Royal Rajasthan Public School

तेजस्विनावधितमस्तु

ABU ROAD

Question Bank

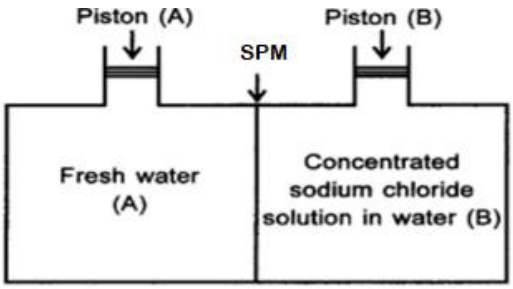
Chemistry

Class:-12th **Session:-2024-25**

CHAPTER 1 : SOLUTION	
1	The value of Henry's constant K_H is: (A) greater for gases with higher solubility (B) greater for gases with lower solubility. (C) constant for all gases. (D) not related to the solubility of gases.
2	Increasing the temperature of an aqueous solution will cause: (A) decrease in molality (B) decrease in molarity (C) decrease in mole fraction (D) decrease in % (w/w)
3	Colligative properties depend on: (A) the nature of the solute (B) the number of solute particles in solution (C) the physical properties of solute (D) the nature of the solvent
4	The Van't Hoff's factor for 0.1 M $Ba(NO_3)_2$ solution is 2.74. The degree of dissociation is (A) 91.3% (B) 87% (C)100% (D) 74%
5	If liquid A and B form ideal solution: (A) The enthalpy of mixing is zero (B) The entropy of mixing is zero (C) The free energy of mixing is zero (D) the free energy as well as entropy of mixing are zero
6	The number of moles of NaCl in 3 litres of 3M solution is: (A) 1 (B) 3 (C) 9 (D) 7
7	Which has highest freezing point: (A) 1 M Glucose (B) 1 M NaCl (C) 1 M $BaCl_2$ (D) 1 M AlF_3
8	Which of the following condition is not satisfied by an ideal solution? (A) $\Delta H_{mixing} = 0$ (B) $\Delta V_{mixing} = 0$ (C) Raoult's Law is obeyed (D) Formation of an azeotropic mixture
9	Considering the formation, breaking and strength of hydrogen bond, predict which of the following mixtures will show a negative deviation from Raoult's law? (A) Methanol and acetone. (B) Chloroform and acetone. (C) Phenol and aniline.

	(D) Cyclohexane and ethanol
10	Which of the following pair will make an ideal solution? (A) Chlorobenzene + Chloroethane (B) Benzene + Toluene (C) Acetone + Chloroform (D) water + HCl
11	If 2 gm of NaOH is present in 200 ml of its solution, its molarity will be (A) 0.25 (B) 0.5 (C) 5 (D)10
12	The atmospheric pollution is generally measured in the units of (A) mass percentage (B) volume percentage (C) volume fraction (D) ppm
13	A 5% solution of cane-sugar (molecular weight = 342) is isotonic with 1% solution of substance A. The molecular weight of X is (A) 342 (B) 171.2 (C) 68.4 (D) 136.8
14	234.2 gm of sugar syrup contains 34.2 gm of sugar. What is the molal concentration of the solution. (A) 0.1 (B) 0.5 (C) 5.5 (D) 55
15	H_2S is a toxic gas used in qualitative analysis. If solubility of H_2S in water at STP is 0.195 m. what is the value of K_H? (A) 0.0263 bar (B) 69.16 bar (C) 192 bar (D) 282 bar
16	Henry's law constant for molality of methane in benzene at 298 K is 4.27×10^5 mm Hg. The mole fraction of methane is benzene at 298 K under 760 mm Hg is (A) 1.78×10^{-3} (B) 17.43 (C) 0.114 (D) 2.814
17	Among the following substances the lowest vapour pressure is exerted by (A) water
	(B) alcohol
	(C) ether
	(D) mercury
18	3 moles of P and 2 moles of Q are mixed, what will be their total vapour pressure in the solution if their partial vapour pressures are 80 and 60 torr respectively? (A) 80 torr

	(B) 140 torr (C) 72 torr (D) 70 torr
19	Which of the following solutions shows positive deviation from Raoult's law? (A) Acetone + Aniline
	(B) Acetone + Ethanol
	(C) Water + Nitric acid
	(D) Chloroform + Benzene
20	The system that forms maximum boiling azetrope is (A) Acetone-chloroform (B) ethanol-acetone (C) n-hexane-n-heptane (D) carbon disulphide-acetone
21	A plant cell shrinks when it is kept in a (A) hypotonic solution
	(B) hypertonic solution
	(C) isotonic solution
	(D) pure water
22	The relative lowering in vapour pressure is proportional to the ratio of number of (A) solute molecules to solvent molecules (B) solvent molecules to solute molecules (C) solute molecules to the total number of molecules in solution (D) solvent molecules to the total number of molecules in solution
23	What weight of glycerol should be added to 600 g of water in order to lower its freezing point by 10°C? (K_f = 1.86 K Kg mol^{-1}) (A) 496 g (B) 297 g (C) 310 g (D) 426 g
24	The osmotic pressure of a solution can be increased by (A) increasing the volume
	(B) increasing the number of solute molecules (C) decreasing the temperature
	(D) removing semipermeable membrane
25	Sprinkling of salt helps in clearing the snow-covered roads in hills. The phenomenon involved in the process is (A) lowering in vapour pressure of snow (B) depression in freezing point of snow (C) melting of ice due to increase in temperature by putting salt (D) increase in freezing point of snow
26	For carrying reverse osmosis for desalination of water the material used for making semipermeable membrane is (A) potassium nitrate
	(B) parchment membrane
	(C) cellulose acetate
	(D) cell membrane

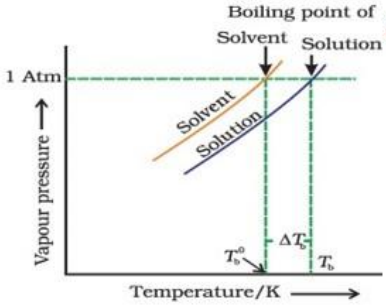
27	Which of the following units is useful in relating concentration of solution with its vapour pressure? (A) Mole fraction
	(B) Parts per million
	(C) Mass percentage
	(D) Molality
28	Consider the figure and mark the incorrect option:  (A) water will move from side (A) to side (B) if a pressure lower than osmotic pressure is applied on piston (B). (B) water will move from side (B) to side (A) if a pressure greater than osmotic, pressure is applied on piston (B). (C) water will move from side (B) to side (A) if a pressure equal to osmotic pressure is applied on piston (B).
	(D) water will move from side (A) to side (B) if pressure equal to osmotic pressure is applied on piston (A).
29	All form ideal solutions except
	(A) C_2H_5Br and C_2H_5I
	(B) C_6H_5Cl and C_6H_5Br
	(C) C_6H_6 and $C_6H_5CH_3$
	(D) C_2H_5I and C_2H_5OH
30	Calculate molarity of nitrate ions in the mixture of solution produced by mixing 2 litre 3M $AgNO_3$ solution with 3 litre 1 M $BaCl_2$ solution? (A) 1.2 M (B) 1.8 M (C) 0.5 M (D) 0.4 M
31	Which of the following solutions in water possesses the lowest vapour pressure. (A) 0.1(M) NaCl
	(B) 0.1(M) $BaCl_2$
	(C) 0.1(M) KCl
	(D) None of these
32	The solubility of a gas in water depends on
	(A) Nature of the gas
	(B) Temperature
	(C) Pressure of the gas
	(D) All of the above.
33	The sum of the mole fraction of the components of a solution is
	(A) 0

	(B) 1
	(C) 2
	(D) 4
	Multiple choice Questions (Asserstion/Reason)
	Given below are two statements labelled as Assertion (A) and Reason (R) Select the most appropriate answer from the options given below: (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true but R is not the correct explanation of A (C) A is true but R is false (D) A is false but R is true
34	Assertion (A): When NaCl is added to water a depression in freezing point is observed. Reason (R): The lowering of vapour pressure of a solution causes depression in the freezing point.
35	Assertion (A): Azeotropic mixtures are formed only by non-ideal solutions and they may have boiling points either greater than both the components or less than both the components. Reason (R): The composition of the vapour phase is same as that of the liquid phase of an azeotropic mixture.
36	Assertion (A): Molarity of a solution in liquid state changes with temperature. Reason (R): The volume of a solution changes with change in temperature.
37	Assertion (A): Molecular mass of benzoic acid when determined by colligative properties is found high. Reason (R): Dimerization of benzoic acid.
38	Assertion: If one component of solution obeys Raoult's Law over a certain range of composition, the other component will not obey Henry Law in that range. Reason: Raoult's law is a special case of Henry's law.
39	**Assertion :** When methyl alcohol is added to water, boiling point of water increases. **Reason :** When a volatile solute is added to a volatile solvent elevation in boiling point is observed.
40	Assertion: 0.1M NaCl will have same osmotic pressure as that of 0.1M Urea solution. Reason: Solution with same concentration will have same osmotic pressure
	<u>CASE BASED QUESTIONS</u>
[1]	Osmotic pressure results from a reduction in the chemical potential of a solvent in the presence of a solute. The tendency of a system to have equal chemical potentials over its entire volume and to reach a state of lowest free energy gives rise to the osmotic diffusion of matter. In ideal and dilute solutions, the osmotic pressure is independent of the nature of the solvent and solutes. At constant temperature it is determined only by the number of kinetically active particles—ions, molecules, associated species, and colloidal particles in a unit volume of the solution. For very dilute solutions of non-dissociating compounds, osmotic pressure is described with sufficient accuracy by the equation $\pi V = nRT$, where n is the

	number of moles of solute, *V* is the volume of the solution, *R* is the universal gas constant, and *T* is the absolute temperature.
41	The process used for the desalination of water is (A) Reverse Osmosis (B) Electrolysis (C) Osmosis (D) Hydrolysis
42	Which colligative property is most suitable to measure molecular mass of proteins (A) Lowering of Vapour Pressure (B) Elevation of boiling point (C) Osmotic Pressure (D) Depression of freezing point
43	With increase in temperature osmotic pressure:
	(A) increases (B) decreases (C) remains constant (D) None of these
44	200 cm^3 of an aqueous solution of a protein contains 1.26 g of the protein. The osmotic pressure of such a solution at 300 K is found to be 2.57×10^{-3} bar. Calculate the molar mass of the protein. (A) 62,022 g mol^{-1} (B) 60,022 g mol^{-1} (C) 61,022 g mol^{-1} (D) 50,022 g mol^{-1}
	A solution which obeys Raoult's law strictly is called an ideal solution, while a solution which shows deviations from Raoult's law is called a non-ideal solution or real solution. Suppose the molecules of the solvent and solute are represented by *A* and *B* respectively, and let g*AB*, g*AA* and g*BB* are the attractive forces between *A*—*B*, *A*—*A* and *B*—*B* respectively. An ideal solution of the components *A* and *B* is defined as the solution in which the intermolecular interactions between the components *A*—*B* are of the same magnitude as the intermolecular interactions found in the pure components *A*—*A* and *B*—*B*. Similarly, a non- ideal solution of the components *A* and *B* is defined as the solution in which the intermolecular interactions between the components *A*—*B* are of the different magnitude as the intermolecular interactions found in the pure components *A*—*A* and *B*—*B*.
45	Which type of deviation will be shown by the solution if yAB < Yaa (A) positive (B) negative (C) no deviation (D) both positive and negative deviation
46	What type of liquids form the ideal solution? (A) Liquids having high boiling points. (B) Liquids that have similar structures from ideal solutions (C) Liquids that have similar polarities from ideal solutions (D) Liquids that have similar structures and polarities from ideal solutions
47	A non-ideal solution with negative deviation is known as (A) azeotropes

	(B) maximum boiling azeotropes (C) minimum boiling azeotropes (D) None of these
48	95% ethanol by volume is an example of (A) azeotropes (B) maximum boiling azeotropes (C) minimum boiling azeotropes (D) None of these

All those properties that depend on the number of solute particles irrespective of their nature relative to the total number of particles present in the solution are called colligative properties. Similar to lowering of vapour pressure, the elevation of boiling point also depends on the number of solute molecules rather than their nature. Let Tb^0 be the boiling point of pure solvent and Tb be the boiling point of solution. The increase in the boiling point **$\Delta Tb = Tb - T^ob$** is known as elevation of boiling point.



periments have us shown that for dilute solutions the elevation of boiling point (ΔTb) is directly proportional to th molal concentratio of the solute in solution.

$\Delta T_b \propto m$ [molality]

$\Delta T_b = K_b\, m$

K_b=Molal Elevation Constant (Ebullioscopic Constant).

$$\Delta T_b = K_b \frac{W_{solute} \times 1000}{M_{solute} \times W_{solvent}}$$

49	Which has the highest boiling point: (A) 1M Glucose (B) 1M NaCl (C) 1M $CaCl_2$ (D) 1M Sucrose
50	Molal elevation constant is also known as (A) Cryoscopic consant (B) Ebullioscopic Constant (C) Molal depression constant (D) both a and b
51	Unit of Molal elevation constant is - (A) K Kg mol^{-1} (B) K mol Kg^{-1} (C) Kg mol K^{-1} (D) mol Kg^{-1} K^{-1}
52	The rise in the boiling point of a solution containing 1.8 gram of glucose in 100g of a solvent in 0.1^o C. The molal elevation constant of the liquid is (A) 0.01 K/m (B) 0.1 K/m (C) 1 K/m (D) 10 K/m

Experimentally measured molar mass that is either lower or higher than the expected or normal value is called as abnormal molar mass. Quantitatively, the extent to which

a solute is dissociated or associated can be expressed by van't Hoff factor i. This factor has been defined as ratio of normal molar mass to experimentally determined molar mass or as the ratio of observed colligative property to the calculated colligative property.

Two solutions having same osmotic pressure at a given temperature are called isotonic solutions. When such solutions are separated by semipermeable membrane no osmosis occurs between them. For example, the osmotic pressure associated with the fluid inside the blood cell is equivalent to that of 0.9% (mass/ volume) sodium chloride solution, called normal saline solution and it is safe to inject intravenously. A hypertonic solution is one whose concentration is more than that of the fluid inside the blood cell similarly A hypotonic solution is one whose concentration is less than that of the fluid inside the blood cell.

