KCET 2025 CHEMISTRY **CODE-A4**

1. The correct statement/s about Galvanic cell is/are

(a) Current flows from cathode to anode

(b) Anode is positive terminal

(c) If E_{cell} <0, then it is spontaneous reaction

(d) Cathode is positive terminal

(1) a and b only

(2) a, b and c

(3) a and d only

(4) b only

2. The electronic conductance depends on'

(1) Nature of electrolyte added

(2) The number of valence electrons per atom

(3) Concentration of the electrolyte

(4) Size of the ions

3. For a given half cell, $Al^{3+} + 3e^- \longrightarrow Al$ on increasing the concentration of aluminium ion, the electrode potential will

(1) Decrease

(2) No change

(3) First increase then decrease

(4) Increase

4. Match the following and select the correct option for the quantity of electricity, in $Cmol^{-1}$, required to deposit various metals at cathode.

List-I	**List-II**
(a) Ag^+	i. 386000 $Cmol^{-1}$
(b) Mg^{2+}	ii. 289500 $Cmol^{-1}$
(c) Al^{3+}	iii. 96500 $Cmol^{-1}$
(d) Ti^{4+}	iv. 193000 $Cmol^{-1}$

(1) a – ii, b – i, c – iv, d – iii

(2) a – iii, b – iv, c – ii, d – i

(3) a – iv, b – iii, c – i, d – ii

(4) a – i, b – ii, c – iii, d – iv

5. Catalysts are used to increase the rate of a chemical reaction. Because it

(1) Increases the activation energy of the reaction

(2) Decreases the activation energy of the reaction

(3) Brings about improper orientation of reactant molecules

(4) Increases the potential energy barrier

6. **Half-life of a first order reaction is 20 seconds and initial concentration of reactant is 0.2M. The concentration of reactant left after 80 seconds is**

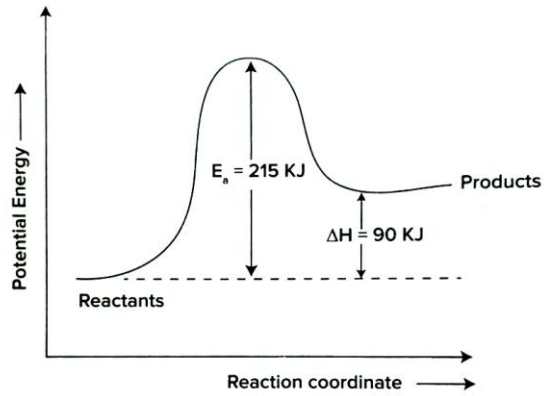
(1) 0.1 M

(2) 0.05 M

(3) 0.0125 M

(4) 0.2 M

7. **In the given graph, E_a for the reverse reaction will be**



(1) 125 KJ

(2) 215 KJ

(3) 90 KJ

(4) 305 KJ

8. **For the reaction $2N_2O_{5(g)} \longrightarrow 4NO_{2(g)} + O_{2(g)}$ initial concentration of N_2O_5 is 2.0 mol L^{-1} and after 300 min, it is reduced to 1.4 mol L^{-1}. The rate of production of NO_2 (in mol L^{-1} min^{-1}) is**

(1) 2.5×10^{-4}

(2) 4×10^{-4}

(3) 2.5×10^{-3}

(4) 4×10^{-3}

9. **Which of the following methods of expressing concentration are unitless?**

(1) Mole fraction and Mass percent (W/W)

(2) Molality and Mole fraction

(3) Mass percent (W/W) and Molality

(4) Molality and Molarity

10. **Select the INCORRECT statement/s from the following:**

(a) 22 books have infinite significant figures.

(b) In the answer of calculation 2.5×1.25 has four significant figures.

(c) Zero's preceding to first non-zero digit are significant.

