NEET 2025 — Chemistry Question Paper with Solutions

41 Chemistry questions as set in the paper · answers checked by RankUp

NEET 2025

1. Identify the suitable reagent for the following conversion.
$C_6H_5COOCH_3$ (methyl benzoate) → C_6H_5CHO (benzaldehyde)

(A) (i) $NaBH_4$, (ii) H^+/H_2O
(B) $H_2/Pd–BaSO_4$
(C) (i) $LiAlH_4$, (ii) H^+/H_2O
(D) (i) $AlH(iBu)_2$, (ii) H_2O

NEET 2025

2. The correct order of decreasing acidity of the following aliphatic acids is

(A) $HCOOH > CH_3COOH > (CH_3)_2CHCOOH > (CH_3)_3CCOOH$
(B) $HCOOH > (CH_3)_3CCOOH > (CH_3)_2CHCOOH > CH_3COOH$
(C) $(CH_3)_3CCOOH > (CH_3)_2CHCOOH > CH_3COOH > HCOOH$
(D) $CH_3COOH > (CH_3)_2CHCOOH > (CH_3)_3CCOOH > HCOOH$

NEET 2025

3. Which one of the following reactions does NOT belong to "Lassaigne's test"?

(A) $Na + X \xrightarrow{(\Delta)} NaX$
(B) $2CuO + C \xrightarrow{(\Delta)} 2Cu + CO_2$
(C) $Na + C + N \xrightarrow{(\Delta)} NaCN$
(D) $2Na + S \xrightarrow{(\Delta)} Na_2S$

NEET 2025

4. If the rate constant of a reaction is 0.03 s^{-1}, how much time does it take for 7.2 mol L^{-1} concentration of the reactant to get reduced to 0.9 mol L^{-1}? (Given: log 2 = 0.301)

(A) 210 s
(B) 21.0 s
(C) 69.3 s
(D) 23.1 s

NEET 2025

5. Given below are two statements :
Statement I: A hypothetical diatomic molecule with bond order zero is quite stable.
Statement II: As bond order increases, the bond length increases.
In the light of the above statements, choose the most appropriate answer from the options given below:

(A) Statement I is true but Statement II is false
(B) Statement I is false but Statement II is true
(C) Both Statement I and Statement II are true
(D) Both Statement I and Statement II are false

NEET 2025

6. Which of the following aqueous solution will exhibit highest boiling point?

(A) 0.01 M Na_2SO_4
(B) 0.015 M $C_6H_{12}O_6$
(C) 0.01 M Urea
(D) 0.01 M KNO_3

NEET 2025

7. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : $CH_3CH_2CH_2CH_2CH_2$–I undergoes S_N2 reaction faster than $CH_3CH_2CH_2CH_2CH_2$–Cl

Reason (R) : Iodine is a better leaving group because of its large size.

In the light of the above statements, choose the correct answer from the options given below:

(A) (A) is true but (R) is false
(B) (A) is false but (R) is true
(C) Both (A) and (R) are true and (R) is the correct explanation of (A)
(D) Both (A) and (R) are true but (R) is not the correct explanation of (A)

NEET 2025

8. Consider the following compounds :

$\underline{K}O_2$, $H_2\underline{O}_2$ and $H_2\underline{S}O_4$

The oxidation state of the underlined elements in them are, respectively,

(A) +1, −2, and +4
(B) +4, −4, and +6
(C) +1, −1, and +6
(D) +2, −2, and +6

NEET 2025

9. Match List - I with List - II.

List - I: A. Haber process; B. Wacker oxidation; C. Wilkinson catalyst; D. Ziegler catalyst

List - II: I. Fe catalyst; II. $PdCl_2$; III. $[(PPh_3)_3RhCl]$; IV. $TiCl_4$ with $Al(CH_3)_3$

Choose the correct answer from the options given below :

(A) A-I, B-II, C-III, D-IV
(B) A-I, B-IV, C-III, D-II
(C) A-I, B-II, C-IV, D-III
(D) A-II, B-III, C-I, D-IV

NEET 2025

10. Given below are two statements :

Statement I: Like nitrogen that can form ammonia, arsenic can form arsine.

Statement II: Antimony cannot form antimony pentoxide.

In the light of the above statements, choose the most appropriate answer from the options given below :

(A) Statement I is correct but Statement II is incorrect
(B) Statement I is incorrect but Statement II is correct
(C) Both Statement I and Statement II are correct
(D) Both Statement I and Statement II are incorrect

NEET 2025

11. Given below are two statements :

Statement I: Ferromagnetism is considered as an extreme form of paramagnetism.

