hot concentrated HI, cleavage occurs preferentially at the methyl–oxygen bond. The products are

(A) CH_3CH_2I and CH_3OH

(B) CH_3I and CH_3CH_2OH

(C) CH_3OH and CH_3CH_2OH

(D) CH_3I and CH_3CH_2I

Q18. Sodium acetate is heated strongly with soda lime ($NaOH/CaO$). This decarboxylation removes CO_2 (as carbonate) and replaces the $-COO^-$ group with hydrogen, as shown. The organic product is

$$CH_3COONa \xrightarrow{NaOH/CaO,\ \Delta} \quad ?$$

(A) ethane (C_2H_6)

(B) ethene (C_2H_4)

(C) methane (CH_4)

(D) acetaldehyde (CH_3CHO)

Q19. Nitrobenzene ($C_6H_5NO_2$) is reduced with Sn and concentrated HCl, followed by treatment with base. The organic product is

(A) nitrosobenzene (C_6H_5NO)

(B) phenol (C_6H_5OH)

(C) azobenzene ($C_6H_5N{=}NC_6H_5$)

(D) aniline ($C_6H_5NH_2$)

Q20. Vitamins are classified as fat-soluble or water-soluble based on their solubility. Which one of the following sets contains *only* fat-soluble vitamins?

(A) Vitamin B and Vitamin C

(B) Vitamins A, D, E and K

(C) Vitamin C and Vitamin D

(D) Vitamin B complex only

Detailed Solutions

Q1.

Solution

Concept — Average atomic mass: The average atomic mass is the abundance-weighted mean of the isotopic masses, $\bar{M} = \sum f_i M_i$, where f_i is the fractional abundance.

Step 1 — Convert abundances to fractions: $f(^{10}B) = 0.199$, $f(^{11}B) = 0.801$.

Step 2 — Weighted mean: $\bar{M} = 0.199 \times 10.013 + 0.801 \times 11.009 = 1.993 + 8.818 = 10.81$ u.

Why other options are wrong:

- (A) 10.01 u is the mass of only ^{10}B.
- (B) 10.51 u uses a 50:50 mix, not the true abundances.
- (D) 11.01 u is the mass of only ^{11}B.

Final Answer: $\bar{M} \approx 10.81$ u $\Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q1

Q2.

Solution

Concept — Energy of a photon: A photon's energy is proportional to its frequency, $E = h\nu$, where h is Planck's constant.

Step 1 — Substitute: $E = (6.626 \times 10^{-34}\,\text{J s})(6.0 \times 10^{14}\,\text{s}^{-1})$.

Step 2 — Compute: $E = 6.626 \times 6.0 \times 10^{-34+14} = 39.76 \times 10^{-20} = 3.98 \times 10^{-19} \approx 4.0 \times 10^{-19}$ J.

Why other options are wrong:

- (A) 1.1×10^{-19} J uses a wrong power of ten.
- (C) 6.6×10^{-19} J mistakenly uses $\nu = 10^{15}$.
- (D) 2.4×10^{-18} J overcounts by an order of magnitude.

Final Answer: $E \approx 4.0 \times 10^{-19}$ J $\Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q2

Q3.

Solution

Concept — Electronegativity across a period: As effective nuclear charge increases left to right (added electrons enter the same shell and screen poorly), the atom pulls bonding electrons more strongly, so electronegativity rises.

Step 1 — Identify the trend: For C, N, O, F, Z_{eff} increases in the order $C < N < O < F$.

Step 2 — Electronegativity order: $F > O > N > C$ (F is the most electronegative element).

Why other options are wrong:

- (B) reverses the trend entirely.
- (C) wrongly places O above F.
- (D) disorders the period.

Final Answer: $F > O > N > C \Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q3

Q4.

Solution

Concept — Hydrogen bonding and boiling point: Boiling point usually rises with molar mass (stronger van der Waals forces), but HF forms strong intermolecular hydrogen bonds, raising its boiling point above the trend.

Step 1 — Among HCl, HBr, HI: With no H-bonding, boiling point increases with molar mass: $HI > HBr > HCl$.

Step 2 — Place HF: Hydrogen bonding lifts HF to the highest boiling point of the four. Hence $HF > HI > HBr > HCl$.

Why other options are wrong:

- (A) ignores the H-bonding of HF and the mass trend.
- (B) wrongly orders the heavier halides by decreasing mass.
- (C) places HF lowest, ignoring its hydrogen bonding.

Final Answer: $HF > HI > HBr > HCl \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q4

Q5.