53	van't Hoff factor i when the particles of non-volatile solute in volatile solvent undergo association (A) less than 1 (B) greater than 1 (C) equal to 1 (D) none of these
54	van't Hoff factor i for 50% dissociation of Na_2SO_4 is (A) 1 (B) 2 (C) 3 (D) 4
55	What happens when RBCs are placed in a hypertonic solution: (A) Swell (B) Remains unaffected (C) Burst **(D)** Shrink
56	What happens when RBCs are placed in 0.5% NaCl solution: (A) Swell may even burst (B) Remains unaffected (C) Shrink (D) None of these

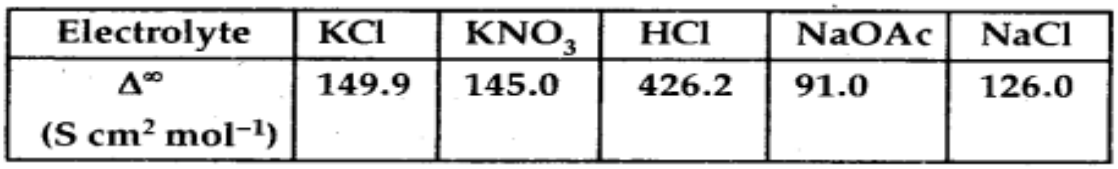
1	2	3	4	5	6	7	8	9	10
B	B	B	B	A	C	A	D	B	B
11	12	13	14	15	16	17	18	19	20
B	D	C	B	D	A	D	C	B	A
21	22	23	24	25	26	27	28	29	30
B	C	B	B	B	C	A	C	D	A
31	32	33	34	35	36	37	38	39	40
B	D	B	A	B	A	A	A	D	D
41	42	43	44	45	46	47	48	49	50
A	C	A	C	A	D	B	C	C	B
51	52	53	54	55	56				
A	C	A	B	D	A				

CHAPTER 2 : ELETROCHEMISTRY	
1.	**Which factor does the Nernst equation take into account to calculate electrode potential under non-standard conditions?** (A) Concentration of reactants and products (B) Temperature (C) Pressure (D) Volume of the solution
2.	**Which of the following is a non-spontaneous cell reaction?** (A) $Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$ (B) $2Ag^{+}(aq) + Cu(s) \rightarrow 2Ag(s) + Cu^{2+}(aq)$ (C) $Fe(s) + Cu^{2+}(aq) \rightarrow Fe^{2+}(aq) + Cu(s)$ (D) $2H_2O(l) \rightarrow 2H_2(g) + O_2(g)$
3.	**What is the standard hydrogen electrode potential?** (A) +1.23 V (B) +0.34 V (C) +0.00 V (D) -0.76 V
4.	**If M, N, O, P and Q are in the increasing order of their standard potentials in standard conditions of their standard half cells, then by combination of which two half cells maximum cell potential will be obtained?** (A) M and N (B) M and O (C) M and P (D) M and Q
5.	**In the electrolysis of water, which gas is liberated at the cathode?** (A) Oxygen (B) Hydrogen (C) Chlorine (D) Sodium
6.	**At which temperatures ceramic materials are known as**

	superconductor? (A) 0 K (B) 273 K (C) 150 K (D) 1000 K
7.	**What does a negative value of E_{cell} (cell potential) calculated using the Nernst equation indicate?** (A) The reaction is non-spontaneous (B) The reaction is at equilibrium (C) The concentration of products is higher than the reactants (D) The concentration of reactants is higher than the products
8.	**What happens to the cell potential (E_{cell}) as the concentration of reactants increases, according to the Nernst equation?** (A) Increases (B) Decreases (C) Remains constant (D) Cannot be determined
9.	**Which of the following statements is true about a galvanic cell?** (A) It converts chemical energy into electrical energy (B) It requires an external source of electricity to operate (C) It is non-spontaneous (D) It does not involve redox reactions
1O.	**How does an increase in temperature affect the cell potential (E_{cell}) as per the Nernst equation?** (A) Increases (B) Decreases (C) Remains constant (D) Depends on the concentration of reactants
11.	**Which metal is commonly used as the anode in sacrificial protection against corrosion?** (A) Zinc (B) Copper

	(C) Silver (D) Aluminum
12.	**Which of the following is a key assumption made in the derivation of the Nernst equation?** (A) The reaction is spontaneous (B) The reaction is at equilibrium (C) The concentration of reactants and products is constant (D) The reaction occurs in a vacuum
13.	**The electrode at which oxidation occurs is called the:** (A) Anode (B) Cathode (C) Electrolyte (D) Salt bridge
14.	**Which of the following is a primary function of a salt bridge in an electrochemical cell?** (A) It completes the circuit (B) It prevents the mixing of electrolytes (C) It conducts electricity (D) It maintains charge neutrality
15.	**Which of the following compounds shows maximum equivalent conductance in their aqueous solutions?** (A) $SrCl_2$ (B) $BeCl_2$ (C) $MgCl_2$ (D) $CaCl_2$
16.	**What is the SI unit of electrical conductivity?** (A) Ohm (Ω) (B) Siemens per meter (S/m) (C) Coulomb (C) (D) Faraday (F)
17.	**What does resistivity depend on?**

	(A) Temperature only (B) Material only (C) Length and cross-sectional area (D) Both material and temperature
18.	**What is the product of the electrolysis of molten sodium chloride?** (A) Sodium metal and chlorine gas (B) Sodium hydroxide and chlorine gas (C) Sodium metal and oxygen gas (D) Sodium hydroxide and hydrogen gas
19.	**Which of the following is not a factor affecting the rate of electrolysis?** (A) Temperature (B) Concentration of electrolyte (C) Surface area of electrodes (D) Pressure
20.	**Which of the following is a half-cell reaction in the Daniell cell?** (A) $Cu(s) \rightarrow Cu^{2+}(aq) + 2e^-$ (B) $Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$ (C) $Zn^{2+}(aq) + 2e^- \rightarrow Zn(s)$ (D) $Cu^{2+}(aq) + 2e^- \rightarrow Cu(s)$
21.	**The equilibrium constant of the reaction:** **$Cu(s) + 2Ag^+(aq) \rightarrow Cu^{2+}(aq) + 2Ag(s)$;** **$E° = 0.46$ V at 298 K is** (A) 2.0×10^{10} (B) 4.0×10^{10} (C) 4.0×10^{15} (D) 2.4×10^{10}
22.	**What happens to the resistance of a conductor as its length increases?** (A) Increases (B) Decreases (C) Remains constant

	(D) Depends on the material
23.	**What is the formula for calculating resistance (R) using resistivity (ρ), length (L), and cross-sectional area (A)?** (A) $R=L\rho/A$ (B) $R=\rho/AL$ (C) $R=AL$ (D) $R=\rho/A/L$
24.	**If $E^0_{Al3+\|Al}$ = -1.66 V and $E^0_{Fe3+\|Fe}$ = 0.04 V, which of the two will be stronger reductant?** (A) Al^{3+} (B) Fe^{3+} (C) Fe (D) Al
25.	 **Calculate Δ°_{HOAc} using appropriate molar conductance of the electrolytes listed above at infinite dilution of H_2O at 25°C.** (A) 517.2 (B) 552.7 (C) 390.7 (D) 217.5
26.	**Which of the following is an example of a secondary battery?** (A) Alkaline battery (B) Mercury battery (C) Lithium-ion battery (D) Fuel cell
27.	**What is the function of the porous barrier in a salt bridge?** (A) To prevent the flow of electrons (B) To prevent the mixing of electrolytes (C) To allow the flow of ions (D) To maintain charge neutrality

Electrolyte	KCl	KNO_3	HCl	NaOAc	NaCl
Δ^∞ ($S\ cm^2\ mol^{-1}$)	149.9	145.0	426.2	91.0	126.0

28.	**What will be the mole ratio of Cu, Ag and Al respectively, when 1 mole electrons passed through $CuSO_4$, $AgNO_3$ and $AlCl_3$ solution?** (A) 1 : 1 : 1 (B) 1 : 2 : 3 (C) 2 : 1 : 3 (D) 3 : 6 : 2
29.	**What will be the result of increase in the concentration of Fe^{2+} in the following cell reaction? $2Fe^{3+} + Zn \rightarrow Zn^{2+} + 2Fe^{2+}$** (A) Cell potential increase (B) Cell potential decrease (C) pH of solution decrease (D) None of these
30.	**What is the overall cell reaction in a lead-acid battery during discharge?** (A) $Pb(s) + H_2SO_4(aq) \rightarrow PbSO_4(s) + H_2(g)$ (B) $Pb(s) + 2H^+(aq) \rightarrow Pb^{2+}(aq) + H_2(g)$ (C) $PbO_2(s) + Pb(s) + 2SO_4^{2-}(aq) \rightarrow 2PbSO_4(s) + 2H_2O(l)$ (D) $PbO_2(s) + Pb(s) + 2H_2SO_4(aq) \rightarrow 2PbSO_4(s) + 2H_2O(l)$

Assertion and Reason Type Questions:

Note: In the following questions a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.
(a) Both assertion and reason are correct and the reason is correct explanation of assertion.
(bi) Both assertion and reason are correct but reason does not explain assertion.
(c) Assertion is correct but reason is incorrect.
(d) Both assertion and reason are incorrect.
(e) Assertion is incorrect but reason is correct.

31.	**ASSERTION:** An electrochemical cell can be set up only if the redox reaction is spontaneous. **REASON:** A reaction is spontaneous if free energy change is negative.
32.	**ASSERTION:** Electrical conductivity of copper increases with increase in temperature. **REASON:** The electrical conductivity of metals is due to the motion of electrons.

33.	**ASSERTION:** Cu^{2+} ions get reduced more easily than H^{+} ions. **REASON:** The standard electrode potential of copper is 0.34V.
34.	**ASSERTION:** The resistivity for a substance is its resistance when it is one meter long and its area of cross section is one square meter. **REASON:** The SI unit of resistivity is ohm meter.
35.	**ASSERTION:** Conductivity decreases with dilution **REASON:** The number of ions per unit volume increases
36.	**ASSERTION:** The acidified zinc sulphate solution is electrolysed between zinc electrodes, it is zinc that is deposited at the cathode and no hydrogen gas is evolved**.** **REASON:** The electrode potential of zinc is more negative than that of hydrogen as the overvoltage for the hydrogen evolution on zinc is quite large.

ANSWER KEY

1. (A) 2. (D) 3. (C) 4. (D) 5. (B) 6. (C) 7. (A) 8. (B) 9. (A) 10. (A)

11. (A) 12. (C) 13. (A) 14. (D) 15. (A) 16. (B) 17. (D) 18. (A) 19. (D) 20. (D)

21. (C) 22. (A) 23. (A) 24. (D) 25. (C) 26. (C) 27. (C) 28. (D) 29. (B) 30. (D)

31. (B) 32. (D) 33. (A) 34. (B) 35. (C) 36. (A)

CHAPTER-3 CHEMICAL KINETICS

1. T_{50} of first order reaction is 10 min. Starting with 10 mol L^{-1} , rate after 20 min is

   a) 0.0693mol L^{-1} min^{-1}

   b) 0.0693 X 2.5 mol L^{-1} min -1

   c) 0.0693 X 5 mol L^{-1} min^{-1}

   d)0.0693 X 10 mol L -1 min -1

2. In a reaction, $2A_2 + B_2 \rightarrow 2A_2B$, the reactant A will disappear at:

   a) half the rate that B will decrease

   b) the same rate that B will decrease

   c) double the rate that A_2B will form

   d) twice the rate that B will decrease

3. The temperature coefficient of a reaction is:

   a) ratio of rate constants at at two temperature differing by 1 ^{0} C

   b) ratio of rate constants at temperature 35 ^{0} C and 25 ^{0} C

   c) ratio of rate constants at temperature 30 ^{0} C and 25 ^{0} C

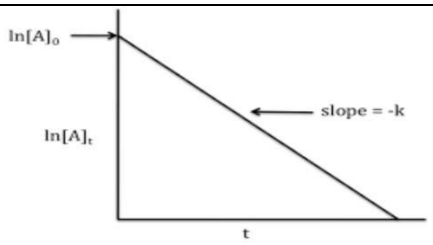
   d) specific reaction rate at 25 ^{0} C

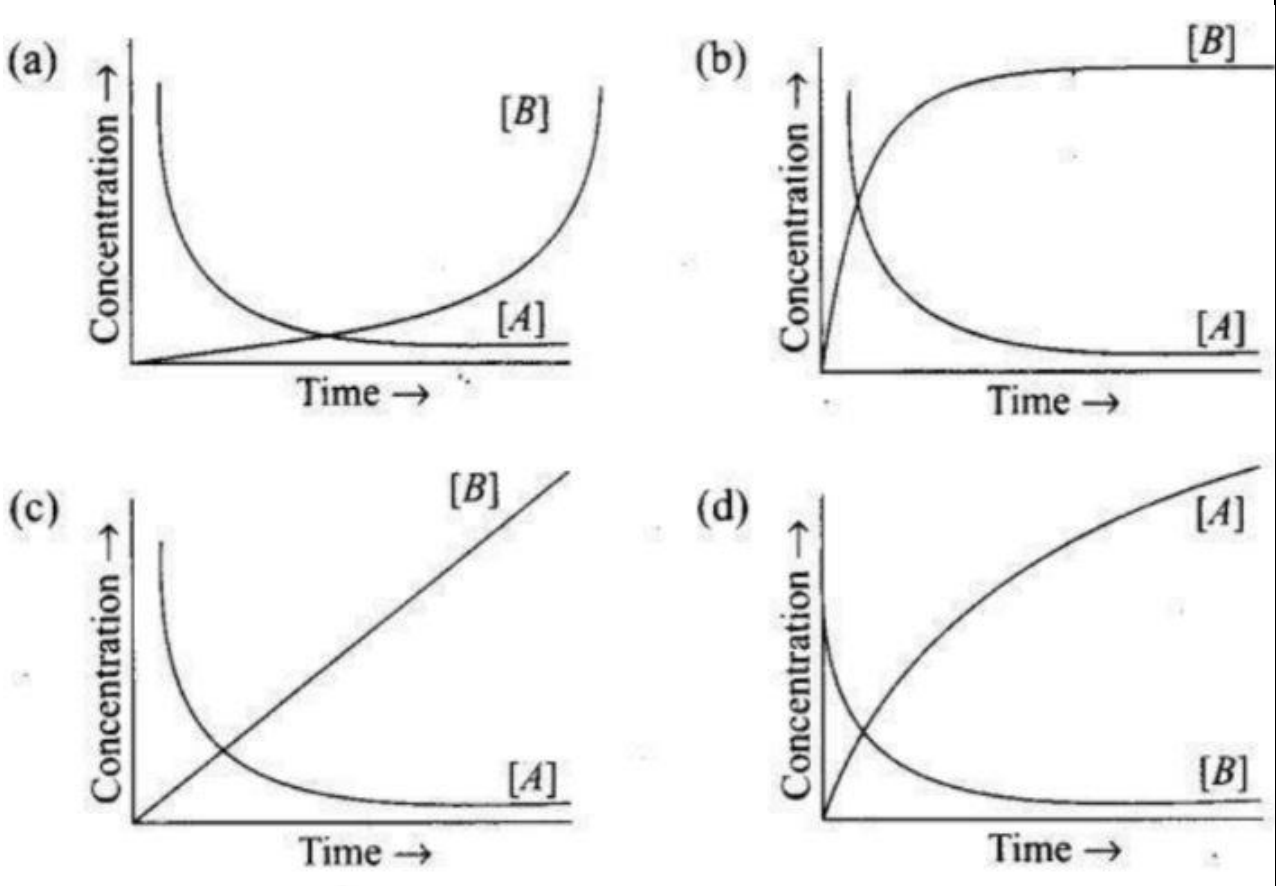
4. Compounds 'A' and 'B' react according to the following chemical equation.
   $A(g) + 2B(g) \rightarrow 2C(g)$
   Concentration of either 'A' or 'B' were changed keeping the concentrations of one of the reactants constant and rates were measured as a function of initial concentration. Following results were obtained. Choose the correct option for the rate equations for this reaction.