(d) In the answer of calculation 12.11 + 18.0 + 1.012 has three significant figures

(1) (b), (c) and (d)

(2) (b) and (c) only

(3) (b) and (d) only

(4) (a) and (b) only

11. Given below are the atomic masses of the elements:

Element:	**Li**	**Na**	**Cl**	**K**	**Ca**	**Br**	**Sr**	**I**	**Ba**
Atomic Mass $(g\ mol^{-1})$	**7**	**23**	**35.5**	**39**	**40**	**80**	**88**	**127**	**137**

Which of the following doesn't from triad?

(1) Ba, Sr, Ca

(2) Cl, Br, I

(3) Cl, K, Ca

(4) Li, Na, K

12. The change in hybridisation (if any) of the 'Al' atom in the following reaction is

$AlCl_3 + Cl^- \rightarrow AlCl_4^-$

(1) No change in the hybridisation state

(2) sp^2 to sp^3

(3) sp^3 to $sp^3 d$

(4) sp^3 to sp^2

13. Match List-I with List-II and select the correct option:

List-I (Molecule/ion)		**List-II (Bond order)**	
(a)	NO	(i)	1.5
(b)	CO	(ii)	2.0
(c)	O_2^-	(iii)	2.5
(d)	O_2	(iv)	3.0

(1) a – iii, b – iv, c – i, d – ii

(2) a – i, b – iv, c – iii, d – ii

(3) a – ii, b – iii, c – iv, d – i

(4) a – iv, b – iii, c – ii, d – i

14. The electronic configuration of X and Y are given below:

X: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$

Y: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$

Which of the following is the correct molecular formula and type of bond formed between X and Y?

(1) X_3Y, ionic bond

(2) X_2Y_3, coordinate bond

(3) XY_3, covalent bond

(4) X_2Y, covalent bond

15. Match List-I with List-II

List-I (Types of redox reactions)		List-II (Examples)	
(a)	Combination reaction	(i)	$Cl_{2(g)} + 2Br^-_{(aq)} \rightarrow 2Cl^-_{(aq)} + Br_{2(l)}$
(b)	Decomposition reaction	(ii)	$2H_2O_{2(aq)} \rightarrow 2H_2O_{(l)} + O_{2(g)}$
(c)	Displacement reaction	(iii)	$CH_{4(g)} + 2O_{2(g)} \xrightarrow{\Delta} CO_{2(g)} + 2H_2O_{(l)}$
(d)	Disproportionation reaction	(iv)	$2H_2O_{(l)} \xrightarrow{\Delta} 2H_{2(g)} + O_{2(g)}$

Choose the correct answer from the options given below.

(1) a – iv, b – iii, c – i, d – ii

(2) a – ii, b – i, c – iv, d – iii

(3) a – iii, b – iv, c – i, d – ii

(4) a – iii, b – ii, c – i, d – iv

16. In the following pairs, the one in which both transition metal ions are colourless is

(1) Sc^{3+}, Zn^{2+}

(2) V^{2+}, Ti^{3+}

(3) Zn^{2+}, Mn^{2+}

(4) Ti^{4+}, Cu^{2+}

17. In the reaction between hydrogen sulphide and acidified permanganate solution,

(1) H_2S is reduced to S, MnO_4^- is oxidised to Mn^{2+}

(2) H_2S is oxidised to SO_2, MnO_4^- is reduced to MnO_2

(3) H_2S is reduced to SO_2, MnO_4^- is oxidised to Mn^{2+}

(4) H_2S is oxidised to S, MnO_4^- is reduced to Mn^{2+}

18. A member of the Lanthanoid series which is well known to exhibit +4 oxidation state is

(1) Samarium

(2) Europium

(3) Erbium

(4) Cerium

19. In which of the following pairs, both the elements do not have (n – 1) d^{10} ns^2 configuration?

(1) Cu, Zn

(2) Zn, Cd

(3) Cd, Hg

(4) Ag, Cu

20. A ligand which has two different donor atoms and either of the two ligates with the central metal atom/ion in the complex is called _____

(1) Chelate ligand

(2) Unidentate ligand

(3) Polydentate ligand

(4) Ambidentate ligand

21. Which of the following statements are true about $[NiCl_4]^{2-}$?

(a) The complex has tetrahedral geometry.