Solution

Concept — Entropy of a phase change: For a reversible phase change at constant temperature, $\Delta S = \dfrac{\Delta H}{T}$ (heat absorbed reversibly divided by temperature).

Step 1 — Use consistent units: $\Delta H_{\text{vap}} = 40.7\ \text{kJ mol}^{-1} = 40700\ \text{J mol}^{-1}$; $T = 373$ K.

Step 2 — Compute: $\Delta S = \dfrac{40700}{373} = 109\ \text{J K}^{-1}\text{mol}^{-1}$.

Why other options are wrong:

- (A) 0.109 forgets to convert kJ to J.
- (B) 40.7 ignores division by T.
- (D) 151 wrongly uses $T = 273$ K.

Final Answer: $\Delta S = 109\ \text{J K}^{-1}\text{mol}^{-1} \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q5

Q6.

Solution

Concept — Equilibrium concentration from K_c: Set up an ICE table; for $A \rightleftharpoons B$, $K_c = \dfrac{[B]}{[A]}$ at equilibrium.

Step 1 — Define change: Let x mol of A convert to B. Then $[A] = 1 - x$, $[B] = x$ (volume $= 1$ L).

Step 2 — Apply K_c: $K_c = \dfrac{x}{1-x} = 4 \Rightarrow x = 4(1-x) \Rightarrow 5x = 4 \Rightarrow x = 0.80$.

Step 3 — Equilibrium $[B]$: $[B] = 0.80\ \text{mol L}^{-1}$.

Why other options are wrong:

- (A) 0.20 is $[A]$ at equilibrium, not $[B]$.
- (C) 0.50 assumes $K_c = 1$.
- (D) 0.25 inverts the ratio.

Final Answer: $[B] = 0.80\ \text{mol L}^{-1} \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q6

Q7.

Solution

Concept — Oxidation number in an oxoanion: The sum of oxidation numbers equals the ionic charge; oxygen is taken as -2, and the value found for sulfur is an *average*.

Step 1 — Set up: Let the average oxidation number of S be x. In $S_2O_3^{2-}$: $2x + 3(-2) = -2$.

Step 2 — Solve: $2x - 6 = -2 \Rightarrow 2x = 4 \Rightarrow x = +2$.

Why other options are wrong:

- (A) $+6$ is sulfur in sulfate SO_4^{2-}.
- (B) $+4$ is sulfur in sulfite SO_3^{2-}.
- (C) 0 ignores the bound oxygens.

Final Answer: $+2$ (average) $\Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q7

Q8.

Solution

Concept — van der Waals constants: Real gases deviate from ideality because molecules attract one another and occupy finite volume. The constant a corrects the pressure term for intermolecular attraction; the constant b (the excluded volume) corrects the volume term for molecular size.

Step 1 — Pressure correction: The term $\frac{an^2}{V^2}$ is added to P because attractions reduce the wall-impact pressure; larger a means stronger attractions.

Step 2 — Volume correction: The term nb is subtracted from V because molecules themselves take up space; larger b means larger molecules.

Why other options are wrong:

- (B) swaps the roles of a and b.
- (C) and (D) wrongly claim both constants correct a single variable.

Final Answer: a = attraction term, b = volume term $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q8

Q9.

Solution

Concept — Molarity to molality: Take 1 L of solution; find the mass of solute and the mass of solvent (total mass − solute mass), then $m = \frac{\text{mol solute}}{\text{kg solvent}}$.

Step 1 — Mass of 1 L solution: $1000\,\text{mL} \times 1.10\,\text{g mL}^{-1} = 1100$ g.

Step 2 — Mass of solute and solvent: 1.0 mol glucose = 180 g; mass of water = 1100 − 180 = 920 g = 0.920 kg.

Step 3 — Molality: $m = \frac{1.0}{0.920} = 1.087 \approx 1.08\,\text{mol kg}^{-1}$.

Why other options are wrong:

- (A) 0.92 inverts the ratio (uses kg as numerator).
- (C) 1.00 ignores the solute mass.
- (D) 1.22 uses a wrong solvent mass.

Final Answer: $m \approx 1.08\,\text{mol kg}^{-1} \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q9

Q10.

Solution

Concept — Kohlrausch's law: At infinite dilution each ion contributes independently, so molar conductivities can be added and subtracted like the salts themselves.

Step 1 — Combine the salts: $\Lambda^\circ_m(CH_3COOH) = \Lambda^\circ_m(CH_3COONa) + \Lambda^\circ_m(HCl) - \Lambda^\circ_m(NaCl)$, since this cancels Na^+ and Cl^- to leave CH_3COO^- and H^+.