Statement II : The number of unpaired electrons in a Cr^{2+} ion (Z = 24) is the same as that of a Nd^{3+} ion (Z = 60).

In the light of the above statements, choose the correct answer from the options given below :

(A) Statement I is true but Statement II is false
(B) Statement I is false but Statement II is true
(C) Both Statement I and Statement II are true
(D) Both Statement I and Statement II are false

NEET 2025

12. Which one of the following reactions does NOT give benzene as the product?

(A) $H–C\equiv C–H \xrightarrow{\text{(red hot iron tube, at 873 K)}}$

(B) $C_6H_5N_2^+Cl^- \xrightarrow{(H_2O,\ \text{warm})}$

(C) $C_6H_5COONa \xrightarrow{\text{(sodalime, }\Delta)}$

(D) n-hexane $\xrightarrow{(Mo_2O_3,\ 773\ K,\ 10–20\ atm)}$

NEET 2025

13. Match List-I with List-II

List - I: A. XeO_3; B. XeF_2; C. $XeOF_4$; D. XeF_6

List - II: I. sp^3d; linear; II. sp^3; pyramidal; III. sp^3d^3; distorted octahedral; IV. sp^3d^2; square pyramidal

Choose the correct answer from the options given below :

(A) A-IV, B-II, C-III, D-I

(B) A-IV, B-II, C-I, D-III

(C) A-II, B-I, C-IV, D-III

(D) A-II, B-I, C-III, D-IV

NEET 2025

14. How many products (including stereoisomers) are expected from monochlorination of the following compound?

$(CH_3)_2CH–CH_2–CH_3$

(A) 5

(B) 6

(C) 2

(D) 3

NEET 2025

15. Which of the following statements are true?

A. Unlike Ga that has a very high melting point, Cs has a very low melting point.

B. On Pauling scale, the electronegativity values of N and Cl are not the same.

C. Ar, K^+, Cl^-, Ca^{2+}, and S^{2-} are all isoelectronic species.

D. The correct order of the first ionization enthalpies of Na, Mg, Al, and Si is Si > Al > Mg > Na.

E. The atomic radius of Cs is greater than that of Li and Rb.

Choose the correct answer from the options given below :

(A) C and D only

(B) A, C, and E only

(C) A, B, and E only

(D) C and E only

NEET 2025

16. The standard heat of formation, in kcal/mol of Ba^{2+} is : [Given : standard heat of formation of SO_4^{2-} ion (aq) = −216 kcal/mol, standard heat of crystallisation of $BaSO_4$(s) = −4.5 kcal/mol, standard heat of formation of $BaSO_4$(s) = −349 kcal/mol]

(A) +133.0

(B) +220.5

(C) −128.5

(D) −133.0

NEET 2025

17. Match List-I with List-II

List - I (Example): A. Humidity; B. Alloys; C. Amalgams; D. Smoke

List - II (Type of Solution): I. Solid in solid; II. Liquid in gas; III. Solid in gas; IV. Liquid in solid

Choose the correct answer from the options given below:

(A) A-III, B-I, C-IV, D-II
(B) A-III, B-II, C-I, D-IV
(C) A-II, B-IV, C-I, D-III
(D) A-II, B-I, C-IV, D-III

NEET 2025

18. Sugar 'X'

A. is found in honey

B. is a keto sugar

C. exists in α and β-anomeric forms.

D. Is laevorotatory.

'X' is :

(A) Maltose
(B) Sucrose
(C) D-Glucose
(D) D-Fructose

NEET 2025

19. Total number of possible isomers (both structural as well as stereoisomers) of cyclic ethers of molecular formula C_4H_8O is :

(A) 10
(B) 11
(C) 6
(D) 8

NEET 2025

20. For the reaction $A(g) \rightleftharpoons 2B(g)$, the backward reaction rate constant is higher than the forward reaction rate constant by a factor of 2500, at 1000 K.

[Given : $R = 0.0831$ L atm mol^{-1} K^{-1}]

Kp for the reaction at 1000 K is

(A) 0.033
(B) 0.021
(C) 83.1
(D) 2.077×10^5

NEET 2025

21. The ratio of the wavelengths of the light absorbed by a Hydrogen atom when it undergoes $n = 2 \rightarrow n = 3$ and $n = 4 \rightarrow n = 6$ transitions, respectively, is

(A) 1/9
(B) 1/4
(C) 1/36
(D) 1/16

NEET 2025

22. If the molar conductivity (Λm) of a 0.050 mol L^{-1} solution of a monobasic weak acid is 90 S cm^2 mol^{-1}, its extent (degree) of dissociation will be

[Assume $\Lambda^\circ_+ = 349.6$ S cm^2 mol^{-1} and $\Lambda^\circ_- = 50.4$ S cm^2 mol^{-1}.]