Experiment	Initial concentration of [A]/mol L^{-1}	Initial concentration of [B]/mol L^{-1}	Initial rate of formation of [C]/mol L^{-1} s^{-1}
1.	0.30	0.30	0.10
2.	0.30	0.60	0.40
3.	0.60	0.30	0.20

   (a) Rate = k $[A]^2$ [B]
   (b) Rate = k [A] $[B]^2$

	(c) Rate = k [A] [B] (d) Rate = k $[A]^2$ $[B]^0$
5.	Rate law for the reaction A + B →C is found to be Rate = k[A] $[B]^2$ Concentration of reactant 'B' is doubled, keeping the concentration of 'A' constant, the rate will be _____ (a) same (b) doubled (c) quadrupled (d) halved
6.	For the reaction NH_4 + + OCN^- ⇌ NH2CONH2, the probable mechanism is NH_4^+ + OCN^- →NH4OCN (fast) NH_4OCN^- ⇌NH_2CONH_2 (slow) The rate law will be: a) rate = k[NH_2CONH_2] b) rate = k[NH_4]$^+$ + [OCN] – c) rate = k[NH_4OCN] d) none of these
7.	Dimethyl ether breakdown is a fractional order process. rate=k$(PCH_3OCH_3)^{3/2}$ gives the rate. What are the units of rate and rate constant if pressure is measured in bars and time is measured in minutes? (a bar min-1, bar2 min^{-1} (b) bar min^{-1}, $bar^{1/2}$ min^{-1} (c) $bar^{1/2}$ min^{-1}, bar^2 min^{-1} (d) bar min^{-1}, $bar^{1/2}$ ml
8.	The rate constant of a first order reaction is 1.15 10^{-3} s^{-1}. How long will it take to decrease 5 g of this reactant to 3 g? a) 444 seconds (b) 400 seconds (c) 528 seconds (d) 669 seconds
9.	For a reaction A + B → C, the experimental rate law is found to be R=k[A]1[B]1/2. Find the rate of the reaction when [A] = 0.5 M, [B] = 0.1 M and k=0.03.

	a. 4.74×10^{-3} $(L/mol)^{1/2}$ s^{-1} b. 5.38×10^{-3} $(L/mol)^{1/2}$ s^{-1} c. 5.748×10^{-3} $(L/mol)^{1/2}$ s^{-1} d. 4.86×10^{-3} $(L/mol)^{1/2}$ s
1O.	How many times will the rate of the elementary reaction $3X + Y \rightarrow X_2Y$ change if the concentration of the substance X is doubled and that of Y is halved? a. $r_2 = 4.5r_1$ b. $r_2 = 5r_1$ c. $r_2 = 2r_1$ d. $r_2 = 4r_1$
11.	 A plot is shown between concentration and time t. Which of the given orders is indicated by the graph a) Zero Order (b) Second Order (c) First Order (d) Fractional Order
12.	Which of the following statements are **true**? (1) Reactions with more negative values of ΔG^o are spontaneous and proceed at a higher rate than those with less negative values of ΔG^o. (2) The activation energy, E_a, is usually about the same as ΔE for a reaction. (3) The activation energy for a reaction does not change significantly as temperature changes. (4) Reactions usually occur at faster rates at higher temperatures. (a) 1, 2, 4 (b) 3, 4 (c) 1, 2, 3 (d) 2, 3, 4

13.	Which statement is **false**? (a) If a reaction is thermodynamically spontaneous it may occur rapidly. (b) If a reaction is thermodynamically spontaneous it may occur slowly. (c) Activation energy is a kinetic quantity rather than a thermodynamic quantity. (d) If a reaction is thermodynamically spontaneous, it must have a low activation energy.
14.	What is the activation energy (in kJ) of a reaction whose rate constant increases by a factor of 100 upon increasing the temperature from 300 K to 360 K? (a) 27 (b) 35 (c) 42 (d) 69
15.	.Consider the reaction A —> B. The concentration of both the reactants and the products varies exponentially with time. Which of the following figures correctly describes the change in concentration of reactants and products with time? 

Assertion and Reason Type Questions

Note: In the following questions a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.
(a) Both assertion and reason are correct and the reason is correct explanation of assertion.
(bi) Both assertion and reason are correct but reason does not explain assertion.
(c) Assertion is correct but reason is incorrect.
(d) Both assertion and reason are incorrect.
(e) Assertion is incorrect but reason is correct.

16.	**Assertion :** Order of the reaction can be zero or fractional. **Reason :** We cannot determine order from balanced chemical equation.
17.	**Assertion :** Order and molecularity are same. **Reason :** Order is determined experimentally and molecularity is the sum of the stoichiometric coefficient of rate determining elementary step.
18.	**Assertion :** The enthalpy of reaction remains constant in the presence of a catalyst. **Reason :** A catalyst participating in the reaction, forms different activated complex and lowers down the activation energy but the difference in energy of reactant and product remains the same.
19.	**Assertion :** All collision of reactant molecules lead to product formation. **Reason :** Only those collisions in which molecules have correct orientation and sufficient kinetic energy lead to compound formation.
20.	**Assertion :** Rate constants determined from Arrhenius equation are fairly accurate for simple as well as complex molecules. **Reason :** Reactant molecules undergo chemical change irrespective of their orientation during collision.
21.	Match the items of Column I and Column II. **Column I** — **Column II** (i) Mathematical expression for rate of reaction — (a) rate constant (ii) Rate of reaction for zero order reaction is equal to — (b) rate law (iii) Units of rate constant for zero order reaction is same as that of — (c) order of slowes step (iv) Order of a complex reaction is determined by — (d) rate of a reaction a) i b ii a iii d iv c b) i a ii b iii d iv c

	c) i b ii c iii d iv a d) i b ii a iii c iv d
22.	Suppose the activation energy of a certain reaction is 250 kJ/mol. If the rate constant at T_1 = 300 K is k_1 and the rate constant at T_2 = 320 K is k_2, then the reaction is __ times faster at 320 K than at 300 K. (a) 3×10^{-29} (b) 0.067 (c) 15.0 (d) 525
23.	At 300 K, the following reaction is found to obey the rate law: Rate = $k[NOCl]^2$: $2NOCl \longrightarrow 2NO + Cl_2$ Consider the three postulated mechanisms given below. Then choose the response that lists all those that are possibly correct and no others. **Mechanism 1** $NOCl \longrightarrow NO + Cl$ slow $Cl + NOCl \longrightarrow NOCl_2$ fast $NOCl_2 + NO \longrightarrow 2NO + Cl_2$ fast Overall: $2NOCl \longrightarrow 2NO + Cl_2$ **Mechanism 2** $2NOCl \longrightarrow NOCl_2 + NO$ slow $NOCl_2 \longrightarrow NO + Cl_2$ fast Overall: $2NOCl \longrightarrow 2NO + Cl_2$ **Mechanism 3** $NOCl \rightleftarrows NO + Cl$ fast, equilibrium $NOCl + Cl \longrightarrow NO + Cl_2$ slow Overall: $2NOCl \longrightarrow 2NO + Cl_2$ (a) 2, 3 (b) 3 (c) 1 (d) 2

24.	The half-life for a first-order reaction is 32 s. What was the original concentration if, after 2.0 minutes, the reactant concentration is 0.062 M? (a) 0.84 M (b) 0.069 M (c) 0.091 M (d) 0.075 M
25.	A first order reaction has a half-life length of 10 minutes. In 100 minutes, what proportion of the response will be completed? (a) 25% (b) 50% (c) 99.9% (d) 75%
26.	n 30 minutes, a first-order reaction is 50% complete. Calculate the amount of time it took to complete 87.5 percent of the reaction. a) 30 minutes b) 60 minutes c) 90 minutes d) 120 minutes
27.	Which of the following is the right temperature coefficient (n) expression? a) n = Rate constant at T + 10°/Rate constant at T° b) n = Rate constant at T + 20°/Rate constant at T° c) n = Rate constant at T + 30°/Rate constant at T° d)n = Rate constant at T + 40°/Rate constant at T°
28.	In a reversible reaction the energy of activation of the forward reaction is 40 kJ. The energy of activation for the reverse reaction will be (a) 40 kJ (b) either greater than or less than 40 kJ (c) less than 40 kJ (d) more than 40 kJ
29.	The rate of a chemical reaction is expressed either in terms of decrease in the concentration of a reactant per unit time or increase in the concentration of product per unit time. Rate of the reaction depends upon the nature of reactants, concentration of reactants, temperature, presence of catalyst, surface area of the reactants and presence of light. Rate of reaction is

	directly related to the concentration of reactant. Rate law states that the rate of reaction depends upon the concentration terms on which the rate of reaction actually depends, as observed experimentally. The sum of powers of the concentration of the reactants in the rate law expression is called order of reaction while the number of reacting species taking part in an elementary reaction which must collide simultaneously in order to bring about a chemical reaction is called molecularityof the reaction. rate of any reaction generally decrease during the course of the reaction? a) concentration of reactants decreases b) concentration of reactants increases c)temperature decrease e)surface area increases
30.	Zero order reactions are relatively uncommon but they occur under special conditions. Some enzyme catalysed reactions and reactions which occurs on metal surfaces are a few examples of zero order reactions. The decompositions which occurs on metal surfaces are a few examples of zero order reactions. The decomposition of gaseous ammonia on a hot platinum surface is a zero order reaction at high pressure. $2NH_3(g) \xrightarrow[1130K]{Pt\ catalyst} N_2(g)+3H_2(g)$ $Rate=k[NH_3]^0=k$ In this reaction, Pt acts as a catalyst. At high pressure, the metal surface gets saturated with gas molecules. So a further change in reaction conditions is unable to alter the amount of ammonia on the surface of the catalyst making the rate of the reaction independent of its concentration. Q. If $[R]_0$ and $[R]$ are the concentrations of the reactant initially and after time t, the equation relating k. is a)$k=[R]_0-[R]/t$ b)$k=[R]_0-[R]t$ c)$k=[R]_0+[R]t$ d)$k=[R]-[R]_0\ t$

ANSWER KEY									
1. b	2. d	3. b	4.b	5. c	6. c	7. b	8. a	9. a	10. d
11. c	12. b	13. d	14. d	15. b	16. b	17. e	18. a	19. e	20. c
21. a	22. d	23. d	24. a	25. c	26. c	27. A	28. b	29. a	30. a

CHAPTER 4 : d- and f-BLOCK ELEMENTS		
1		Which of the following statements are INCORRECT? i. All the transition metals except scandium form MO oxides which are ionic. ii. The highest oxidation number corresponding to the group number in transition metal oxides is attained in Sc_2O_3 to Mn_2O_7. iii. Basic character increases from V_2O_3 to V_2O_4 to V_2O_5. iv. V_2O_4 dissolves in acids to give VO_4^{3-} salts. v. CrO is basic but Cr_2O_3 is amphoteric. Choose the correct answer from the options given below:
	A	ii and iv
	B	iii and iv
	C	ii and iii
	D	i and v
2		What is the correct order of EM^{2+}/M° values with a negative sign for the four elements Cr, Mn, Fe, and Co?
	A	Fe > Mn > Cr > Co
	B	Cr > Mn > Fe > Co
	C	Mn > Cr > Fe > Co
	D	Cr > Fe > Mn > Co
3		The total number of unpaired electrons in Mn^{3+}, Cr^{3+}, and V^{3+} gaseous species is, and the most stable species is
	A	4, 3 and 2; V^3
	B	3, 3 and 2; Cr^{3+}
	C	4, 3 and 2; Cr^{3+}
	D	3, 3 and 3; Mn^{3+}
4		Statement I : Cr^{2+} is oxidising and Mn^{3+} is reducing in nature. Statement II : Sc^{3+} compounds are repelled by the applied magnetic field.
	A	Statement I is incorrect but Statement II is correct
	B	Both Statement I and Statement II are correct
	C	Both Statement I and Statement II are incorrect
	D	Statement I is correct but Statement II is incorrect
5		The incorrect statement among the following is :
	A	Actinoids are highly reactive metals, especially when finely divided
	B	Actinoid contraction is greater for element to element than lanthanoid contraction.
	C	Most of the trivalent Lanthanoid ions are colorless in the solid state
	D	Lanthanoids are good conductors of heat and electricity
6		Zr (Z = 40) and Hf (Z = 72) have similar atomic and ionic radii because of :
	A	Having similar chemical properties
	B	Belonging to same group
	C	Diagonal relationship
	D	Lanthanoid contraction
7		Identify the incorrect statement.

	A	The transition metals and their compounds are known for their catalytic activity due to their ability to adopt multiple oxidation states and to form complexes
	B	Interstitial compounds are those that are formed when small atoms like H, C or N are trapped inside the crystal lattices of metals.
	C	The oxidation states of chromium in CrO_4^{2-} and $Cr_2O_7^{2-}$ are not the same.
	D	Cr^{2+} (d^4) is a stronger reducing agent than Fe^{2+} (d^6) in water.
8		Which one of the following ions exhibits d-d transition and paramagnetic as well?
	A	CrO_4^{2-}
	B	$Cr_2O_7^{2-}$
	C	MnO_4^-
	D	MnO_4^{2-}
9		Match the metal ions given in Column I with the spin magnetic moments of the ions given in Column II and assign the correct code :

Column - I	Column - II
A. Co^{3+}	(i) $\sqrt{8}$ B.M.
B. Cr^{3+}	(ii) $\sqrt{35}$ B.M.
C. Fe^{3+}	(iii) $\sqrt{3}$ B.M.
D. Ni^{2+}	(iv) $\sqrt{15}$ B.M .

	A	**A**	**B**	**C**	**D**
		(iv)	(v)	(ii)	(i)
	B	**A**	**B**	**C**	**D**
		(i)	(ii)	(iii)	(iv)
	C	**A**	**B**	**C**	**D**
		(iv)	(i)	(ii)	(iii)
	D	**A**	**B**	**C**	**D**
		(iv)	(i)	(ii)	(iii)
10		Name the gas that can readily decolourise acidified $KMnO_4$ solution.			
	A	SO_2			
	B	NO_2			
	C	P_2O_5			

	D	CO_2
11		$HgCl_2$ and I_2 both when dissolved in water containing I^- ions, the pair of species formed is
	A	HgI_2, I^-
	B	HgI_4^{2-}, I_3^-
	C	Hg_2I_2, I^-
	D	HgI_2, I_3^-
12		The reason for greater range of oxidation states in actinoids is attributed to
	A	actinoid contraction
	B	5f, 6d and 7s levels having comparable energies
	C	4f and 5d levels being close in energies
	D	the radioactive nature of actinoids.
13		Which one of the following statements related to lanthanoids is incorrect?
	A	Europium shows + 2 oxidation state.
	B	The basicity decreases as the ionic radius decreases from Pr to Lu.
	C	All the lanthanons are much more reactive than aluminium.
	D	Ce(+4) solutions are widely used as oxidizing agent in volumetric analysis.
14		The electronic configuration of Eu (Atomic No. 63), Gd (Atomic No. 64) and Tb (Atomic No.65) are
	A	$[Xe]4f^6 5d^1 6s^2$, $[Xe]4f^7 5d^1 6s^2$ and $[Xe]4f^8 5d^1 6s^2$
	B	$[Xe]4f^7\ 6s^2$, $[Xe]4f^7\ 5d^1\ 6s^2$ and $[Xe]4f^9\ 6s^2$
	C	$[Xe]4f^7\ 6s^2$, $[Xe]4f^8\ 6s^2$ and $[Xe]4f^8\ 5d^1\ 6s^2$
	D	$Xe]4f^6\ 5d^1\ 6s^2$, $[Xe]4f^7\ 5d^1\ 6s^2$ and $[Xe]4f^9\ 6s^2$
15		Which one of the following statements is correct when SO_2 is passed through acidified $K_2Cr_2O_7$ solution?
	A	SO_2 is reduced.
	B	Green $Cr_2(SO_4)_3$ is formed.
	C	The solution turns blue.
	D	The solution is decolourised.
16		Magnetic moment 2.84 B.M. is given by (At. nos. Ni = 28, Ti = 22, Cr = 24, Co = 27)
	A	Cr^{2+}
	B	Co^{2+}
	C	Ni^{2+}
	D	Ti^{3+}
17		Reason of lanthanoid contraction is
	A	negligible screening effect of 'f'- orbitals
	B	increasing nuclear charge
	C	decreasing nuclear charge
	D	decreasing screening effect.
18		Sc (Z = 21) is a transition element but Zn (Z = 30) is not because
	A	both Sc^{3+} and Zn^{2+} ions are colourless and form white compounds.
	B	in case of Sc, 3d orbitals are partially filled but in Zn these are filled
	C	last electron is assumed to be added to 4s level in case of Zn.
	D	both Sc and Zn do not exhibit variable oxidation states.