(b) Co-ordination number of Ni is 2 and oxidation state is +4.

(c) The complex is sp^3 hybridised

(d) It is high spin complex.

(e) The complex is paramagnetic.

(1) a, c, d and e (2) a, b, d and e (3) b, c, d and e (4) a, b, c and d

22. Which formula and its name combination is incorrect?

(1) K_3 [Cr $(C_2O_4)_3$], Potassium trioxalatochromate (III)

(2) $[CoCl_2(en)_2]$ Cl, dichloridobis (ethane – 1, 2 – diamine) cobalt (III) chloride

(3) $[Co(NH_3)_5(CO_3)]Cl$, Pentaamine carbonyl cobalt (III) chloride

(4) [Pt $(NH_3)_2Cl(NO_2)$] diamine chloridonitrito – N – Platinum (II)

23. In the complex ion $[Fe(C_2O_4)_3]^{3-}$, the Co-ordination number of Fe is

(1) 4

(2) 5

(3) 6

(4) 3

24. Match List-I with List-II for the following reaction pattern

Glucose $\xrightarrow{\text{Reagent}}$ Product $\longrightarrow$ Structural prediction.

List-I (Reagents)		**List-II (Structural prediction)**	
(a)	Acetic anhydride	(i)	Glucose has an aldehyde group
(b)	Bromine water	(ii)	Glucose has a straight chain of six carbon atoms
(c)	Hydroiodic acid	(iii)	Glucose has five hydroxyl groups
(d)	Hydrogen cyanide	(iv)	Glucose has a carbonyl group

(1) a – iv, b – iii, c – ii, d – i

(2) a – iii, b – i, c – ii, d – iv

(3) a – i, b – ii, c – iii, d – iv

(4) a – iii, b – ii, c – i, d – iv

25. The correct sequence of α – amino acid, hormone, vitamin, carbohydrates respectively is

(1) Thiamine, Thyroxine, Vitamin A, Glucose

(2) Glutamine, Insulin, Aspartic acid, Fructose

(3) Arginine, Testosterone, Glutamic acid, Maltose

(4) Aspartic acid, Insulin, Ascorbic acid, rhamnose

26. Which examples of carbohydrates exhibit α – link (α – Glycosidic link) in their structure?

(1) Maltose and Lactose

(2) Amylose and Amylopectin

(3) Cellulose and Glycogen

(4) Glucose and Fructose

27. In the titration of potassium permanganate ($KMnO_4$) against Ferrous ammonium sulphate (FAS) solution, dilute sulphuric acid but not nitric acid is used to maintain acidic medium, because

(1) It is difficult to identify the end point

(2) Nitric acid doesn't act as an indicator

(3) Nitric acid itself is an oxidising agent

(4) Nitric acid is a weak acid than sulphuric acid

28. The group reagent $NH_4Cl(s)$ and aqueous NH_3 will preciplatate which of the following ion?

(1) NH_4^+

(2) Al^{3+}

(3) Ba^{2+}

(4) Ca^{2+}

29. In the preparation of sodium fusion extract, the purpose of fusing organic compound with a piece of sodium metal is to

(1) Convert the organic compound into vapour state

(2) Convert the elements of the compound from covalent from to ionic form

(3) Convert the elements of the compound from ionic form to covalent form

(4) Decrease the melting point of the compound

30. The sodium fusion extract is boiled with concentrated nitric acid while testing for halogens, by doing so, it

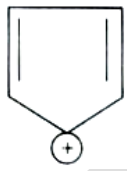
(1) helps in precipitation of AgCl

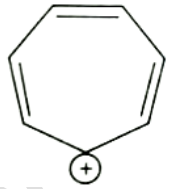
(2) increases the solubility of AgCl

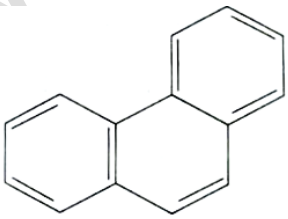
(3) Increases the concentration of NO_3^- ion