(A) 0.225
(B) 0.215
(C) 0.115
(D) 0.125

NEET 2025

23. 5 moles of liquid X and 10 moles of liquid Y make a solution having a vapour pressure of 70 torr. The vapour pressures of pure X and Y are 63 torr and 78 torr respectively. Which of the following is true regarding the described solution?

(A) The solution is ideal.
(B) The solution has volume greater than the sum of individual volumes.
(C) The solution shows positive deviation.
(D) The solution shows negative deviation.

NEET 2025

24. Among the following, choose the ones with equal number of atoms.
A. 212 g of $Na_2CO_3(s)$ [molar mass = 106 g]
B. 248 g of $Na_2O(s)$ [molar mass = 62 g]
C. 240 g of NaOH(s) [molar mass = 40 g]
D. 12 g of $H_2(g)$ [molar mass = 2 g]
E. 220 g of $CO_2(g)$ [molar mass = 44 g]
Choose the correct answer from the options given below:

(A) B, C, and D only
(B) B, D, and E only
(C) A, B, and C only
(D) A, B, and D only

NEET 2025

25. Which of the following are paramagnetic?
A. $[NiCl_4]^{2-}$
B. $Ni(CO)_4$
C. $[Ni(CN)_4]^{2-}$
D. $[Ni(H_2O)_6]^{2+}$
E. $Ni(PPh_3)_4$
Choose the correct answer from the options given below :

(A) A and D only
(B) A, D and E only
(C) A and C only
(D) B and E only

NEET 2025

26. If the half-life ($t_{1/2}$) for a first order reaction is 1 minute, then the time required for 99.9% completion of the reaction is closest to :

(A) 5 minutes
(B) 10 minutes
(C) 2 minutes
(D) 4 minutes

NEET 2025

27. Energy and radius of first Bohr orbit of He^+ and Li^{2+} are [Given R_H = 2.18×10^{-18} J, a_0 = 52.9 pm]

(A) $E_n(Li^{2+}) = -19.62 \times 10^{-16}$ J; $r_n(Li^{2+})$ = 17.6 pm; $E_n(He^+) = -8.72 \times 10^{-16}$ J; $r_n(He^+)$ = 26.4 pm
(B) $E_n(Li^{2+}) = -8.72 \times 10^{-16}$ J; $r_n(Li^{2+})$ = 17.6 pm; $E_n(He^+) = -19.62 \times 10^{-16}$ J; $r_n(He^+)$ = 17.6 pm
(C) $E_n(Li^{2+}) = -19.62 \times 10^{-18}$ J; $r_n(Li^{2+})$ = 17.6 pm; $E_n(He^+) = -8.72 \times 10^{-18}$ J; $r_n(He^+)$ = 26.4 pm
(D) $E_n(Li^{2+}) = -8.72 \times 10^{-18}$ J; $r_n(Li^{2+})$ = 26.4 pm; $E_n(He^+) = -19.62 \times 10^{-18}$ J; $r_n(He^+)$ = 17.6 pm

NEET 2025

28. Dalton's Atomic theory could not explain which of the following?

(A) Law of multiple proportion
(B) Law of gaseous volume
(C) Law of conservation of mass
(D) Law of constant proportion

NEET 2025

29. Identify the correct orders against the property mentioned

A. $H_2O > NH_3 > CHCl_3$ - dipole moment

B. $XeF_4 > XeO_3 > XeF_2$ - number of lone pairs on central atom

C. O–H > C–H > N–O - bond length

D. $N_2 > O_2 > H_2$ - bond enthalpy

Choose the correct answer from the options given below:

(A) A, C only
(B) B, C only
(C) A, D only
(D) B, D only

NEET 2025

30. Match List-I with List-II.

List - I (Name of Vitamin): A. Vitamin B_{12}; B. Vitamin D; C. Vitamin B_2; D. Vitamin B_6

List - II (Deficiency disease): I. Cheilosis; II. Convulsions; III. Rickets; IV. Pernicious anaemia

Choose the correct answer from the options given below:

(A) A-II, B-III, C-I, D-IV
(B) A-IV, B-III, C-II, D-I
(C) A-I, B-III, C-II, D-IV
(D) A-IV, B-III, C-I, D-II

NEET 2025

31. The correct order of decreasing basic strength of the given amines is:

(A) N-ethylethanamine > ethanamine > N-methylaniline > benzenamine
(B) benzenamine > ethanamine > N-methylaniline > N-ethylethanamine
(C) N-methylaniline > benzenamine > ethanamine > N-ethylethanamine
(D) N-ethylethanamine > ethanamine > benzenamine > N-methylaniline

NEET 2025

32. The correct order of the wavelength of light absorbed by the following complexes is,

A. $[Co(NH_3)_6]^{3+}$

B. $[Co(CN)_6]^{3-}$

C. $[Cu(H_2O)_4]^{2+}$

D. $[Ti(H_2O)_6]^{3+}$

Choose the correct answer from the options given below:

(A) C < D < A < B
(B) C < A < D < B
(C) B < D < A < C
(D) B < A < D < C

NEET 2025

33. Which one of the following compounds does not decolourize bromine water?

(A) $C_6H_5–CH=CH_2$
(B) $C_6H_5–NH_2$
(C) Cyclohexane (C_6H_{12})
(D) $C_6H_5–OH$

NEET 2025

34. Match List-I with List-II

List - I (Mixture): A. $CHCl_3$ + $C_6H_5NH_2$; B. Crude oil in petroleum industry; C. Glycerol from spent-lye; D. Aniline - water

List - II (Method of separation): I. Distillation under reduced pressure; II. Steam distillation; III. Fractional distillation; IV. Simple distillation

Choose the correct answer from the options given below:

(A) A-III, B-IV, C-I, D-II
(B) A-III, B-IV, C-II, D-I
(C) A-IV, B-III, C-I, D-II
(D) A-IV, B-III, C-II, D-I

NEET 2025

35. Which among the following electronic configurations belong to main group elements?

A. $[Ne]3s^1$
B. $[Ar]3d^3 4s^2$
C. $[Kr]4d^{10}5s^2 5p^5$
D. $[Ar]3d^{10}4s^1$
E. $[Rn]5f^0 6d^2 7s^2$

Choose the correct answer from the option given below :

(A) D and E only
(B) A, C and D only
(C) B and E only
(D) A and C only

NEET 2025

36. Which one of the following compounds can exist as cis-trans isomers?

(A) 1, 1-Dimethylcyclopropane
(B) 1, 2-Dimethylcyclohexane
(C) Pent-1-ene
(D) 2-Methylhex-2-ene

NEET 2025

37. Phosphoric acid ionizes in three steps with their ionization constant values Ka_1, Ka_2 and Ka_3, respectively, while K is the overall ionization constant. Which of the following statements are true?

A. $\log K = \log Ka_1 + \log Ka_2 + \log Ka_3$
B. H_3PO_4 is a stronger acid than $H_2PO_4^-$ and HPO_4^{2-}
C. $Ka_1 > Ka_2 > Ka_3$
D. $Ka_1 = (Ka_3 + Ka_2)/2$

Choose the correct answer from the options given below :

(A) B, C and D only
(B) A, B and C only
(C) A and B only
(D) A and C only

NEET 2025

38. Match List-I with List-II

List - I (Ion): A. Co^{2+}; B. Mg^{2+}; C. Pb^{2+}; D. Al^{3+}

List - II (Group Number in Cation Analysis): I. Group-I; II. Group-III; III. Group-IV; IV. Group-VI

Choose the correct answer from the options given below :

(A) A-III, B-II, C-IV, D-I
(B) A-III, B-II, C-I, D-IV
(C) A-III, B-IV, C-II, D-I
(D) A-III, B-IV, C-I, D-II

NEET 2025

39. Higher yield of NO in $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$ can be obtained at [ΔH of the reaction = +180.7 kJ mol^{-1}]

A. Higher temperature
B. Lower temperature
C. Higher concentration of N_2
D. Higher concentration of O_2

Choose the correct answer from the options given below :

(A) B, C, D only
(B) A, C, D only
(C) A, D only
(D) B, C only

NEET 2025

40. Given below are two statements :

Statement-I : Benzenediazonium salt is prepared by the reaction of aniline with nitrous acid at 273 − 278 K. It decomposes easily in the dry state.

Statement-II : Insertion of iodine into the benzene ring is difficult and hence iodobenzene is prepared through the reaction of benzenediazonium salt with KI.