19		Which of the following statements about the interstitial compounds is incorrect?
	A	They are much harder than the pure metal.
	B	They have higher melting points than the pure metal.
	C	The retain metallic conductivity.
	D	They are chemically reactive.
20		Which one of the following does not correctly represent the correct order of the property indicated against it?
	A	Ti < V < Cr < Mn; increasing number of oxidation states
	B	Ti^{3+} < V^{3+} < Cr^{3+} < Mn^{3+} : increasing magnetic moment
	C	Ti < V < Cr < Mn : increasing melting points
	D	Ti < V < Mn < Cr : increasing 2^{nd} ionization enthalpy
21		Which of the following exhibits only + 3 oxidation state?
	A	U
	B	Th
	C	Ac
	D	Pa
22		Four successive members of the first series of the transition metals are listed below. For which one of them the standard potential (E^0M^{2+}/M) value has a positive sign?
	A	Co (Z = 27)
	B	Ni (Z = 28)
	C	Cu (Z = 29)
	D	Fe (Z = 26)
23		The catalytic activity of transition metals and their compounds is ascribed mainly to
	A	their magnetic behaviour
	B	their unfilled f-orbitals
	C	their ability to adopt variable oxidation states
	D	their chemical reactivity
24		Which of the statements is not true?
	A	On passing H_2S through acidified $K_2Cr_2O_7$ solution, a milky colour is observed.
	B	$Na_2Cr_2O_7$ is preferred over $K_2Cr_2O_7$ in volumetric analysis
	C	$K_2Cr_2O_7$ solution in acidic medium is orange.
	D	$K_2Cr_2O_7$ solution becomes yellow increasing the pH beyond 7.
25		Acidified $K_2Cr_2O_7$ solution turns green when Na_2SO_3 is added to it. This is due to the formation of
	A	$Cr_2(SO_4)_3$
	B	CrO_4^{2-}
	C	$Cr_2(SO_3)_3$
	D	$CrSO_4$
26		Which of the following ions will exhibit colour in aqueous solutions?
	A	La^{3+} (Z = 57)
	B	Ti^{3+} (Z = 22)
	C	Lu^{3+} (Z = 71)
	D	Se^{3+} (Z = 21)

27		Which one of the elements with the following outer orbital configurations may exhibit the largest number of oxidation states?
	A	$3d^5 4s^1$
	B	$3d^5 4s^2$
	C	$3d^2 4s^2$
	D	$3d^3 4s^2$
28		The correct order of decreasing second ionisation enthalpy of Ti(22), V(23), Cr(24) and Mn(25) is
	A	Mn > Cr > Ti > V
	B	Ti > V > Cr > Mn
	C	Cr > Mn > V > Ti
	D	V > Mn > Cr > Ti
29		Which one of the following ions is the most stable in aqueous solution?
	A	V^{3+}
	B	Ti^{3+}
	C	Mn^{3+}
	D	Cr^{3+}
30		The number of moles of $KMnO_4$ reduced by one mole of KI in alkaline medium is
	A	One
	B	Two
	C	Five
	D	Three

ANSWER KEY

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
B	**C**	**C**	**A**	**C**	**D**	**C**	**D**	**D**	**A**
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
B	**B**	**C**	**B**	**B**	**C**	**A**	**B**	**D**	**C**
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
D	**C**	**C**	**B**	**A**	**B**	**B**	**C**	**D**	**B**

CHAPTER 5 : COORDINATION COMPOUNDS	
1.	Which of the following is a complex of metal other than transition metal? (a) Haemoglobin (b) Chlorophyll (c) Ferrocene (d) Vitamin B_{12}
2.	Which of the following is not a double salt but a coordinate compound? (a) $KCl.MgCl_2.6H_2O$ (b) $FeSO_4.(NH_4)_2SO_4.6H_2O$ (c) $K_2SO_4.Al_2(SO_4)_3.24H_2O$ (d) $4KCN.Fe(CN)_2$
3.	The donor atoms in ethylenediaminetetraacetate ion is (a) two N and two O (b) two N and four O (c) four N and two O (d) three N and three O
4.	The correct I.U.P.A.C. name of the complex, $[Fe(C_5H_5)_2]$ is (a) cyclopentadienyl iron (II) (b) bis(cyclopentadienyl) iron (II) (c) dicyclopentadienyl iron (II) (d) ferrocene (0)
5.	The geometrical isomerism in coordination compounds is exhibited by (a) square planar and tetrahedral complexes (b) square planar and octahedral complexes (c) tetrahedral and octahedral complexes (d) square planar, tetrahedral, octahedral comp
6.	Which of the following is not optically active? (a) $[Co(en)_3]^{3+}$ (b) $[Cr(ox)_3]^{3-}$ (c) cis-$[CoCl_2(en)_2]^+$ (d) trans-$[CoCl_2(en)_2]^+$
7.	The complex ion $[Cu(NH_3)_4]^{+2}$ is (a) tetrahedral and paramagnetic (b) tetrahedral and diamagnetic (c) square planar and paramagnetic (d) square planar and diamagnetic
8.	The hybrid state of Co in high spin complex, $K_3[CoF_6]$ is (a) sp^3d^2 (b) sp^3 (c) d^2sp^3 (d) sp^3d
9.	In an octahedral crystal field, the t_{2g} orbital are (a) raised in energy by 0.4 Δ_o (b) lowered in energy by 0.4 Δ_o (c) raised in energy by 0.6 Δ_o (d) lowered in energy by 0.6 Δ_o
1O.	If $\Delta_o < P$, then the correct electronic configuration for d^4 system will be (a) $t_{2g}^4 e_g^0$ (b) $t_{2g}^3 e_g^1$ (c) $t_{2g}^0 e_g^4$ (d) $t_{2g}^2 e_g^2$
11.	The tetrahedral complexes are generally high spin. This is because (a) $\Delta_t < P$ (b) $\Delta_t > P$ (c) $\Delta_t = P$ (d) none of these
12.	Wilkinson's catalyst, $[(Ph_3P)_3RhCl]$ is used for

	(a) hydrogenation of carboxylic acids (b) hydrogenation of alkynes (c) hydrogenation of alkenes (d) polymerization of alkenes
13.	Zeigler Natta catalyst is used for (a) synthesis of methanol (b) polymerization of olefins (c) cracking of hydrocarbons (d) hydrogenation of alkenes
14.	Among the compounds, $[Ni(CO)_4]$ -1, $[Ni(CN)_4]^{2-}$ - 2 and $[NiCl_4]^{2-}$ - 3, the correct statement is (a) 1, 3 are diamagnetic while 2 is paramagnetic (b) 2, 3 are diamagnetic while 1 is paramagnetic (c) 1, 2 are diamagnetic while 3 is paramagnetic (d) 1 is diamagnetic while 2, 3 are paramagnetic
15.	Which of the following is a complex salt? (a) Fischer's salt (b) Mohr's salt (c) Glauber's salt (d) Microcosmic salt
16.	Which of the following will show maximum paramagnetic nature? (a) $[Cr(H_2O)_6]^{3+}$ (b) $[Fe(CN)_6]^{4-}$ (c) $[Fe(CN)_6]^{3-}$ (d) $[Cu(H_2O)_6]^{2+}$
17.	The correct formula of the complex formed in the brown ring test of nitrates is (a) $[Fe(H_2O)_5NO]^{+}$ (b) $[Fe(H_2O)_5NO]^{2+}$ (c) $Fe(H_2O)_5NO]^{3+}$ (d) $[Fe(H_2O)_4(NO_2)]$
18.	For the square planar complex, [MABCD] where M is central metal and A, B, C, D are mono-dentate ligands, the number of possible geometrical isomers are (a) 2 (b) 4 (c) 3 (d) 5
19.	Which of the following will show optical isomerism? (a) $[Cr(en)(H_2O)_4]^{3+}$ (b) $[Cr(en)_3]^{3+}$ (c) trans-$[Cr(en)(Cl_2)(NH_3)_2]^{+}$ (d) $[Cr(NH_3)_6]^{+}$
20.	The primary valency of the Fe in the complex, $K_4[Fe(CN)_6]$ is (a) 3 (b) 2 (c) 4 (d) 6
21.	Which of the following compound will exhibit linkage isomerism? (a) $[Co(en)_3]Cl_3$ (b) $[Co(NH_3)_6][Cr(en)_3]$ (c) $[Co(en)_2(NO_2)Cl]Br$ (d) $[Co(NH_3)_5Cl]Br_2$
22.	Which of the following will form an octahedral complex? (a) d^4 (low spin) (b) d^8 (high spin) (c) d^6 (high spin) (d) none of these
23.	The shape of cuprammonium ion is -

	(a) tetrahedral (b) octahedral (c) trigonal (d) square planar
24.	In the complex, $[Co(NH_3)_5(CO_3)]ClO_4$, the C.N., O.N., the number of d-electrons and the number of unpaired electrons in d-orbital are respectively (a) 6, 3, 6, 0 (b) 7, 2, 7, 1 (c) 7, 1, 6, 4 (d) 6, 2, 6, 3
25.	When $AgNO_3$ is added to a solution of complex $CoCl_3.(NH_3)_5$, the precipitate of AgCl shows two ionizable Cl^-. It indicates that (a) two Cl^- satisfy primary valency while one Cl^- satisfy both primary and secondary valency (b) two Cl^- satisfy primary valency while one Cl^- satisfy only secondary valency (c) all three Cl^- satisfy only primary valency (d) all three Cl^- satisfy only secondary valency
26.	The number of unpaired electrons in $[CoF_6]^{3-}$ is (a) 2 (b) 3 (c) 4 (d) 5
27.	The fac-mer isomerism is associated with which of the following general formula? (a) $[M(AA')_2]$ (b) $[M(AA)_3]$ (c) [MABCD] (d) $[MA_3B_3]$
28.	Which of the following statement is correct? (a) $[Cu(NH_3)_4]^{2+}$ is diamagnetic while $[Fe(CN)_6]^{4-}$ is paramagnetic (b) both are paramagnetic (c) $[Cu(NH_3)_4]^{2+}$ is paramagnetic while $[Fe(CN)_6]^{4-}$ is diamagnetic (d) both are diamagnetic
29.	Correct configuration of complex compound $[Mn(H_2O)_6]^{2+}$ is- (a) $t_{2g}^3 e_g^2$ (b) $t_{2g}^5 e_g^0$ (c) $t_{2g}^5 e_g^1$ (d) $t_{2g}^4 e_g^2$
30.	Hybridisation of $Fe(CO)_5$ with the help of Valence bond theory is – (a) dsp^2 (b) $d^2 sp^3$ (c) $sp^3 d^2$ (d) dsp^3
31.	Vitamin B_{12} contains – (a) Cr (b) Fe (c) Co (d) Cu
32.	The correct statement about $[NiCl_4]^{2-}$ and $[Ni(CO)_4]$ is (a) Both are tetrahedral and paramagnetic in nature (b) Both are tetrahedral but $[NiCl_4]^{2-}$ is paramagnetic while $[Ni(CO)_4]$ is diamagnetic in nature (c) c)Both are square planar and diamagnetic

	Both are square planar and paramagnetic
33.	Which of the following sequence is correct regarding field strength of ligands as per spectrochemical series? (a) $SCN^- < F^- < CN^- < CO$ (b) $F^- < SCN^- < CN^- < CO$ (c) $CN^- < F^- < CO < SCN^-$ (d) $SCN^- < CO < F^- < CN^-$
34.	Low spin tetrahedral compounds are not formed because (a) $\Delta_t > P$ (b) $\Delta_t < P$ (c) $\Delta_t \geq P$ (d) $\Delta_t > \Delta_o$
35.	Which of the following complex ion is not expected to absorb visible light? **(a)** $[NiCl_4]^{2-}$ (b) $[Fe(H_2O)_6]^{3+}$ **(c)** $[Cr(NH_3)_6]^{3+}$ (d) $[Ni(H_2O)_6]^{2+}$
36.	Which of the following is diamagnetic in nature? (a) Co^{3+} octahedral complex with weak field ligands (b) Co^{3+} octahedral complex with strong field ligands (c) Co^{2+} in tetrahedral complex (d) Co^{2+} in square planar complex
Assertion Reason Type Questions: **Instructions:** The following questions consist two statements as Assertion and Reason. While answering these questions, choose correctly any of the following responses. (a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion. (b) If both Assertion and Reason are true and Reason is not the correct explanation of Assertion. (c) If Assertion is true and Reason is false. (d) If Assertion is false and Reason is true.	
37.	**Assertion:** The complex $[Co(NH_3)_3Cl_3]$ gives no precipitate with $AgNO_3$ solution. **Reason:** The above complex is non ionizable.
38.	**Assertion:** $[Ni(CO)_4]$ is tetrahedral in shape. **Reason:** Ni atom is in zero oxidation state and undergoes sp^3 hybridization
39.	**Assertion:** Wilkinson's catalyst contains Ti^{4+} as the metal cation. **Reason:** Wilkinson's catalyst has composition $[(Ph_3P)_3RhCl]$.
40.	**Assertion:** Ethylenediaminetetraacetate ion makes an octahedral complex with the metal ion. **Reason:** It has six donor atoms which coordinate simultaneously to the metal ion.
41.	**Assertion:** $[Cu(en)_2]^{2+}$ is more stable than $[Cu(NH_3)_4]^{2+}$. **Reason:** Both of these complexes have a square planar shape

42.	**Assertion:** Glycinate ion is an example of bi-dentate ligand. **Reason:** It contains two donor atoms per glycinate ion.
43.	**Assertion:** The total number of isomers shown by $[Co(en)_2Cl_2]^+$ complex ion is three. **Reason:** $[Co(en)_2Cl_2]^+$ complex ion has an octahedral geometry
44.	**Assertion:** The oxidation number of central ion in Zeisse's salt is +2. **Reason:** C_2H_4 ligand in it has charge equal to -2
45.	**Assertion**: $[Ni(CO)_4]$ has square planer geometry and is diamagnetic in nature. **Reason**: CO is a neutral ligand which forms synergic bonding with the metal.

Answer key: Only One Correct Option Type Questions:

1	2	3	4	5	6	7	8	9	10
b	d	b	b	b	d	c	a	b	b
11	12	13	14	15	16	17	18	19	20
a	c	b	c	a	a	b	c	a	B
21	22	23	24	25	26	27	28	29	30
c	a	b	a	a	c	d	c	a	D
31	32	33	34	35	36	37	38	39	
c	b	b	b	c	b	a	a	d	

Assertion Reason Type Questions:

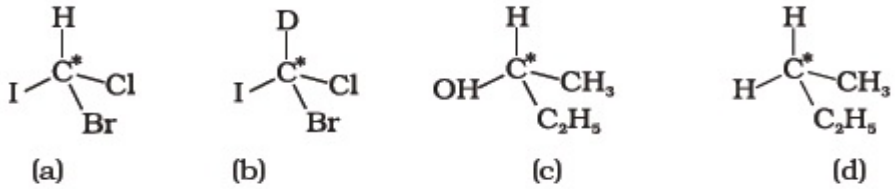
40	41	42	43	44	45		
a	b	a	b	c	a		

CHAPTER 6 : HALOALKANES AND HALOARENES

1

Section A

In which of the following molecules carbon atom marked with asterisk (*) is asymmetric?



(A) (a), (b), (c), (d)

(B) (a), (b), (c)

(C) (b), (c), (d)

(D) (a), (c), (d)

2

Chlorobenzene is formed by reaction of chlorine with benzene in the presence of $AlCl_3$. Which of the following species attacks the benzene ring in this reaction?

(A) Cl^- (B) Cl^+ (C) $AlCl_3$ (D) $[AlCl_4]^-$

3

Identify following reaction:

A) Wurtz Reaction
B) Etard Reaction
C) Finkelstein Reaction
D) Swarts Reaction

4

The reaction of toluene with chlorine in the presence of iron and in the absence of light yields _____.