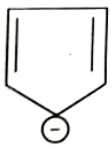
(4) decomposes Na_2S and NaCN, if formed

31. Which of the following is not an aromatic compound?

(1) 

(2) 

(3) 

(4) 

32. The IUPAC name of the given organic compound is

$HC \equiv C - CH = CH - CH = CH_2$

(1) Hexa – 1 – yn – 3, 5 – diene

(2) Hexa – 5 – yn – 1, 3 – diene

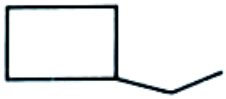
(3) Hexa – 1, 3 – dien – 5 – yne

(4) Hexa – 3, 5 – dien – 1 – yne

33. Amont the following, identify the compound that is not an isomer of hexane

(1) $CH_3 - CH_2 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_2 - CH_3$

(2) $CH_3 - CH_2 - CH_2 - CH_2 - CH_2 - CH_3$

(3) 

(4) $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_2 - CH_2 - CH_3$

34. The organic compound  **can be classified as _____**

(1) Allylic halide

(2) Benzyl halide

(3) Aryl halide

(4) Alkyl halide

35. Chlorobenzene reacts with bromine gas in the presence of Anhyd $AlBr_3$ to yield p-Bromochlorobenzene.

This reaction is classified as _____

(1) Elimination reaction

(2) Nucleophilic substitution reaction

(3) Electrophilic substitution reaction

(4) Addition reaction

36. The organometallic compound $(CH_3)_3$ CMgBr on reaction with D_2O produces _____

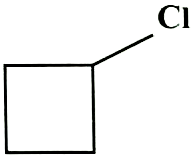
(1) $(CH_3)_3$ COD

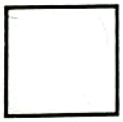
(2) $(CD_3)_3$ CD

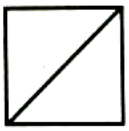
(3) $(CD_3)_3$ COD

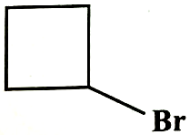
(4) $(CH_3)_3$ CD

37. The major product formed when 1 – Bromo – 3 – Chlorocyclobutane reacts with metallic sodium in dry ether is

(1) 

(2) 

(3) 

(4) 

38. Ethyl alcohol is heated with concentrated sulphuric acid at 413 K. The major product formed is

(1) $C_2H_5 – O – C_2H_5$

(2) $CH_3 – O – C_3H_7$

(3) $CH_2 = CH_2$

(4) $CH_3COOC_2H_5$

39. Phenol can be distinguished from propanol by using the reagent

(1) Bromine water

(2) Iron metal

(3) Iodine in alcohol

(4) Sodium metal

40. Match the following with their pKa values

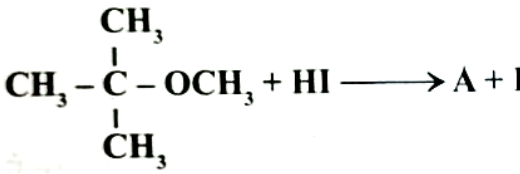
Acid	**pKa**
(I) Phenol	**(a) 16**
(II) p-Nitrophenol	**(b) 0.78**
(III) Ethyl alcohol	**(c) 10**
(IV) Picric acid	**(d) 7.1**

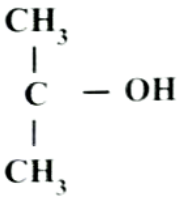
(1) I – c, II – d, III – a, IV – b

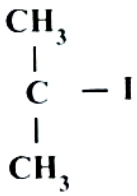
(2) I – a, II – d, III – c, IV – b

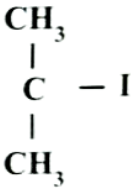
(3) I – a, II – b, III – c, IV – d

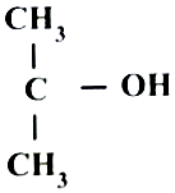
(4) I – b, II – a, III – d, IV – c

41.  A and respectively are

(1) A = CH_3– I, B = 

(2) A = CH_3OH, B = 

(3) A = CH_3– I, B = 

(4) A = CH_3OH, B = 

42. **Oxidation of Toluene with chromyl chloride followed by hydrolysis given Benzaldehyde. This reaction is known as _____**