In the light of the above statements, choose the most appropriate answer from the options given below:

(A) Statement I is correct but Statement II is incorrect
(B) Statement I is incorrect but Statement II is correct
(C) Both Statement I and Statement II are correct
(D) Both Statement I and Statement II are incorrect

NEET 2025

41. The major product of the following reaction is

$C_6H_5–CO–CH_2–CH_2–CN \rightarrow$[(i) CH_3MgBr (excess), (ii) H_3O^+]

(A) $C_6H_5–C(CH_3)(OH)–CH_2–CH_2–C(OH)(CH_3)_2$
(B) $C_6H_5–CO–CH_2–CH_2–CO–CH_3$
(C) $C_6H_5–C(CH_3)(OH)–CH_2–CH_2–CN$
(D) $C_6H_5–C(CH_3)(OH)–CH_2–CH_2–CO–CH_3$

Answer key and explanations

1. Answer: (D) (i) $AlH(iBu)_2$, (ii) H_2O

DIBAL-H ($AlH(iBu)_2$) at low temperature reduces an ester only as far as the aldehyde stage, and hydrolysis then releases benzaldehyde. $LiAlH_4$ reduces the ester all the way to benzyl alcohol, $NaBH_4$ hardly reduces esters at all, and H_2/Pd–$BaSO_4$ (Rosenmund) is used for acid chlorides, not esters.

2. Answer: (A) HCOOH > CH_3COOH > $(CH_3)_2CHCOOH$ > $(CH_3)_3CCOOH$

Alkyl groups are electron-donating (+I) and destabilise the carboxylate anion, so acidity falls as more methyl groups are attached to the α-carbon. Formic acid, with no alkyl group, is the strongest, followed by acetic, isobutyric and finally pivalic acid; the reversed orders ignore this +I effect.

3. Answer: (B) $2CuO + C \xrightarrow{(\Delta)} 2Cu + CO_2$

In Lassaigne's test the organic compound is fused with sodium so that N, S and halogens become NaCN, Na_2S and NaX, which are then tested in the sodium fusion extract. Heating with copper(II) oxide to oxidise carbon to CO_2 is the test for carbon (and the basis of Duma's/Liebig methods), not part of the sodium fusion test.

4. Answer: (C) 69.3 s

The unit s^{-1} shows a first-order reaction. $t = (2.303/k) \log(7.2/0.9) = (2.303/0.03) \times \log 8 = 76.77 \times 0.903 \approx 69.3$ s; equivalently 7.2 → 0.9 is three half-lives of 0.693/0.03 = 23.1 s each. 23.1 s is only one half-life.

5. Answer: (D) Both Statement I and Statement II are false

A bond order of zero means equal numbers of bonding and antibonding electrons, so no net bond forms and the molecule (like He_2) does not exist stably. Higher bond order means stronger, shorter bonds, so bond length decreases with bond order. Both statements are false.

6. Answer: (A) 0.01 M Na_2SO_4

Elevation of boiling point is proportional to i × concentration: Na_2SO_4 gives 3 × 0.01 = 0.03, KNO_3 2 × 0.01 = 0.02, glucose 0.015 and urea 0.01. Sodium sulphate has the largest number of solute particles and so the highest boiling point; glucose looks larger only if the van't Hoff factor is ignored.

7. Answer: (C) Both (A) and (R) are true and (R) is the correct explanation of (A)

For the same primary alkyl group, the rate of S_N2 depends on how easily the C–X bond breaks. Iodide is large and highly polarisable, the C–I bond is the weakest, and I^- is a weak base, so it leaves most easily; this is exactly why the iodide reacts faster than the chloride. Both statements are true and the reason explains the assertion.

8. Answer: (C) +1, −1, and +6

Potassium, an alkali metal, is always +1 (KO_2 is potassium superoxide, O_2^-). In the peroxide H_2O_2, 2(+1) + 2x = 0 gives oxygen −1. In H_2SO_4, 2(+1) + x + 4(−2) = 0 gives sulphur +6. Taking oxygen as −2 in a peroxide is the usual trap.

9. Answer: (A) A-I, B-II, C-III, D-IV

The Haber synthesis of ammonia uses an iron catalyst; Wacker oxidation of ethene to ethanal uses $PdCl_2$; Wilkinson's catalyst for hydrogenation is $[(PPh_3)_3RhCl]$; and the Ziegler(–Natta) catalyst for polymerising alkenes is $TiCl_4$ with an organoaluminium compound. Each catalyst matches its own process in order.