A) Benzyl chloride

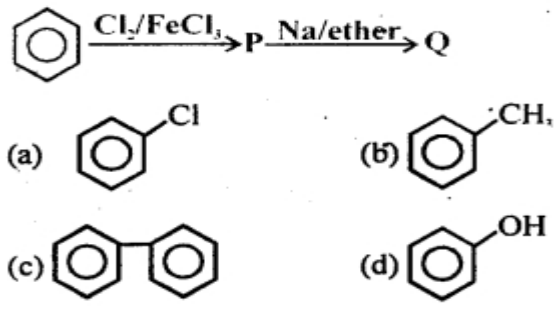
B) o-Chloro toluene

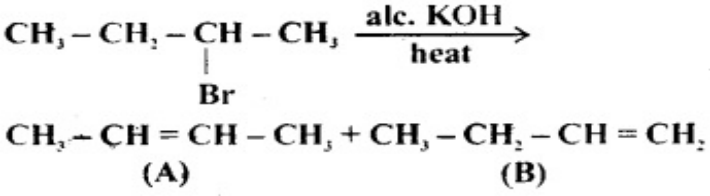
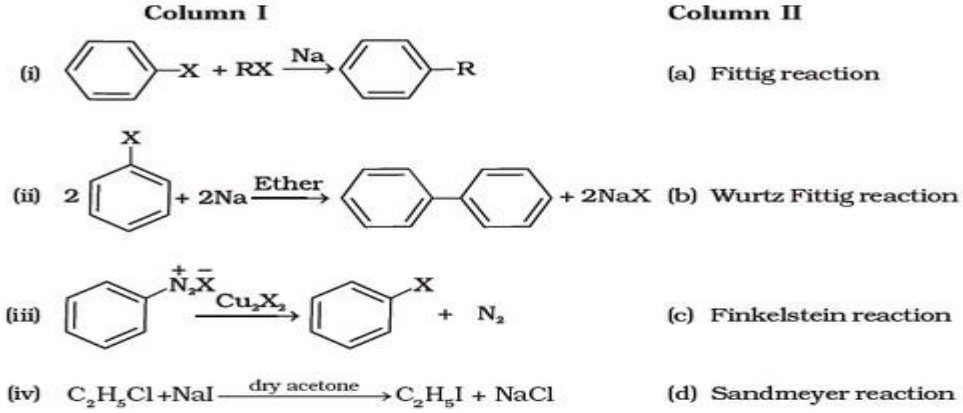
C) p-Chloro toluene

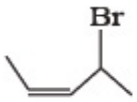
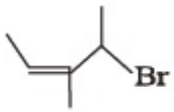
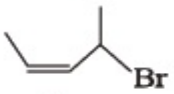
D) Mixture of B and C

5

What is **Q** in the following reaction?

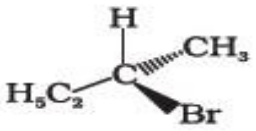


6	**Which of the following is the correct order of decreasing S_N2 reactivity?** A) $RCH_2X > R_2CHX > R_3CX$ B) $R_3CX > R_2CHX > RCH_2X$ C) $R_2CHX > R_3CX > RCH_2X$ D) $RCH_2X > R_3CX > R_2CHX$
7	Which of the following is correct for the reaction  a) A is major product and B is minor product b) B is major product and A is minor product c) Only A will be obtained as a product d) Only B will be obtained as a product
8	Tertiary alkyl halides are practically inert to substitution by SN 2 mechanism because of (A) steric hindrance (B) inductive effect (C) instability (D) insolubility
9	Match the reactions given in Column I with the names given in Column II.  A) i-a, ii-b ,iii-c, iv-d B) i-b, ii-a , iii-d, iv-c C) i-d, ii-b ,iii-c, iv-a D) i-c, ii-a ,iii-b, iv-d
10	Alkyl fluorides are synthesised by heating an alkyl chloride/bromide in presence of_

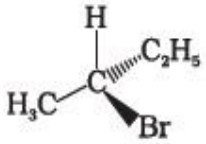
	(A) CaF_2 (B) PF_3 (C) Hg_2F_2 (D) NaF
11	Haloalkanes contain halogen atom (s) attached to the sp^3 hybridised carbon atom of an alkyl group. Identify haloalkane from the following compounds. (A) 2-Bromopentane (B) Vinyl chloride (chloroethene) (C) 2-chloroacetophenone (D) chlorobenzene
12	Alkyl halides are prepared from alcohols by treating with_____ (A) $HCl + ZnCl_2$ (B) Red P + Br_2 (C) PCl_5 (D) All the above
13	Match the structures given in Column I with the names in Column II. **Column I** **Column II** (i)  (a) 4-Bromopent-2-ene (ii)  (b) 4-Bromo-3-methylpent-2-ene (iii)  (c) 1-Bromo-2-methylbut-2-ene (iv) (d) 1-Bromo-2-methylpent-2-ene A) i-a, ii-b ,iii-c, iv-d B) i-b, ii-a, iii-d, iv-c C) i-d, ii-b ,iii-c, iv-a D) i-a, ii-d, iii-c, iv-b
14	Which is the correct increasing order of boiling points of the following compounds? 1-Iodobutane, 1-Bromobutane, 1-Chlorobutane, Butane (A) Butane < 1-Chlorobutane < 1-Bromobutane < 1-Iodobutane (B) 1-Iodobutane < 1-Bromobutane < 1-Chlorobutane < Butane

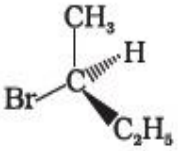
	(C) Butane < 1-Iodobutane < 1-Bromobutane < 1-Chlorobutane (D) Butane < 1-Chlorobutane < 1-Iodobutane < 1-Bromobutane
15	Aryl halides are less reactive towards nucleophilic substitution reactions as compared to alkyl halides due to (a) formation of a less stable carbonium ion in aryl halides (b) resonance stabilization in aryl halides (c) presence of double bonds in alkyl halides (d) inductive effect in aryl halides
16	p-dichlorobenzene has higher melting point than its o- and m- isomers. Why? (a) m- dichlorobenzene is more polar than o-isomer (b) p-isomer has a symmetrical crystalline structure (c) boiling point of o- isomer is more than p-isomers (d) All of these are correct
17	Which of the following is most reactive towards aqueous NaOH? (a) C_6H_5Cl (b) $C_6H_5CH_2Cl$ (c) C_6H_5Br (d) BrC_6H_4Br
18	Which of the following haloalkanes is optically active? (a) 1-Chloropropane (b) 2-Bromobutane (c) 1-Iodopropane (d) 1-Fluorobutane
19	The general reaction, R–X + aq. $OH^{--} \longrightarrow ROH+X^-$ is expected to follow decreasing order of reactivity as in (t- Bu = tertiary Butyl group) (a) t-BuI> t-BuBr > t-BuCl > t-BuF (b) t-BuF> t-BuCI > t-BuBr > t-BuI (c)t-Bu'Br> t-BuCI > t-BuI > t-BuF (d) t-BuF> t-BuCI > t-BuI > t-BuBr
20	Which of the following alcohols will yield the corresponding alkyl chloride on reaction with concentrated HCl at room temperature? (a) $CH_3CH_2—CH_2—OH$ (b) $CH_3CH_2—CH(CH_3)—OH$ (c) $CH_3CH_2—CH(CH_3)—CH_2OH$ (d) $CH_3CH_2—C(CH_3)_2—OH$

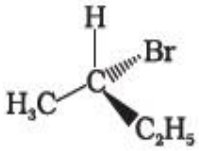
21 Which of the following structures is enantiomeric with the molecule (A) given below :

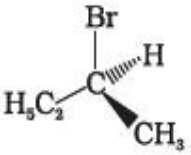


(A)

(i) 

(ii) 

(iii) 

(iv) 

(a) i
(b) ii
(c) iii
(d) iv

22

Column I	**Column II**
(A) $CH_3CH(Br)CH(CH_3)CH_3 + C_2H_5ONa \rightarrow CH_3CH_2C(OC_2H_5)(CH_3)CH_3$	(i) β-elimination
(B) $CH_3CH_2Br \xrightarrow{AgOH} CH_3CH_2OH$	(ii) SN^1 nucleophilic substitution
(C) $CH_3CH=CH_2 + HBr \xrightarrow{Peroxide} CH_3CH_2CH_2Br$	(iii) SN^2 nucleophilic substitution
(D) $CH_3\text{-}CH_2Br$ + alc. $KOH \longrightarrow CH_2=CH_2$	(iv) Kharash effect

(a) A=(i), B=(iv), C=(ii), D=(iii)
(b) A=(i), B=(ii), C=(iv), D=(iii)
(c) A=(ii), B=(iii), C=(iv), D=(i)
(d) A=(iii),B=(i), C=(ii), D=(iv)

Given below question no 15-18 consist of an "Assertion" (A) and "Reason" (R) Type questions. Use the following Key to choose the appropriate answer.

A.If both (A) and (R) are true, and (R) is the correct explanation of (A).

B.If both (A) and (R) are true but (R) is not the correct explanation of (A).

C.If (A) is true but (R) is false.

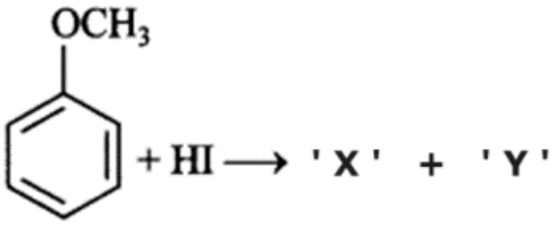
D.If (A) is false but (R) is true.

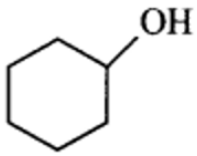
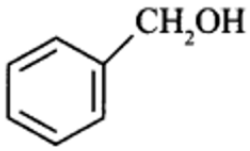
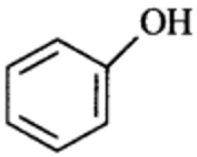
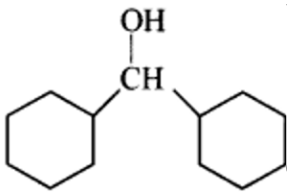
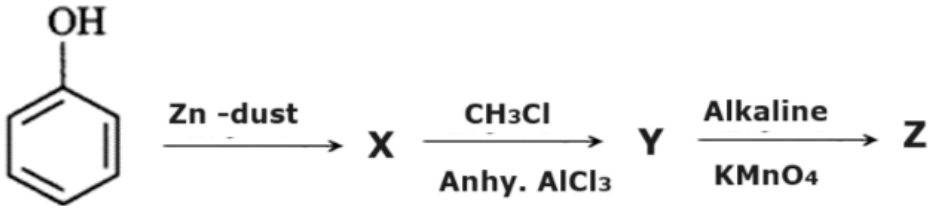
23 Assertion : Presence of a nitro group at ortho or para position increases the reactivity of haloarenes towards nucleophilic substitution.

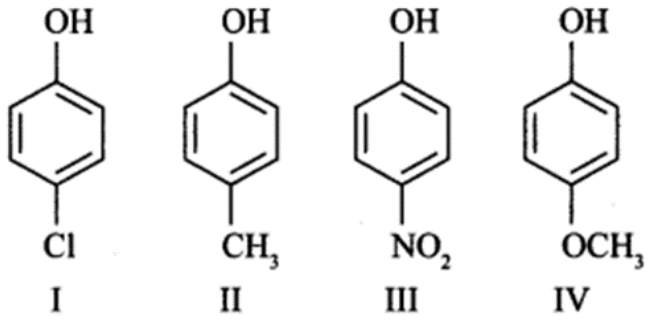
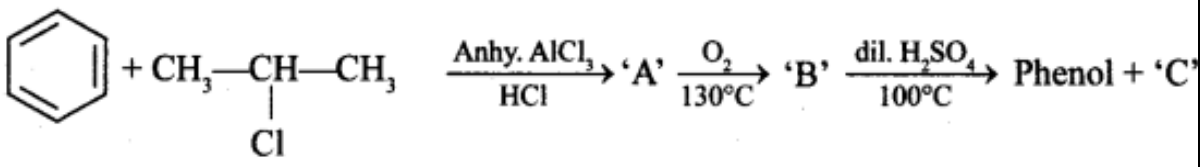
	Reason : Nitro group, being an electron withdrawing group decreases the electron density over the benzene ring.
24	Assertion : It is difficult to replace chlorine by –OH in chlorobenzene in comparison to that in chloroethane. Reason : Chlorine-carbon (C—Cl) bond in chlorobenzene has a partial double bond character due to resonance.
25	Assertion: Chlorobenzene is less reactive than benzene towards the electrophilic substitution reaction. Reason: Resonance destabilises the carbo cation.
26	Assertion: The C–Cl bond length in chlorobenzene is shorter than that in CH_3–Cl. Reason: In haloarenes Cl is attached to sp^2 hyridised carbon which is more electronegative than sp^3 hybridised carbon.
27	**Assertion (A)** : The hydrolysis of chloro-benzene can be made hard by introduction of nitro groups on benzene ring. **Reason** : Nitro group engage negative charge in resonance so hydrolysis becomes hard.
28	**Assertion** : SN_2 reaction of an optically active aryl halide with an aqueous solution of KOH always gives an alcohol with opposite sign of rotation. **Reason** : SN_2 reactions always proceed with inversion of configuration
29.	**Assertion** : Alkylbenzene is not prepared by Friedel-Crafts alkylation of benzene. **Reason** : Alkyl halides are less reactive than acyl halides
30.	**ASSERTION** – The compounds which can rotate the plane polarised light when it is passed through its solution are called optically active compounds **REASON** – If the compound rotates the plane polarised light to right, it is called dextrorotatory.