(1) Etard Reaction

(2) Kolbe reaction

(3) Stephen reaction

(4) Cannizzaro Reaction

43. **Statement-I: Reduction of ester by DIBAL-H followed by hydrolysis gives aldehyde.**

Statement -II: Oxidation of benzyl alcohol with aqueous $KMnO_4$ leads to the formation Benzaldehyde.

Amont the above statements, identify the correct statement.

(1) Both statements-I and II are false

(2) Statement-I is true but statement-II is false

(3) Statement-I is false but statement-II is true

(4) Both statements-I and II are true

44. **Arrange the following compounds in their decreasing order of reactivity towards Nucleophile**

CH_3COCH_3, $CH_3COC_2H_5$, CH_3CHO

(1) CH_3 CHO > CH_3 CO CH_3 > CH_3 CO C_2H_5

(2) CH_3COCH_3 > CH_3CHO > $CH_3COC_2H_5$

(3) $CH_3COC_2H_5$ > CH_3COCH_3 > CH_3CHO

(4) CH_3CHO > $CH_3COC_2H_5$ > CH_3COCH_3

45. Which of the following has most acidic Hydrogen?

(1) Propanoic acid

(2) Dichloroacetic acid

(3) Trichloroacetic acid

(4) Chloroacetic acid

46. Which of the following reagents are suitable to differentiate Aniline and N-methylaniline chemically?

(1) Acetic anhydride

(2) Br_2 water

(3) Conc. Hydrochloric acid and anhydrous zinc chloride

(4) Chloroform and Alcoholic potassium hydroxide

47. Which of the following reaction/s does not yield an amine?

I. $R-X + \underset{(alc)}{NH_3} \xrightarrow[\Delta]{}$

II. $R-C\equiv N \xrightarrow[Na(Hg)/C_2H_5OH]{H_2/Ni}$

III. $R-C\equiv N + H_2O \xrightarrow{H^+}$

IV. $R-\overset{\overset{O}{\|}}{C}-NH_2 + 4\,[H] \xrightarrow[ii)\ H_3O^+]{i)\ LiAlH_4}$

(1) Both I and III

(2) Only II

(3) Only III

(4) Both II and IV

48. Match the compounds given in List-I with the items given in List-II

List-I	List-II
(I) Benzenesulphonyl Chloride	**(a) Zwitterion**
(II) Sulphanilic acid	**(b) Hinsberg reagent**
(III) Alkyl Diazonium salts	**(c) Dyes**
(IV) Aryl Diazonium salts	**(d) Conversion to alcohols**

(1) I – c, II – b, III – a, IV – d

(2) I – a, II – c, III – b, IV – d

(3) I – c, II – a, III – d, IV – b

(4) I – b, II – a, III – d, IV – c

49. The number of orbitals associated with 'N' shell of an atom is

(1) 16

(2) 32

(3) 3

(4) 4

50. According to the Heisenberg's Uncertainty principle, the value of $\Delta v, \Delta x$ for an object whose mass is 10^{-6}kg is $(h = 6.626 \times 10^{-34}$ Js$)$

(1) $3.0 \times 10^{-24} m^{-2} s^{-1}$

(2) $4.0 \times 10^{-26} m^{-2} s^{-1}$

(3) $3.5 \times 10^{-25} m^{-2} s^{-1}$

(4) $5.2 \times 10^{-29} m^{-2} s^{-1}$

51. Given below are two statements.

Statement-I: Adiabatic work done is positive when work is done on the system and internal energy of the system increases