Step 2 — Substitute: $\Lambda^\circ_m = 91 + 426 - 126 = 391\ \text{S cm}^2\,\text{mol}^{-1}$.

Why other options are wrong:

- (A) 643 adds all three values.
- (B) 217 leaves out the HCl term correctly but mis-sums.
- (D) 461 adds $NaCl$ instead of subtracting it.

Final Answer: $\Lambda^\circ_m(CH_3COOH) = 391\ \text{S cm}^2\,\text{mol}^{-1} \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q10

Q11.

Solution

Concept — Half-life and reaction order: The dependence of $t_{1/2}$ on initial concentration differs with order. For zero order, $t_{1/2} = \frac{[A]_0}{2k}$, which is directly proportional to $[A]_0$.

Step 1 — Read the formula: $t_{1/2} \propto [A]_0$ for a zero-order reaction.

Step 2 — Conclusion: Doubling $[A]_0$ doubles the half-life; it rises in direct proportion.

Why other options are wrong:

- (A) constant half-life is the first-order case.
- (B) decreasing half-life with $[A]_0$ is the second-order case ($t_{1/2} \propto 1/[A]_0$).
- (C) inverse proportionality is again second order, not zero order.

Final Answer: $t_{1/2}$ increases in direct proportion to $[A]_0 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q11

Q12.

Solution

Concept — Catalytic activity of transition metals: Transition metals show catalysis because they offer multiple oxidation states (easy electron transfer) and surfaces that adsorb reactant molecules, providing a lower-energy pathway.

Step 1 — Variable oxidation states: Partly filled d orbitals let the metal gain/lose electrons during the reaction, forming reactive intermediates.

Step 2 — Surface adsorption: Reactants adsorb on the metal surface, weakening their bonds and lowering the activation energy.

Why other options are wrong:

- (B) many catalytic transition-metal species are paramagnetic and reactive.
- (C) fully filled d orbitals (e.g. Zn) generally make poor catalysts; partly filled ones are active.
- (D) catalysis occurs across several oxidation states, not only the highest.

Final Answer: Variable oxidation states + surface adsorption $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q12

Q13.

Solution

Concept — Effective atomic number (EAN): EAN counts the metal's own electrons (after losing electrons for its oxidation state) plus two electrons donated by each ligand: EAN $= Z -$ (oxidation state) $+ 2 \times$ (number of ligands).

Step 1 — Metal electrons: Co has $Z = 27$; in the $+3$ state it has $27 - 3 = 24$ electrons.

Step 2 — Ligand donation: Six NH_3 ligands donate $6 \times 2 = 12$ electrons.

Step 3 — Total EAN: $24 + 12 = 36$ (the krypton configuration).

Why other options are wrong:

- (A) 30 counts only 3 ligand pairs.
- (C) 27 is the bare atomic number with no corrections.
- (D) 24 omits the ligand donation.

Final Answer: EAN $= 36 \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q13

Q14.

Solution

Concept — $-I$ effect and electronegativity: The electron-withdrawing inductive ($-I$) effect of a halogen increases with its electronegativity, because a more electronegative atom pulls the shared electrons more strongly.

Step 1 — Electronegativity order: $F > Cl > Br$ (fluorine is the most electronegative halogen).

Step 2 — $-I$ effect order: The $-I$ effect follows electronegativity: $F > Cl > Br$.

Why other options are wrong:

- (A) reverses the electronegativity order.
- (B) and (D) misplace F and Br.

Final Answer: $F > Cl > Br \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q14

Q15.

Solution

Concept — Hydroboration–oxidation: The B_2H_6 then H_2O_2/OH^- sequence adds $-H$ and $-OH$ across the double bond with *anti-Markovnikov* regiochemistry: $-OH$ goes to the *less* substituted (terminal) carbon.

Step 1 — Regiochemistry: For $CH_3 - CH = CH_2$, boron (and hence $-OH$ after oxidation) adds to the terminal CH_2.

Step 2 — Product: $-OH$ on C-1 gives $CH_3CH_2CH_2OH$, i.e. propan-1-ol.

Why other options are wrong:

- (A) propan-2-ol is the Markovnikov product (acid-catalysed hydration), not hydroboration.
- (B) 2-bromopropane comes from HBr, not this reagent.
- (C) propanal would need an oxidation to the aldehyde, not hydration.

Final Answer: propan-1-ol $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q15

Q16.