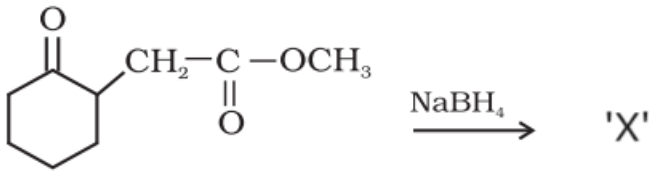
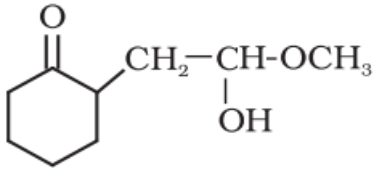
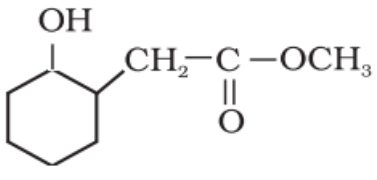
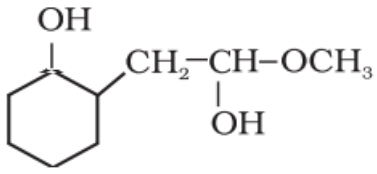
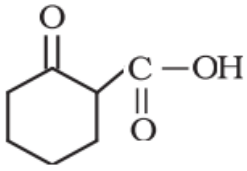
1 B	2 B	3 D	4 D	5 C	6 A	7 A	8 A	9 B
10 C	11 A	12 D	13 A	14 A	15 B	16 B	17 B	18 B
19 A	20 D	21 A	22 C	23 A	24 A	25 A	26 B	27 D
28 D	29 D	30 B						

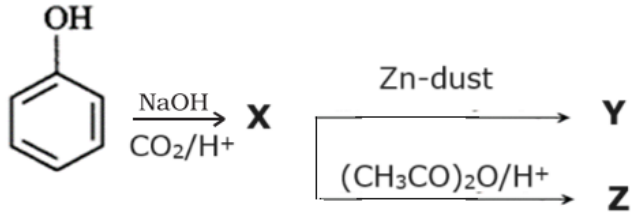
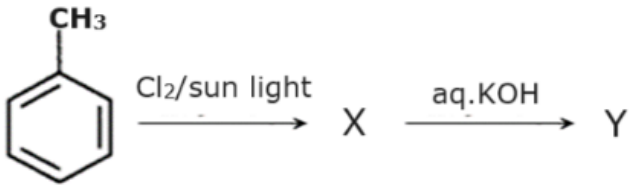
CHAPTER-7 ALCOHOLS, PHENOLS AND ETHERS	
1.	**When "propene (CH_3-CH=CH_2)" treated with H_2O/dil.H_2SO_4 (hydration) the product 'X' is formed, and when this is treated with B_2H_6/H_2O_2(OH^-) the product 'Y' is formed. The correct information about 'X' and 'Y' is_** (A) X = propan-1-ol; Y = propan-2-ol (B) X = propan-2-ol; Y = propan-1-ol (C) X = propanal; Y = propanone (D) X = propanone; Y = propanal
2.	**Which of the reagents/test can be used to distinguish propan-1-ol and propan-2-ol?** (A) Lucas reagent and Iodoform test (B) Iodoform test and Tollens Reagent (C) Tollen's reagent and Fehling's test (D) Lucas reagent and Fehling's test
3.	**Which one is an example of allylic alcohol?** (A) Prop-2-en-1-ol (B) but-2-en-2-ol (C) Prop-1-en-1-ol (D) Prop-1-en-2-ol
4.	**The correct increasing reactivity order of following alcohols towards Lucas reagent is among: - 2-butanol, 1-butanol, 2-methyl-2-propanol is:** (A) butan-2-ol > butan-1-ol > 2-methyl-propan-2-ol (B) butan-2-ol < butan-1-ol < 2-methyl propan-2-ol (C) butan-1-ol > butan-2-ol > 2-methyl propan-2-ol (D) butan-1-ol < butan-2-ol < 2-methyl propan-2-ol
5.	**The IUPAC name of optically active compound/isomer of alcohol having molecular formula C_4H_9OH is:** (A) butan-1-ol. (B) butan-2-ol. (C) 2-methyl prop-1-ol. (D) 2-methyl prop-2-ol.
6.	**Aspirin possesses analgesic, anti-inflammatory and antipyretic properties. It is obtained by acetylation of_** (A) o-Hydroxy benzoic acid (B) m-Hydroxy benzoic acid

	(C) o-Dihydroxy benzene (D) Phenol
7.	**Alcohols are produced by the reaction of Grignard reagents with aldehydes and ketones. Addition of ethyl magnesium bromide (Grignard's reagent) on acetone followed by hydrolysis gives:** (A) 2-methyl butan-1-ol (B) butan-2-ol (C) 2-methyl propan-2-ol (D) 2-methyl butan-2-ol
8.	**In the structural aspects of methanol, phenol and methoxymethane the bond angle order is:** (A) phenol < methoxymethane < Methanol (B) methoxymethane < Methanol< phenol (C) methanol< phenol < methoxymethane (D) phenol < methanol < methoxymethane
9.	**Arrange the following sets of compounds in order of their increasing boiling points:** (A) ethanol < butan-1-ol < butan-2-ol < pentan-1-ol. (B) ethanol < Pentan-1-ol < butan-1-ol < butan-2-ol (C) Pentan-1-ol < butan-1-ol < butan-2-ol < ethanol (D) ethanol < butan-2-ol < butan-1-ol < pentan-1-ol.
1O.	**The commercial alcohol is made unfit for drinking by mixing in it some copper sulphate (to give it a colour) and pyridine (a foul-smelling liquid). It is known as:** (A) Neutralization of alcohol (B) Denaturation of alcohol (C) Saturation of alcohol (D) Formation of rectified spirit
11.	Identify 'X' and 'Y' in the reaction when phenyl methyl ether heated with HI  (A) Iodo benzene and phenol (B) Phenol and iodomethane

	(C) Benzene and methanol (D) Iodo benzene and methanol
12.	**Which of the following reagents *<u>cannot be used</u>* to oxidise primary alcohols to aldehydes?** (A) CrO_3 in anhydrous medium. (B) $KMnO_4$ in acidic medium. (C) Pyridinium chlorochromate. (D) Heat in the presence of Cu at 573K.
13.	**Which one of the following compounds has the most acid nature?** (A)  (B)  (C)  (D) 
14.	**Identify the product 'Z' in the following reaction:**  (A)Benzaldehyde (B)Benzoic acid (C) Benzene (D) Toluene
15.	**Identify the electrophile involved in Riemer-Tiemann reaction of phenol with CHCl3 in presence of NaOH.** (A) $:CCl_2$

	(B) $^{-}CCl_3$ (C) $^{+}CCl_3$ (D) $^{+}CHCl_2$
16.	**Arrange the following in decreasing order of acidic character:**  I II III IV (A) IV > III > I > II (B) II > IV > I > III (C) III > IV > III > II (D) III > I > II > IV
17.	**Identify 'C' in the following:**  (A) Water (B) Ethanol (C) Propanone (D) Cumene hydroperoxide
18.	**Pka value of Phenols are less than that of alcohols because_** (A) Phenol is an aromatic compound. (B) Phenols are more soluble in polar solvents. (C) Phenoxide ion is stablised by resonance. (D) Alcohols do not lose H atoms at all.
19.	**Which compound is predominantly formed when phenol is allowed to react with bromine in aqueous medium?** (A) Picric acid (B) O-Bromophenol (C) 2, 4, 6-Tribromophenol (D) p-Bromophenol
20.	**Which of the following compound will easily undergo dehydration?** (A) 2- Methyl propane - 2 - ol

	(B) Ethyl alcohol (C) 3 - Methyl - 2 - butanol (D) 2 - Pentenol
21.	The I.U.P.A.C. name of the ether $CH_2 = CH\text{-}CH_2O\ CH_3$ is (A) Alkyl methyl ether (B) 1-Methoxy-2-propene (C) 3-Methoxy-1-propene (D) Vinyl dimethyl ether
22.	**Identify the compound 'X' in the reaction given below_**  (A)  (B)  (C)  (D) 
23.	**Identify sodium alkoxide and alkyl halide in the reaction given below_** (A) sodium ethoxide and tertiary butyl chloride (B) sodium tertiary butoxide and ethyl chloride (C) sodium methoxide and tertiary butyl chloride (D) sodium methoxide and methyl chloride

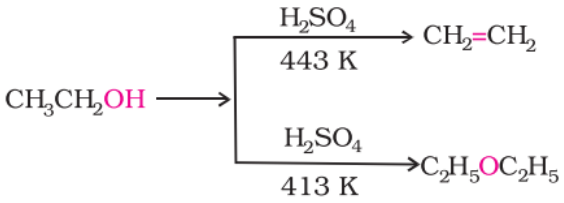
24.	C-O-C bond angle in Ethers is (A) more than 109.5 ^{O} (B) less than 109.5 ^{O} (C) equal to 109.5 ^{O} (D) 130^{O}
25.	**In the below sequence, what are Y and Z?**  (A) Y= Phenol Z= Aspirin (B) Y= Benzene Z= Phenol (C) Y= Benzoic acid Z= Aspirin (D) Y= Benzene Z= Benzoic acid
26.	**Monochlorination of toluene in sunlight followed by hydrolysis with aq. KOH yields the compound Y, identify compound 'Y'.**  (A) o-cresol (B) m-cresol (C) 2, 4-dihydroxytoulene (D) benzyl alcohol
27.	**Salicylic acid can be prepared from Phenol through_** (A) Friedel-craft reaction (B) Kolbe's reaction (C) Williamson synthesis (D) Koch Reaction
28.	**Vapours of an alcohol 'X' when passed over hot reduced copper, produced an alkene, the alcohol 'X' is_** (A) primary alcohol (B) secondary alcohol (C) tertiary alcohol (D) Allylic alcohol
29.	**In vinylic alcohols -OH is bonded to** (A) sp^3 hybridised Carbon (B) sp hybridised Carbon

	(C) sp^2 hybridised Carbon (D) sp^3d hybridised Carbon
30.	**Among the following sets of reactants which one produces anisole?** (A) CH_3CHO: RMgX (B)C_6H_5OH; NaOH, CH_3I (C) C_6H_5OH, neutral $FeCl_3$ (D) C_6H_5 —CH_3; CH_3COCl; $AlCl_3$
	ASSERTION REASONING BASED QUESTIONS: DIRECTIONS for the question no 31 to 36: In each of the question given below, there are two statements marked as Assertion (A) and Reason (R). Mark your answer as per the codes provided below: (A) Both Assertion and Reason are true and Reason is the correct explanation of Assertion. (B) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion. (C) Assertion is true but Reason is false. (D) Assertion is false but Reason is true.
31.	**ASSERTION:** Water is more acidic than Alcohols. **REASON:** In Alcohols the polarity of O-H bond decreases due to +I effect of alkyl R-group.
32.	**ASSERTION:** The reaction of Grignard reagent with formaldehyde followed by hydrolysis gives primary alcohol. **REASON:** Primary (1°) alcohols are more acidic than 2° (sec) or 3^0(tert.) Alcohols.
33.	**ASSERTION:** Phenol yields a mixture of ortho and para nitrophenols with dilute nitric acid at low temperature (298 K). **REASON:** The ortho and para isomers of nitrophenol can be separated by steam distillation.
34.	**ASSERTION:** Ethers containing substituted alkyl groups (secondary or tertiary) can be prepared by Williamson Ether synthesis **REASON:** Williamson ether synthesis reaction involves SN1 attack of an alkoxide ion on primary alkyl halide. Better results are obtained if the alkyl halide is tertiary.
35.	**ASSERTION:** Primary (1°) alcohols produce white ppt with Lucas Reagent immediately. **REASON:** Lucas Reagent is a mixture of anhydrous $ZnCl_2$ and concentrated HCl.
36.	**ASSERTION:** Boiling points of alcohols and phenols are higher in comparison to other classes of compounds, namely hydrocarbons, ethers, haloalkanes and haloarenes of comparable molecular masses

	REASON: The high boiling points of alcohols are mainly due to the presence of intermolecular hydrogen bonding in them which is lacking in ethers and hydrocarbons.

READ THE PARAGRAPH AND GIVE ANSWER THE QUESTIONS:

Alcohol and ether are isomeric in nature having formula $C_nH_{(2n+2)}O$. According to IUPAC nomenclature, alcohol and ether are named as alkanol and alkoxyalkane respectively. Alcohol are more soluble in water than ethers due to hydrogen bonding. Among isomeric alcohols the solubility depends up on no of carbon atoms in alcohol. Alcohols undergo dehydration in the presence of protic acids (H_2SO_4, H_3PO_4). The formation of the reaction product, alkene or ether depends on the reaction conditions. For example, ethanol is dehydrated to ethene in the presence of sulphuric acid at 443 K. At 413 K, ethoxyethane is the main product.



For example, when ethanol undergoes acid catalyzed dehydration then it can form either ethene or ethoxyethane depends up on conditions applied.

37.	**Which is an isomeric alcohol of ethoxyethane:** (A) pentan-1-ol (B) 2-methyl butan-1-ol (C) propanol (D) 2-methyl propan-1-ol
38.	**Which statement is not true;** (A) ethanol and methoxy ethane are functional isomers. (B) boiling point of alcohol is higher than corresponding ethers. (C) ethanol is more soluble than propanol. (D) ethanol gives ethene when dehydrated at 443 K temp. with low conc. of ethanol.
39.	**The correct order of rate of acid catalyzed dehydration of isomeric alcohol is:** (A) 3^o alcohol < 2^o alcohol < 1^o alcohol (B) 1^o alcohol < 3^o alcohol < 2^o alcohol (C) 1^o alcohol = 2^o alcohol = 3^o alcohol (D) 1^o alcohol < 2^o alcohol < 3^o alcohol
40.	**Which pair of alcohols can give same alkene on catalytic dehydration in appropriate conditions:** (A) Propan-1-ol and butan-1-ol

	(B) Propan-1-ol and propan-2-ol (C) Butan-1-ol and butan-2-ol (D) Butan-1-ol and 2-methyl proan-1-ol

ANSWER KEY									
1.B	2.A	3.A	4.D	5.B	6.A	7.D	8.C	9.D	10.B
11.B	12.B	13.C	14.B	15.A	16.D	17.C	18.C	19.C	20.A
21.C	22.B	23.B	24.A	25.C	26.D	27.B	28.C	29.C	30.B
31.A	32.B	33.B	34.C	35.D	36.A	37.D	38.A	39.D	40. B

CHAPTER 8 : ALDEHYDE, KETONES AND CARBOXYLIC ACID

1	Acetone combines with ethylene glycol in dry HCl gas to generate (a) hemiacetal (b) hemiketal (c) cyclic ketals (d) acetals
2	Which of the compounds is formed when benzyl alcohol is oxidized (a) benzene (b) benzoic acid (c) benzaldehyde (d) carbon dioxide, water
3	Which compound is least soluble in water (a) ethanal (b) methanal (c) hexanal (d) propanal
4	When benzaldehyde and formaldehyde are heated in aqueous NaOH solution they form (a) Methanol and sodium benzoate (b) sodium formate and benzyl alcohol (c) methanol and benzyl alcohol (d)benzoyl alcohol and sodium benzoate
5	When a mixture of sodium benzoate and soda lime is heated it produces (a) calcium benzoate (b) sodium benzoate (c) benzoic acid (d) benzene
6	Write the IUPAC name of CH_3-CH_2CH_2CH=CH-CHO (a) hex-2-enal (b) pent-2-enal (c) but-en-al (d) hexenone
7	What is the correct IUPAC name of methylcyclohexanone (a) 2-methylcyclohexanone (b) cyclo methyl hexane-2-one (c) 3-methyl cyclohexanone (d) methylcyclohexan-2-one
8	How can pentan-2-one and pentan-3-one can be differentiated (a) tollen's test (b) iodoform test (c) fehling's test (d) benedict test
9	Formic acid and ethanoic acid can be distinguished by (a) iodoform test

	(b) tollen's test (c) sodium bi carbonate test (d) litmus test
10	The oxidation of toluene to benzaldehyde by chromyl, chloride is called (a) Etard reaction (b) Riemer-Tiemann reaction (c) Wurtz reaction (d) Cannizzaro's reaction
11	The addition of HCN to carbonyl compounds is an example of (a) nucleophilic addition (b) electrophilic addition (c) free radical addition (d) electromeric addition
12	Aldehydes other than formaldehyde react with Grignard's reagent to give addition products which on hydrolysis give (a) tertiary alcohols (b) secondary alcohols (c) primary alcohols (d) carboxylic acids
13	Which of the following will not give aldol condensation? (a) Phenyl acetaldehyde (b) 2-Methylpentanal (c) Benzaldehyde (d) 1-Phenylpropanone
14	Benzoyl Chloride on reduction with H_2/ Pd-$BaSO_4$ produces (a) benzoic acid (b) benzylalochol (c) benzoyl sulphate (d) benzaldehyde
15	Which of the following acids does not form anhydride? (a)Formic add (b) Acetic acid (c)Propionic add (d) n-butyric acid
16	The acid which does not contain -COOH group is (a) Ethanoic acid (b)Lactic acid (c) Picric add (d)Palmitic acid
17	HVZ reaction is used to prepare (a) ß-haloacid (b)α-haloacid (c) α, ß-unsaturated add (d) None of these
18	An alkene C_7H_{14} on reductive ozonolysis gives an aldehyde with formula C_3H_6O and and a ketone. The ketone is (a)2-butanone