Statement-II: No work is done during free expansion of an ideal gas

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

(1) Both Statement-I and Statement-II are false

(2) Statement-I is true but Statement-II is false

(3) Statement-I is false but Statement-II is true

(4) Both Statement-I and Statement-II are true

52. Which one of the following reactions has $\Delta H = \Delta U$?

(1) $CaCO_3(s) \xrightarrow{\Delta} CaO(s) + CO_2(g)$

(2) $C_6H_6(I) + \frac{15}{2} O_2(g) \longrightarrow 6CO_2(g) + 3H_2O(I)$

(3) $2HI(g) \rightleftharpoons H_2(g) + I_2(g)$

(4) $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

53. Identify the incorrect statements among the following:

(a) All enthalpies of fusion are positive.

(b) The magnitude of enthalpy change does not depend on the strength of the intermolecular interactions in the substance undergoing phase transformation.

(c) When a chemical reaction is reversed, the value of $\Delta_r H^o$ is reversed in sign.

(d) The change in enthalpy is dependent of path between initial state (reactants) and final state (products)

(e) For most of the ionic compounds, $\Delta_{sol} H^o$ is negative.

(1) a, b and d

(2) b, d and e

(3) a, d and e

(4) a and c only

54. Which of the following statements is/are true about equilibrium?

(a) Equilibrium is possible only in a closed system at a given temperature

(b) All the measurable properties of the system remain constant at equilibrium.

(c) Equilibrium constant for the reverse reaction is the inverse of the equilibrium constant for the reaction in the forward direction.

(1) Only b

(2) Only c

(3) a, b and c

(4) Only a

55. According to Le Chatelier's principle, in the reaction $CO(g) + 3H_2 \rightleftharpoons CH_4(g) + H_2O(g)$, the formation of methane is favoured by

(a) increasing the concentration of CO

(b) increasing the concentration of H_2O

(c) decreasing the concentration of CH_4

(d) decreasing the concentration of H_2

(1) a and c

(2) b and d

(3) a and d

(4) a and b

56. The equilibrium constant at 298K for the reaction $A + B \rightleftharpoons C + D$ is 100. If the initial concentrations of all the four species were 1M each, then equilibrium concentration of D $(\text{in mol } L^{-1})$ will be

(1) 0.182

(2) 1.818

(3) 1.182

(4) 0.818

57. Amont the following 0.1 m aqueous solutions, which one will exhibit the lowest boiling point elevation, assuming complete ionization of the compounds in solution?

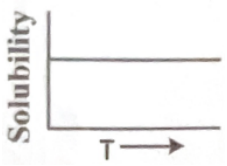
(1) Aluminium chloride

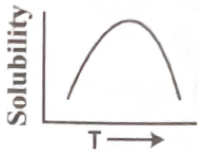
(2) Aluminium sulphate

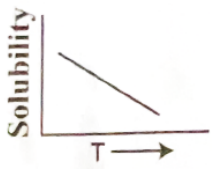
(3) Potassium sulphate

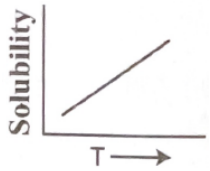
(4) Sodium chloride

58. Variation of solubility with temperature T for a gas in liquid is shown by the following graphs. The correct representation is

(1) 

(2) 

(3) 

(4) 

59. 180g of glucose, $C_6H_{12}O_6$, is dissolved in 1 kg of water in a vessel. The temperature at which water boils at 1.013 bar is _____ (given, K_b for water is 0.52K kg mol^{-1}. Boiling point for pure water is 373.15 K)

(1) 373.67 K

(2) 373.15 K

(3) 373.0 K

(4) 373.202 K

60. If N_2 gas is bubbled through water at 293 K, how many moles of N_2 gas would dissolve in 1 litre of water? Assume that N_2 exerts a partial pressure of 0.987 bar.
[Given K_H for N_2 at 293 K is 76.48 K bar]

(1) 0.716×10^{-3}

(2) 7.16×10^{-5}

(3) 7.16×10^{-4}

(4) 7.16×10^{-3}