10. Answer: (A) Statement I is correct but Statement II is incorrect

All group 15 elements form hydrides EH_3, so arsenic forms arsine (AsH_3) just as nitrogen forms NH_3. Group 15 elements also form pentoxides E_2O_5, and Sb_2O_5 is a known oxide, so the second statement is wrong.

11. Answer: (A) Statement I is true but Statement II is false

Ferromagnetism arises when unpaired spins align co-operatively in domains, so it is treated as an extreme form of paramagnetism. Cr^{2+} is $3d^4$ with 4 unpaired electrons, whereas Nd^{3+} is $4f^3$ with only 3, so the second statement is false.

12. Answer: (B) $C_6H_5N_2^+Cl^- \xrightarrow{(H_2O,\ warm)}$

Warming benzenediazonium chloride with water replaces the $-N_2^+$ group by –OH, giving phenol, not benzene. Ethyne trimerises to benzene in a red-hot iron tube, decarboxylation of sodium benzoate with soda lime gives benzene, and n-hexane is aromatised to benzene over a Mo_2O_3-type catalyst at 773 K and 10–20 atm.

13. Answer: (C) A-II, B-I, C-IV, D-III

XeO_3 has 3 bond pairs and 1 lone pair (sp^3, pyramidal); XeF_2 has 2 bond pairs and 3 lone pairs (sp^3d, linear); $XeOF_4$ has 5 bond pairs and 1 lone pair (sp^3d^2, square pyramidal); XeF_6 has 6 bond pairs and 1 lone pair (sp^3d^3, distorted octahedral).

14. Answer: (B) 6

2-Methylbutane has four kinds of hydrogen. Substitution at a CH_3 of the isopropyl end gives 1-chloro-2-methylbutane (chiral, 2 enantiomers), at the CH gives 2-chloro-2-methylbutane (achiral, 1), at the CH_2 gives 2-chloro-3-methylbutane (chiral, 2) and at the terminal CH_3 gives 1-chloro-3-methylbutane (achiral, 1): 2 + 1 + 2 + 1 = 6. Counting only the 4 constitutional isomers misses the enantiomers.

15. Answer: (D) C and E only

Gallium itself melts at only about 303 K, so A is false; N and Cl both have electronegativity 3.0 on the Pauling scale, so B is false. All five species in C have 18 electrons (true). The ionisation enthalpy order is Si > Mg > Al > Na because Mg's filled $3s^2$ is extra stable, so D is false. Cs is larger than both Li and Rb, so E is true.

16. Answer: (C) −128.5

For $Ba^{2+}(aq) + SO_4^{2-}(aq) \rightarrow BaSO_4(s)$, $\Delta H(\text{crystallisation}) = \Delta fH(BaSO_4) - \Delta fH(Ba^{2+}) - \Delta fH(SO_4^{2-})$. So $-4.5 = -349 - x - (-216)$, giving $x = -349 + 216 + 4.5 = -128.5$ kcal/mol. Ignoring the crystallisation enthalpy gives the −133.0 trap.

17. Answer: (D) A-II, B-I, C-IV, D-III

Humidity is water (liquid) dispersed in air (gas); alloys such as brass are solid in solid; amalgams are mercury (liquid) dissolved in a solid metal; smoke is solid particles in a gas. Swapping alloys and amalgams is the usual mistake.

18. Answer: (D) D-Fructose

Fructose is a ketohexose, occurs free in honey and fruits, forms α and β anomeric furanose rings and is strongly laevorotatory. Glucose is an aldose and dextrorotatory, while sucrose and maltose are disaccharides and not keto sugars.

19. Answer: (A) 10

Five-membered ring: tetrahydrofuran, 1 isomer. Four-membered ring: 2-methyloxetane (chiral, 2 forms) and 3-methyloxetane (1 form). Three-membered ring: 2-ethyloxirane (chiral, 2 forms), 2,2-dimethyloxirane (1 form) and 2,3-dimethyloxirane (cis meso form plus a pair of trans enantiomers, 3 forms). Total = 1 + 3 + 6 = 10; counting only constitutional isomers gives 6.

20. Answer: (A) 0.033

$K_c = k_f/k_b = 1/2500 = 4 \times 10^{-4}$. With $\Delta n(g) = 2 - 1 = 1$, $K_p = K_c(RT) = 4 \times 10^{-4} \times 0.0831 \times 1000 = 4 \times 10^{-4} \times 83.1 \approx 0.033$. Multiplying by 2500 instead of dividing gives the 2.077×10^5 trap.