	(b) 2-pentanone (c)3-pentanone (d) propanone
19	Acetaldol is a condensation product of (a) two molecules of ethanal (b) two molecules of propanone (c) ethanal and methanal (d) ethanal and propanone
20	The most suitable reagent for the conversion of $R\text{-}CH_2OH \rightarrow RCHO$ is (a)$KMnO_4$ (b) $K_2Cr_2O_7$ (c) CrO_3 (d) PCC (Pyridimiumchlorochromate)
21	Which one the following can be oxidized to the corresponding carbonyl compound? (a) 2-Hydroxypropane (b) o-Nitrophenol (c) Phenol (d) 2-Hydroxy-2-methyl propane
22	Name the alkene that on ozonolysis will give ketone only (a)2,3 dimethyl but -2-ene (b) 2,3 dimethyl but -1-ene (c) 2,2 di methyl but -1-ene (d) 2- Methyl prop -1- ene
23	Benzoic acid reacts with conc. HNO_3 and conc.H_2SO_4 to give (a) o-nitrobenzoic acid (b) p-nitrobenzoic acid (c) m-nitrobenzoic acid (d) o,p-dinitrobenzoic acid
24	Carbonyl compounds undergo nucleophillic addition because of (a) More stable anion with negative charge on oxygen and less stable carbocation (b) Electromeric effect (c)Electronegativity difference of carbon and oxygen atoms (d)None of these
25	Cyanohydrin of which of the following will yield lactic acid? (a) HCHO (b) CH_3COCH_3 (c) CH_3CH_2CHO (d) CH_3CHO
26	Which of the following will not give iodoform test? (a) Ethanol (b) Ethanal (c) Pentan-3-one (d) Pentan-2-one
27	**Propanone can be prepared from ethyne by** (a) passing a mixture of ethyne and steam over a catalyst, magnesium at 420°C (b) passing a mixture of ethyne and ethanol over a catalyst zinc chromite

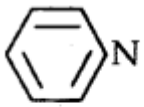
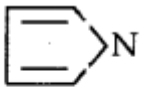
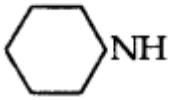
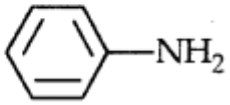
	(c) boiling ethyne with water in the presence of $HgSO_4$ and H_2SO_4 (d) treating ethyne with iodine and NaOH
28	**α-Hydroxypropanoic acid can be prepared from ethanal by following the steps given in the sequence** (a)Treat with HCN followed by acidic hydrolysis (b) Treat with $NaHSO_3$ followed by reaction with Na_2CO_3 (c) Treat with H_2SO_4 followed by hydrolysis (d) Treat with $K_2Cr_2O_7$ in presence of sulphuric acid
29	**Which of the following is the correct order of relative strength of acids?** (a) $ClCH_2COOH > BrCH_2COOH > FCH_2COOH$ (b) $BrCH_2COOH > ClCH_2COOH > FCH_2COOH$ (c) $FCH_2COOH > ClCH_2COOH > BrCH_2COOH$ (d) $ClCH_2COOH > FCH_2COOH > BrCH_2COOH$
30	**The correct order of increasing acidic strength is** (a) phenol < ethanol <chloroacetic acid < acetic acid (b) ethanol < phenol <chloroacetic acid < acetic acid (c) ethanol < phenol < acetic acid <chloroacetic acid (d) chloroacetic acid < acetic acid < phenol < ethanol
31	**The reagent which does not react with both, acetone and benzaldehyde is** (a) Sodium hydrogensulphite (b) Phenyl hydrazine (c) Fehling's solution (d) Grignard reagent
32	**Which of the following compounds will give butanone on oxidation with alkaline KMnO4 solution?** (a) Butan-1-ol (b) Butan-2-ol (c) Both of these (d) None of these
33	A liquid was mixed with ethanol and a drop of concentrated H2SO4 was added. A compound with a fruity smell was formed. The liquid was (a) CH_3OH (b) HCHO (c) CH_3COCH_3 (d) CH_3COOH
34	When ethanal reacts with CH_3MgBr and C_2H_5OH/dry HCl, the product formed are (a) methyl alcohol and 2-propanol (b) ethane and hemiacetal (c) 2-propanol and acetal (d) propane and methyl acetate
35	Which of the following reaction will not result in the formation of carbon-carbon bond? (a) Friedel-Craft acyation (b) Wurtz reaction

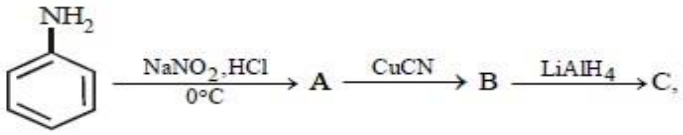
	(c) Cannizzaro reaction (d) Reimer-Timann reaction
36	Wolf-Kishnerreauction is (a) reducation of carbonyl compound into alcohol (b) reducation of carbonyl compound into alkene (c) reduction of carboxyl compound into alkane (d) reduction of nitor compound into aniline
37	Imine derivative of aldehyde and ketone is called as (a) Schiff's reagent (b) Fehling's reagent (c) Schiff's base (d) Schiff's acid
38	The acid formed when propyl magnesium bormide is treated with CO2 is : (a) C_3H_7COOH (b) C_2H_5COOH (c) both (d) d-None of these
39	Which one of the following reagents is used for the conversion of ethanoic acid to ethanoicanhydride ? (a) P_2O_5 (b) $SOCl_2$ (c) PCl_3 (d) both (a) and (b)
40	IUPAC name of ethyl isopropyl ketone is (a) 4-methyl pent-3-one (b) 2-methyl pent-3-one (c) 4-methyl pent-2-one (d) 2-methyl pent-2-one
In the following questions from 41-50 a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices. (A) Assertion and reason both are correct and reason is correct explanation of assertion. (B) Assertion and reason both are correct statements but reason is not correct explanation of assertion. (C) Assertion is correct statement but reason is wrong statement. (D) Assertion is wrong statement but reason is correct statement.	
41	Assertion: Lower aldehyde and ketones are soluble in water but the solubility decreases as molecular mass increases. Reason: Aldehydes and ketones can be distinguished by Fehling's reagent.
42	Assertion: Acetophenone and benzophenone cannot be distinguished by the iodoform test. Reason: Acetophenone and benzophenone both are carbonyl compounds.
43	Assertion: Ketones are less reactive than aldehydes towards nucleophilic addition reaction.

	Reason: Aldehydes have more electro positive character of its carbonyl group and less steric hindrance than ketones.
44	Assertion: Even though there are two NH_2 groups in semi carbazide, only one reacts with carbonyl compounds. Reason: Semi carbazide has two NH_2 groups out of which one is in resonance with the carbonyl group.
45	Assertion: Aldehydes react with Tollen's reagent to form silver mirror. Reason: Both, aldehydes and ketones contain a carbonyl group**.**
46	Assertion: Ethanal and Acetophenone both gives positive iodoform test. Reason: Only Ethanal have required $-COCH_3$ group A.
47	Assertion: Propanal is more reactive than CH_3CHO. Reason- Due to the presence of alkyl groups on both sides of the carbonyl carbon, propanone is sterically more hindered than CH_3CHO, making it less reactive to nucleophilic attack**.**
48	Assertion: HCHO is more reactive than CH_3COCH_3 towards reaction with HCN. Reason: HCHO is more polar and has less steric hindrance therefore more reactive with HCN than CH_3COCH_3.
49	Assertion: There is a $-NH_2$ groups in Benzamide even it is slightly acidic in nature Reason: Its due to steric hindrance and electronic effect .
50	Assertion: Carboxylic acids have greater boiling point than alcohols and amines having same no of carbon atoms Reason: Carboxylic acid have the greater ability to form dimers in solution due to H-bonding.

ANSWERS
MULTIPLE CHOICE QUESTIONS
1.(c) 2. (b) 3. (c) 4. (b) 5. (d) 6. (a) 7. (a) 8. (b) 9. (b) 10. (a) 11. (a) 12. (b) 13. (c) 14. (d) 15. (a) 16. (c) 17. (b) 18. (a) 19. (a) 20. (d) 21. (a) 22. (a) 23. (c) 24. (a) 25. (d) 26. (c) 27. (c) 28. (a) 29. (c) 30. (c) 31. (c) 32. (b) 33. (d) 34. (c) 35. (c) 36. (c) 37. (c) 38. (a) 39. (a) 40. (b)
ASSERTION- REASONS
41. (B) 42. (B) 43. (A) 44. (A) 45. (B) 46. (C) 47. (D) 48. (A) 49. (C) 50. (A)

CHAPTER 9- AMINES	
1	Amongst the following, the strongest base in aqueous medium is ..... (A) CH_3NH_2 (B) $NC\text{-}CH_2NH_2$ (C) $(CH_3)_2NH$ (D) $C_6H_5NHCH_3$
2	Methylamine on treatment with chloroform and ethanolic KOH gives foul smelling compound, the compound is (A) CH_3NCO (B) CH_3CNO (C) CH_3CN (D) CH_3NC
3	Benzylamine may be alkylated as shown in the following equation: $C_6H_5CH_2NH_2 + R\text{-}X \rightarrow C_6H_5CH_2NHR$ Which of the following alkylhalides is best suited for this reaction through S_N1 mechanishm ? (A) CH_3Br (B) C_6H_5Br (C) $C_6H_5CH_2Br$ (D) C_2H_5Br
4	The best reagent for converting 2-phenylpropanamide into 1- phenyl ethanamine is…….. (A) excess H_2 (B) Br_2 in aqueous NaOH (C) I_2 inpresence of red P (D) $LiAlH_4$ in ether
5	$C_6H_5NO_2 \xrightarrow{Sn/HCl} A \xrightarrow{NaNO2/HCl} B$; To obtain benzene from B, the suitable reagent is: (A) $SnCl_2 + HCl$ (B) H_3PO_2 (C) $C_2H_5N_2Cl$ (D) CH_3OH
6	Hoffmann Bromamide Degradation reaction is shown by (A) $ArNH_2$ (B) $ArCONH_2$ (C) $ArNO_2$ (D) $ArCH_2NH_2$
7	The correct IUPAC name of $CH_2{=}CH\text{-}CH_2NHCH_3$ is: (A) Allyl methyl amine (B) 2-amino-4-pentene (C) 4-aminopent-1-ene (D)N-methylprop-2-en-1-amine
8	The correct order of basic strength for the following compound is: (i) (ii) (iii) (A) ii<iii<i (B) iii<i<ii (C) iii<ii<i (D) ii<i<iii
9	Which of the following statements concerning methylamine is correct? (A) Methylamine is less basic than NH_3 (B) Methylamine is stronger base than NH_3 (C) Methylamine is slightly acidic (D) Methylamine forms salts with alkali
10	Hinsberg reagent is used to separate the mixture of different amines. Which of the following does not react with Hinsberg reagent? (A) $C_2H_5NH_2$ (B) $(CH_3)_2NH$ (C) $(CH_3)_3N$ (D) $CH_3CHNHCH_3$

11	What is the correct order of boiling points of the isomeric amines where P=ethylmethylamine, Q=propylamine and R=trimethylamine? (A) P > Q > R (B) R > Q > P (C) Q > R > P (D) Q > P > R
12	Considering the basic strength of amines in aqueous solution which one has the smallest pk_b value? (A) $(CH_3)_2NH$ (B) $C_6H_5NH_2$ (C) CH_3NH_2 (D) $(CH_3)_3N$
13	A compound Z with molecular formula C_3H_9N reacts with $C_6H_5SO_2Cl$ to give a solid, insoluble in alkali. Identify Z. (A) $(CH_3)_3N$ (B) $CH_3CH_2NHCH_3$ (C) $CH_3CH_2CH_2NH_2$ (D) CH_3NH_2
14	Reena filled aniline and ethylamine in two test-tubes and labeled them as "P" and "Q". After that she forgot the labeling of test-tubes. Which chemical test helps her to identify both the amines? (A) Carbylamine test (B) Hinsberg test (C) Azodye test (D) Fehling test
15	2-Methyl butanamide on reacting with Br_2 in alkaline medium gives an amine. Which of the following is a correct characteristic of that amine? (A) It is optically active (B) It is a secondary amine (C) It can form a stable diazonium salt (D) It has one carbon atom more than the amide
16	The strongest base among the following is? (a)  (b)  (c)  (d) 
17	Which of the following is TRUE about the solubility of Ethylamine and Aniline? (A) Aniline is soluble in HCl (B) Both are insoluble in HCl. (C)Both are soluble in water (D) Ethylamine is insoluble in water.
18	Amongst the given set of reactants, the most appropriate for preparing 2° amine is..... (A) 1° R-NH_2 + RCHO followed by H_2/Pt (B) 2° R-Br + NaCN followed by H_2/Pt (C) 2° R-Br + NH_3 (D) 1° R-Br (2 mol) + potassium phthalimide followed by H_3O^+/ heat
19	For a school project work Mrs. Roy asked her students to dye a white hanky. Sakshi and Seema took the help of their chemistry teacher for the project. Sakshi dyed her white hanky yellow in colour, and Seema dyed it orange. The yellow colour was formed by preparing a compound X and immediately adding aniline to it. The orange colour was formed by preparing compound X and immediately adding phenol to it. The students saw compound X was readily soluble in cold water. Compound "X" is ..... (A) Methyl amine (B) Aryldiazonium salt

	(C) ethyldiazonium salt (D) Ethyl amine
20	IUPAC name of product formed by reaction of methyl amine with two moles of ethyl chloride (A)N,N-Dimethylethanamine (B)N,N-Diethylmethanamine (C) N-Methyl ethanamine (D)N-Ethyl - N-methylethanamine
21	Benzoic acid is treated with $SOCl_2$ and the product (X) formed is heated with ammonia to give (Y). (Y) on reaction with Br_2 and KOH gives (Z). (Z) in the reaction is – (A) aniline (B) chlorobenzene (C) benzamide (D) benzoyl chloride
22	Nitration of aniline also gives m-nitro aniline, in strong acidic medium because (A)In electrophilic substitution reaction amino group is meta directive (B)In spite of substituents nitro group always goes to m- position (C)In strong acidic medium, nitration of aniline is a nucleophic substitution reaction (D)In strong acidic medium aniline present as anilinium ion
23	Arrange the following in increasing order of basic strength: Aniline, p-nitroaniline and p-toluidine (A) Aniline< p-nitroaniline < p-toluidine (B) Aniline< p-toluidine < p-nitroaniline (C) p-toluidine < p-nitroaniline <Aniline (D) p-nitroaniline < Aniline <p-toluidine
24	Benzene sulphonyl chloride is a chemical which can be used to identify the class of an Amine. When an amine 'A' reacts with benzene sulphonyl chloride it gives precipitate of sulphonamides which is soluble in alkali. The amine A is; (A) N-Ethylethanamine (B) N,N-Diethylethanamine (C) Ethanamine (D) N-Methylbenzenamine
25	Aniline on treatment with excess of bromine water gives (A)Aniline bromide (B)*o*-bromoaniline (C)*p*-bromoaniline (D)2, 4, 6-tribromoaniline
26	In the reaction sequence the product 'C' is:  (A) benzonitrile (B) benzylamine (C) benzoic acid (D) benzaldehyde
27	The most appropriate fact about the diazonium salt is: (A) The alkyldiazonium salts are very much stable (B) C_6H_5CN that can't be obtain by the Nucleophilic substitution of Cl in C_6H_5Cl but can be easily obtained from diazonium salt (C) Benzene diazonium chloride is a colourless crystalline liquid (D) Diazotization reaction requires a high temperature to get completed
28	One of the following amines will not undergo Hoffmann bromamide reaction- (A) $CH_3CONHCH_3$ (B) $CH_3CH_2CONH_2$ (C) CH_3CONH_2 (D) $C_6H_5CONH_2$
29	Two isomers, n- $C_4H_9NH_2$ and $(C_2H_5)_2NH$ have molar mass of 73 each. Which of the following is correct about their boiling points? (A) The boiling point of n- $C_4H_9NH_2$ is higher than that of $(C_2H_5)_2NH$. (B) The boiling point of $(C_2H_5)_2NH$ is higher than that of n- $C_4H_9NH_2$.