Solution

Concept — Grignard addition to a carbonyl: A Grignard reagent adds its alkyl group to the carbonyl carbon; the carbonyl oxygen becomes an alkoxide, which on acid hydrolysis gives an alcohol. Addition to a *ketone* yields a *tertiary* alcohol.

Step 1 — Add the nucleophile: CH_3^- from CH_3MgBr adds to the carbonyl carbon of acetone $(CH_3)_2C{=}O$, giving the alkoxide $(CH_3)_3C{-}OMgBr$.

Step 2 — Hydrolyse: Dilute acid protonates the alkoxide to give $(CH_3)_3C{-}OH$, i.e. 2-methylpropan-2-ol (a tertiary alcohol).

Why other options are wrong:

- (B) propan-2-ol would come from CH_3MgBr + acetaldehyde (a secondary alcohol).
- (C) butan-2-ol needs a different carbonyl/Grignard pair.
- (D) propan-1-ol is a primary alcohol, not formed from a ketone.

Final Answer: 2-methylpropan-2-ol $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q16

Q17.

Solution

Concept — Cleavage of ethers by HI: Hot concentrated HI cleaves an ether C–O bond. With one equivalent, the alkyl iodide forms from the *smaller / less hindered* alkyl group (it favours an S_N2-type attack of I^- on the less hindered carbon), and the larger group is released as the alcohol.

Step 1 — Identify the bonds: In $CH_3-O-CH_2CH_3$, the methyl group is smaller and less hindered, so I^- attacks the methyl carbon.

Step 2 — Products: Methyl–oxygen cleavage gives CH_3I and CH_3CH_2OH (ethanol).

Why other options are wrong:

- (A) wrongly forms the ethyl iodide and methanol (attack on the more hindered carbon).
- (C) no alkyl iodide forms; HI does generate an iodide.
- (D) requires two equivalents of HI; only one is used here.

Final Answer: CH_3I and $CH_3CH_2OH \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q17

Q18.

Solution

Concept — Decarboxylation: Heating the sodium salt of a carboxylic acid with soda lime ($NaOH/CaO$) removes the carboxyl group as carbonate and replaces $-COONa$ with $-H$, shortening the carbon chain by one.

Step 1 — Reaction: $CH_3COONa + NaOH \xrightarrow{CaO,\ \Delta} CH_4 + Na_2CO_3$.

Step 2 — Product: The methyl group becomes methane, CH_4.

Why other options are wrong:

- (A) ethane would form only by coupling (e.g. Kolbe electrolysis), not decarboxylation.
- (B) ethene is not a decarboxylation product of acetate.
- (D) acetaldehyde requires reduction of the acid, not decarboxylation.

Final Answer: methane (CH_4) $\Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q18

Q19.

Solution

Concept — Reduction of nitro compounds to amines: A nitro group $-NO_2$ on an aromatic ring is reduced to a primary amino group $-NH_2$ by a metal–acid system such as Sn/HCl (followed by basification of the resulting salt).

Step 1 — Reduction: $C_6H_5NO_2 \xrightarrow{Sn/HCl} C_6H_5NH_3^+$ (the anilinium salt).

Step 2 — Basify: Adding base liberates the free amine $C_6H_5NH_2$ (aniline).

Why other options are wrong:

- (A) nitrosobenzene is only a partial-reduction intermediate, not the final product.
- (B) phenol would require replacement of $-NO_2$ by $-OH$, a different reaction.
- (C) azobenzene forms under controlled alkaline reduction, not with Sn/HCl.

Final Answer: aniline ($C_6H_5NH_2$) $\Rightarrow$ D

Answer: (D) Go Back to Q19

Q20.

Solution

Concept — Fat- vs water-soluble vitamins: Vitamins A, D, E and K dissolve in fats and are stored in the body; the B-complex vitamins and vitamin C are water-soluble and are not stored (excess is excreted).

Step 1 — Recall the fat-soluble set: A, D, E, K (a common mnemonic).

Step 2 — Match the option: Only option (B) lists exactly A, D, E and K.

Why other options are wrong:

- (A) vitamins B and C are both water-soluble.
- (C) vitamin C is water-soluble (only D is fat-soluble here).
- (D) the B complex is water-soluble.

Final Answer: Vitamins A, D, E and K $\Rightarrow$ B

Answer: (B) Go Back to Q20

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	C	2	B	3	A	4	D	5	C
6	B	7	D	8	A	9	B	10	C
11	D	12	A	13	B	14	C	15	D
16	A	17	B	18	C	19	D	20	B