21. Answer: (B) 1/4

$1/\lambda \propto (1/n_1^2 - 1/n_2^2)$. For 2 → 3: 1/4 − 1/9 = 5/36; for 4 → 6: 1/16 − 1/36 = 5/144. So $\lambda_1/\lambda_2 = (5/144)/(5/36) = 1/4$. Taking the ratio of the wave numbers instead gives 4, not among the options.

22. Answer: (A) 0.225

By Kohlrausch's law $\Lambda°m = 349.6 + 50.4 = 400$ S cm² mol⁻¹. Degree of dissociation $\alpha = \Lambda m/\Lambda°m = 90/400 = 0.225$. The concentration is not needed for α itself.

23. Answer: (D) The solution shows negative deviation.

x(X) = 5/15 = 1/3 and x(Y) = 2/3, so Raoult's law predicts $p = 63/3 + 78 \times 2/3 = 21 + 52 = 73$ torr. The observed 70 torr is lower, which is negative deviation (stronger X–Y attractions, volume contraction), so a larger volume or positive deviation is wrong.

24. Answer: (D) A, B, and D only

Moles of atoms: Na_2CO_3 2 mol × 6 = 12; Na_2O 4 mol × 3 = 12; NaOH 6 mol × 3 = 18; H_2 6 mol × 2 = 12; CO_2 5 mol × 3 = 15. Only sodium carbonate, sodium oxide and hydrogen contain the same number (12 N_A) of atoms; comparing moles of molecules instead of atoms is the trap.

25. Answer: (A) A and D only

Ni^{2+} ($3d^8$) with weak-field Cl^- is tetrahedral with 2 unpaired electrons, and octahedral $[Ni(H_2O)_6]^{2+}$ also has 2 unpaired electrons, so both are paramagnetic. Strong-field CN^- pairs the electrons in square-planar $[Ni(CN)_4]^{2-}$, and Ni(0) in $Ni(CO)_4$ and $Ni(PPh_3)_4$ is d^{10}, so these three are diamagnetic.

26. Answer: (B) 10 minutes

$t = (2.303/k) \log(100/0.1) = (2.303 \times 3/0.693) \times t_{1/2} = 9.97 \times 1$ min ≈ 10 minutes. In other words about ten half-lives leave 1/1024 ≈ 0.1% of the reactant.

27. Answer: (C) $E_n(Li^{2+}) = -19.62 \times 10^{-18}$ J; $r_n(Li^{2+}) = 17.6$ pm; $E_n(He^+) = -8.72 \times 10^{-18}$ J; $r_n(He^+) = 26.4$ pm

For n = 1, $E = -R_H Z^2$ and $r = a_0/Z$. He^+ (Z = 2): $E = -2.18 \times 10^{-18} \times 4 = -8.72 \times 10^{-18}$ J, $r = 52.9/2 \approx 26.4$ pm. Li^{2+} (Z = 3): $E = -2.18 \times 10^{-18} \times 9 = -19.62 \times 10^{-18}$ J, $r = 52.9/3 \approx 17.6$ pm. The 10^{-16} options have the wrong power of ten.

28. Answer: (B) Law of gaseous volume

Dalton's theory of indivisible atoms combining in simple whole-number ratios accounts for conservation of mass, constant composition and multiple proportions. Gay-Lussac's law of combining gas volumes needed Avogadro's idea of molecules (e.g. H_2, O_2 splitting into atoms), which Dalton's theory could not provide.

29. Answer: (C) A, D only

Dipole moments are about 1.85 D (H_2O), 1.47 D (NH_3) and 1.04 D ($CHCl_3$), so A is right. Lone pairs on Xe are 2 (XeF_4), 1 (XeO_3) and 3 (XeF_2), so B is wrong. O–H (~96 pm) is the shortest of the three bonds, not the longest, so C is wrong. Bond enthalpies are N_2 946 > O_2 498 > H_2 436 kJ mol^{-1}, so D is right.

30. Answer: (D) A-IV, B-III, C-I, D-II

Vitamin B_{12} deficiency causes pernicious anaemia, vitamin D deficiency causes rickets, riboflavin (B_2) deficiency causes cheilosis (cracked lips) and pyridoxine (B_6) deficiency causes convulsions. Swapping B_2 and B_6 is the common slip.

31. Answer: (A) N-ethylethanamine > ethanamine > N-methylaniline > benzenamine

Aliphatic amines are much stronger bases than aryl amines because the aryl ring delocalises the nitrogen lone pair. Diethylamine (secondary, two +I groups) is more basic than ethylamine, and N-methylaniline is slightly more basic than aniline because of the extra methyl +I effect (pKb about 9.3 against 9.4).