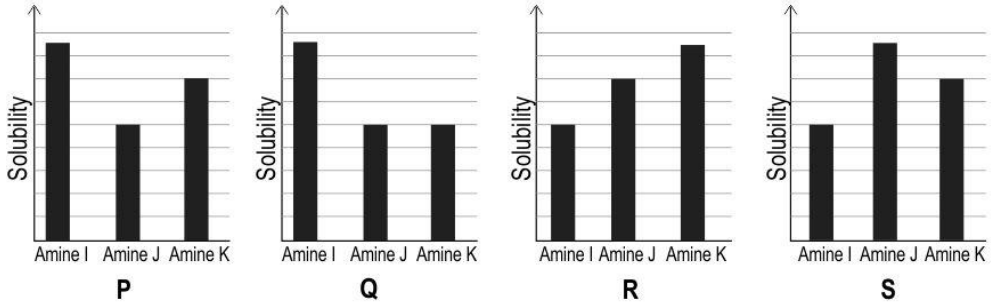
	(C) Both the amines will have the same boiling point. (D) The boiling point of both the amines will be lower than that of water
30	The correct statement regarding the basicity of arylamine is (A) arylamines are generally more basic than alkylamines because of aryl group (B) arylamines are generally more basic than alkylamines because the nitrogen atom in aryalamines is sp- hybridised (C) arylamines are generally less basic than alkylamines because the nitrogen lone- pair electrons are delocalised by intraction with the aromatic ring π-electron system (D) arylamines are generally more basic than alkylamines because the nitrogen loan-pair
In the following questions from 41-50 a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices. (A) Assertion and reason both are correct and reason is correct explanation of assertion. (B) Assertion and reason both are correct statements but reason is not correct explanation of assertion. (C) Assertion is correct statement but reason is wrong statement. (D) Assertion is wrong statement but reason is correct statement.	
31	Assertion (A): Aromatic 1° amine can be prepared by Gabriel pthalamide synthesis. Reason (R): Primary Alkylhalide undergoes nucleophilic substitution reaction with anion formed by pthalamide.
32	Assertion (A): Besides ortho and para nitroaniline, nitration of aniline in an acidic medium also gives the meta derivative. Reason (R): In acidic medium aniline gets protonated forming anilinium ion.
33	Assertion (A): Nitration of aniline can be conventionally done by protecting the amino group by acetylation. Reason (R): Acetylation increases the electron density in benzene ring.
34	Assertion(A) :Acetanilide is more basic than aniline. Reason(R): Acetylation of aniline results in decrease of electron density on nitrogen.
35	Assertion (A): Aniline is a stronger base than ammonia. Reason (R): The unshared electron pair on nitrogen atom in aniline becomes less available for protonation due to resonance.
36	Assertion (A): Propyl amine on reaction with nitrous acid forms aliphatic diazonium salts. Reason (R): Aliphatic diazonium salts are stable at 273-278 K.
Read the passage given below and answer the following questions: Aniline activates the benzene ring by increasing electron density at ortho- and para-positions. Hence, it is o-, p-directing. -NH2 group strongly activates the ring therefore it is difficult to stop the reaction at monosubstitution stage. Among electrophilic substitution reaction, direct nitration of aniline is not done to get o- and p-nitroaniline because lone pair of electrons present at nitrogen atom will accept proton from nitrating mixture to give anilinium ion which is meta-directing. Aniline with NaNO2 and HCl forms benzene diazonium chloride at very low temperature. Aromatic amines react with nitrous acid to form a yellow oily liquid known as N-nitrosoamines.	

In these questions (i-iv), a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.

37 (i)	Assertion: Nitrating mixture used for carrying out nitration of benzene consists of cone. conc. HNO_3+conc. H_2SO_4. Reason: In presence of H_2SO_4, HNO_3 acts as a base and produces NO_2^+ ions.
37 (ii)	Assertion: In strongly acidic solution, aniline becomes more reactive towards electrophilic reagents. Reason: The amino group being completely protonated in strongly acidic solution, the lone pair of electrons on the nitrogen is no longer available for resonance.

Read the passage given below and answer the following questions:

The graphs below show the solubility of a primary, a secondary and a tertiary aliphatic amine I, J, and K in water, at the same temperature. The number of carbon atoms in each of the compounds is three. Amine I is the tertiary amine, amine J is the primary amine, and amine K is the secondary amine.



38	Which of the graphs identifies the three amines correctly? (A) P (B) Q (C) R (D) S

Read the passage given below and answer the following questions:

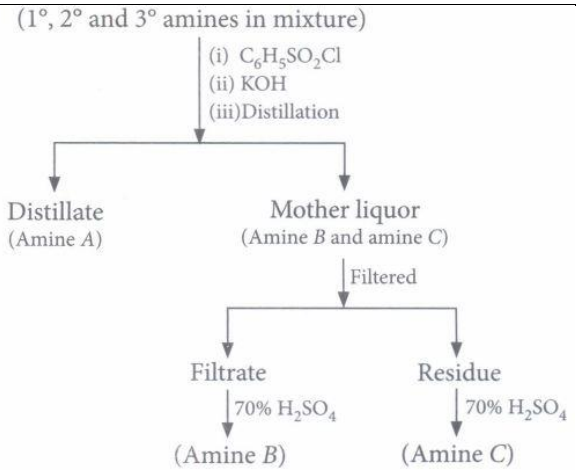
A mixture of two aromatic compounds (A) and (B) was separated by dissolving in chloroform followed by extraction with aqueous KOH solution. The organic layer containing compound (A), when heated with alcoholic solution of KOH produce C_7H_5N (C) associated with unpleasant odour.

The following questions are multiple choice questions. Choose the most appropriate answer:

39 (i)	The reaction of (A) with alcoholic solution of KOH to produce (C) of unpleasant odour is called (A) Sandmeyer reaction (B) Carbylamine reaction (C) Ullmann reaction (D) Reimer-Tiemann reaction
39 (i)	The alkaline aqueous layer (B) when heated with chloroform and then acidified give a mixture of isomeric compounds of molecular formula $C_7H_6O_2$. (B) is (A) C_6H_5CHO (B) C_6H_5COOH (C) $C_6H_5CH_3$ (D) C_6H_5OH

Read the passage given below and answer the following questions:

When the mixture contains the three amine salts (1°, 2° and 3°) along with quaternary salt, it is distilled with KOH solution. The three amines distill, leaving the quaternary salt unchanged in the solution. Then the mixture of amines is separated by fractional distillation, Hinsbergs method and Hoffmann's method.



The following questions are multiple choice questions. Choose the most appropriate answer:

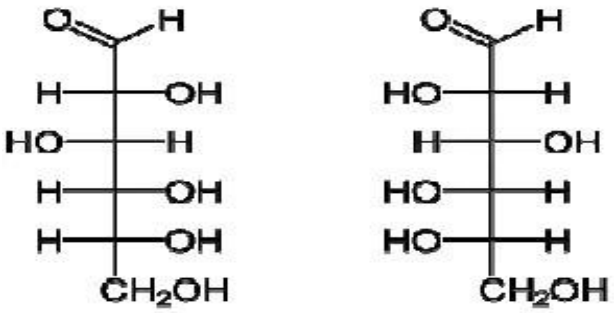
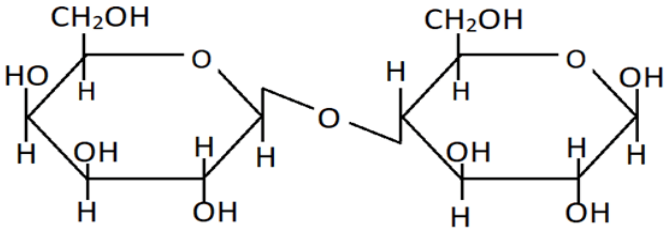
40 (i)	Primary amine with Hinsberg's reagent forms (A) N-alkyl benzene sulphonamide soluble in KOH solution (B) N-alkyl benzene sulphonamide insoluble in KOH solution (C) N, N-dialkyl benzene sulphonamide soluble in KOH solution (D) N, N-dialkyl benzene sulphonamide insoluble in KOH solution.
40 (ii)	3° amines with Hinsberg's reagent give (A) product which is same as that of 1° amine (B) product which is same as that of 2° amine (C) no reaction (D) products which is a quaternary salt.

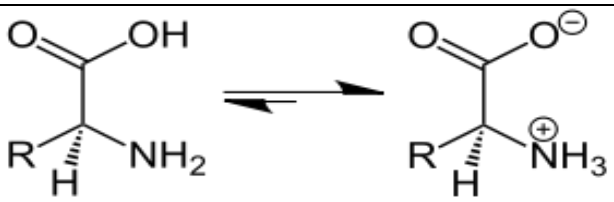
ANSWERS:

1(C)	2(D)	3(C)	4(B)	5(B)	6(B)	7(D)	8(D)	9(B)	10(C)
11(D)	12(A)	13(B)	14(C)	15(A)	16(C)	17(A)	18(C)	19(B)	20(D)
21(A)	22(D)	23(D)	24(C)	25(D)	26(B)	27(B)	28(A)	29(A)	30(C)
31(D)	32(A)	33(C)	34(D)	35(D)	36(C)	37(i)(A)	37(ii)(D)	38(D)	39(D)
40(i)(A)	40(ii)(C)								

CHAPTER 10 : BIOMOLECULES	
1	Starch is composed of two polysaccharides which are (A) amylopectin and glycogen (B) amylose and glycogen (C) amylose and amylopectin (D) cellulose and glycogen
2	Which reagent is used to convert glucose into saccharic acid? (A) Br_2/H_2O (B) Nitric acid (C) Alkaline solution of iodine (D) Ammonium hydroxide
3	What type of proteins have a fiber-like structure and are generally insoluble in water? (A) Globular proteins (B) Primary proteins (C) Secondary proteins (D) Fibrous proteins
4	Which of the following is a sweetest sugar? (A) Glucose (B) Fructose (C) Maltose (D) Sucrose
5	The letter 'D' in carbohydrates signifies (A) dextrorotatory (B) configuration (C) optical rotation (D) mode of synthesis
6	A diabetic person carries a packet of glucose with him always, because (A) glucose increases the blood sugar level slowly (B) glucose reduces the blood sugar level (C) glucose increases the blood sugar level almost instantaneously (D) glucose reduces the blood sugar level slowly
7	The (+) or (-) signs in carbohydrates signifies (A) optical rotation (B) configuration (C) diamagnetic nature (D) mode of synthesis
8	Which of the following polymer is stored in the liver of animals? (A)Amylose (B) Cellulose (C) Amylopectin (D) Glycogen
9	A proteinaceous product is _____ (A) Terylene (B) Cellulose (C) Polythene (D) Silk and wool
10	The protein responsible for blood clotting is (A) Albumins (B)Fibrinogen (C) Fibroin (D Globulins
11	Invert sugar is (A) a type of cane sugar (B) optically inactive form of sugar

	(C) mixture of glucose and galactose (D) mixture of glucose and fructose in equimolar quantities
12	Which Vitamin is water soluble? (A) Vitamin B1 (B) Vitamin B2 (C) Vitamin B 12 (D) Vitamin B 6
13	Which of the following is/are example(s) of denaturation of protein? (A) Coagulation of egg white (B) Curding of milk (C) Clotting of blood (D) Both (A) and (B)
14	What type of amino acids are obtained on hydrolysis of proteins? (A) Alpha (α)-amino acids (B) Beta (β)-amino acids (C) Gamma (γ)-amino acids (D) Delta (δ)-amino acids
15	The number of chiral carbons in ß-D (+) glucose is: (A) five (B) six (C) three (D) four
16	Which of the following does not have glycosidic linkage? (A) Sucrose (B) Amylose (C) Galactose (D) Maltose
17	Which of the following is/are a suitable method to prevent scurvy? (i) Intake of citrus fruits (ii) Exposure to sunlight (iii) Intake of green leafy vegetables (A) only (i) (B) only (ii) (C) both (i) and (ii) (D) both (i) and (iii)
18	Nucleotide is _____ (A) a pentose sugar, phosphoric acid and nitrogen containing heterocyclic compounds (B) a pentose sugar and phosphoric acid (C) phosphoric acid and nitrogen containing heterocyclic compounds (D) none of these
19	At iso- electric point an amino acid does not migrate in an electrical field. The isoelectric point is (A)Concentration (B) strength of electric current (C) pH (D) None of these
20	Which of the following contains a transition metal? (i) Chlorophyll (ii) Haemoglobin (iii) Vitamin B_{12} (iv) DNA (A) i & ii only (B) ii & iii only (C) ii, iii & iv (D) all four
21	Which of the following is not true for nucleic acids? (A) DNA is the chemical basis of heredity and may be regarded as the reserve of genetic information. (B) RNA is a protein molecule.

	(C) DNA finger printing is used in forensic laboratories for identification of criminals. (D) DNA molecule is capable of self-duplication during cell division.
22	Amino acids show amphoteric behavior. Why? (A) They have an amino group (B) They have a carboxylic group (C) Both (A) and (B) (D) none of the above
23	What type of bonding helps in stabilizing the α-helix structure of proteins? (A) Peptide linkage (B) Hydrogen bonding (C) Amino linkage (D) Van der waals force
24	What is the relation between the two molecules given below?  (A)Anomers (B) Functional isomers (C) Epimers (D) Structural isomers
25	The linkage by which nucleotides are joined together between 5′ and 3′ atoms of pentose sugar? (A) Phosphodiester linkage (B) Peptide bond (C)Glycosidic linkage (D)Hydrogen bonding
26	Identify the disaccharide  (A)Lactose (B) Maltose (C) Sucrose (D) Trehalose
27	Enzymes are regarded as _____ (A) biocatalysts (B) messengers (C) inhibitors (D) antibodies
28	Which of the following amino acids is optically inactive? (A) Valine (B) Alanine (C) Lysine (D) Glycine

29	 Identify (i) (ii) (A)Carboxylic acid and its salt (B)Amine and its salt (C)Amino acid and zwitter ion (D) None of these
30	Fibroin is one of the proteins in silk. Part of the structure of fibroin is shown How many different amino acids have combined to form this part of the structure? 2 (B) 3 (C) 4 D) 6 (A) ASSERTION REASON TYPE QUESTIONS Answer the following questions selecting the appropriate option given below. (a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion. (b) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion. (c) Assertion is correct, but reason is wrong statement. (d) Assertion is wrong, but reason is correct statement
31	**Assertion**: Amino acids in a protein remain intact even when it is denatured. **Reason**: The primary structure of protein is broken to give individual amino acids on denaturation.
32	**Assertion**: The rate of an enzyme catalysed reaction is maximum at a particular pH called optimum pH, which is between pH values 5-7. **Reason**: Enzymes provide an alternate pathway by reducing the activation energy.
33	**Assertion**: Less intake of iodine in diet leads to enlargement of thyroid gland **Reason**: iodine deficiency leads to hyperthyroidism.
34	**Assertion**. Despite having aldehyde group, glucose does not show schiff's test. **Reason**: The aldehyde group in glucose is used to from the ring structure of glucose.
35	**Assertion**: Alpha and beta glucose are functional isomers with molecular formula $C_6H_{12}O_6$

	Reason: The chemical difference between alpha and beta glucose is the orientation of the -OH (hydroxyl) and -H (hydrogen) groups on carbon
36	**Assertion**: Proteins are found to have two different types of secondary structure viz. alpha helix and beta pleated structure. **Reason**: The secondary structure is stabilized by hydrogen bonding Cytosine and guanine have a triple hydrogen bond while adenine and thymine

ANSWER KEY

1	2	3	4	5	6	7	8	9	10
C	B	D	B	B	C	A	D	D	B
11	12	13	14	15	16	17	18	19	20
A	C	D	A	A	C	D	A	C	B
21	22	23	24	25	26	27	28	29	30
B	C	B	C	A	A	A	D	C	D
31	32	33	34	35	36				
C	B	C	A	D	B				

******ALL THE BEST******