32. Answer: (D) B < A < D < C

Absorbed wavelength is inversely related to the crystal-field splitting. CN^- is the strongest-field ligand, so $[Co(CN)_6]^{3-}$ absorbs at the shortest wavelength, followed by $[Co(NH_3)_6]^{3+}$ (Co^{3+} with NH_3). $[Ti(H_2O)_6]^{3+}$ absorbs around 500 nm, and $[Cu(H_2O)_4]^{2+}$, with a weak field and a +2 ion, absorbs in the red (~600–800 nm), the longest wavelength.

33. Answer: (C) Cyclohexane (C_6H_{12})

Styrene adds bromine across its C=C bond, while aniline and phenol are so strongly activated that they rapidly give 2,4,6-tribromo products; all three decolourise bromine water. Cyclohexane is a saturated alkane with no activated ring or double bond, so it does not react with bromine water.

34. Answer: (C) A-IV, B-III, C-I, D-II

Chloroform (b.p. 334 K) and aniline (b.p. 457 K) differ widely in boiling point, so simple distillation works. Crude oil fractions with close boiling points need fractional distillation. Glycerol decomposes at its boiling point and is recovered from spent lye by distillation under reduced pressure. Aniline is steam-volatile and immiscible with water, so steam distillation is used.

35. Answer: (D) A and C only

Main-group (s- and p-block) elements have the last electron in an s or p orbital: $[Ne]3s^1$ is sodium and $[Kr]4d^{10}5s^25p^5$ is iodine. $[Ar]3d^34s^2$ (V) and $[Ar]3d^{10}4s^1$ (Cu) are d-block, and $[Rn]6d^27s^2$ (Th) is an f-block actinoid; copper is the usual trap because its outer electron is 4s.

36. Answer: (B) 1, 2-Dimethylcyclohexane

In 1,2-dimethylcyclohexane the two methyl groups on different ring carbons can be on the same or opposite faces of the ring, giving cis and trans forms. 1,1-Dimethylcyclopropane has both methyls on one carbon, and pent-1-ene and 2-methylhex-2-ene each have one alkene carbon carrying two identical groups, so none of these shows geometrical isomerism.

37. Answer: (B) A, B and C only

Adding the three steps multiplies their constants, $K = Ka_1 \cdot Ka_2 \cdot Ka_3$, so log K is the sum of the three logs. Removing H^+ from an increasingly negative species gets harder, so $Ka_1 > Ka_2 > Ka_3$ and H_3PO_4 is the strongest of the three acids. There is no averaging relation between the constants, so the last statement is false.

38. Answer: (D) A-III, B-IV, C-I, D-II

In the classical scheme Pb^{2+} is precipitated in group I as $PbCl_2$, Al^{3+} in group III as $Al(OH)_3$, Co^{2+} in group IV as CoS (H_2S in ammoniacal medium) and Mg^{2+} is left for group VI. So Co^{2+} goes with Group-IV, Mg^{2+} with Group-VI, Pb^{2+} with Group-I and Al^{3+} with Group-III.

39. Answer: (B) A, C, D only

The forward reaction is endothermic, so by Le Chatelier's principle a higher temperature shifts the equilibrium towards NO. Adding more of either reactant, N_2 or O_2, also shifts it forward. Lower temperature would favour the reactants.

40. Answer: (C) Both Statement I and Statement II are correct

Diazotisation of aniline with $NaNO_2$/HCl is carried out at 273–278 K because the diazonium salt is unstable; it is used in solution since the dry salt decomposes (even explosively). Direct iodination of benzene is reversible and inefficient, so iodobenzene is conveniently made by warming the diazonium salt with KI. Both statements are correct.

41. Answer: (D) $C_6H_5–C(CH_3)(OH)–CH_2–CH_2–CO–CH_3$

Excess CH_3MgBr adds to the ketone to give a tertiary alkoxide and also adds once to the nitrile to give an imine magnesium salt, which cannot react further. Acid work-up protonates the alkoxide to a tertiary alcohol and hydrolyses the imine to a methyl ketone. The diol would need a second Grignard addition to the ketone formed from the nitrile, which only appears after hydrolysis.

Questions as set in the AIPMT/NEET papers conducted by CBSE and NTA. Answers checked and explanations written by the RankUp team. RankUp is not affiliated with CBSE or NTA.