केन्द्रीय विद्यालय संगठन/KENDRIYA VIDYALAYA SANGATHAN

हैदराबाद संभाग /HYDERABAD REGION

QUESTION BANK OF MULTIPLE-CHOICE QUESTIONS 2021-22

CLASS -XII SUBJECT - CHEMISTRY

CHIEF PATRON

SRI K. SASEENDRAN, DEPUTY COMMISSIONER

PATRON

DR (SMT) V. GOWRI, ASSISTANT COMMISSIONER

COORDINATORS

1. SMT KRISHNA KARMAKAR-KV MALKAPURAM
2. Y.SURENDER VICE PRINCIPAL-KV PICKET

PREPARED & VETTED BY SUBJECT TEACHERS

1. MR. P HEMACHANDER,PICKET- ALCOHOLS PHENOLS AND ETHERS HALOALKANES AND HALOARENES
2. MRS.B.KOTESWARI- P BLOCK,BIOMOLECULES
3. MRS.V.ROOPA,HAKIMPET -SOLID STATE
4. MR SREEDHAR- PGT CHEMISTRY-N0-2 NAUSENABAGH (SOLUTIONS)
5. MR MADHUSUDHAN RAO -PGT CHEMISTRY, KV GOLCONDA -2(SOLUTIONS)
6. MR HARIKITHAN.P -PGT CHEMISTRY- KV BOLARAM (SOLIDSTATE)
7. MR SHOBHAN BABU- PGT CHEMISTRY-(SOLID STATE)
8. MR ANJANEYULU- PGT CHEMISTRY-(HALOALKANES AND HALOARENES)
9. MR DLN MURTHY -PGT CHEMISTRY-(P-BLOCK ELEMENTS)
10. MR VICTOR EMMANEUL- PGT CHEMISTRY-(BIOMOLECULES)
11. MRS LAXMI PAPPAI -PGT CHEMISTRY, KV NSB-1(P- BLOCK ELEMENTS)
12. MR NAVEEN-PGT CHEMISTRY-(HALOALKANES AND HALOARENES)

13. MR VENKATESH –PGT-CHEMISTRY, KV STEEL PLANT (ALCOHOLS, PHENOLS,AND ETHERS)

KENDRIYA VIDYALAYA SANGATHAN HYDERABAD REGION

Questions based on assessment introduced by the CBSE.

CLASS: XII **SUBJECT: CHEMISTRY**

LESSON:1. SOLID STATE(1)

1.	**Case based Questions:** **Passage I** **Read the passage given below and answer the questions that follow:** At absolute zero crystals tend to have perfectly ordered arrangement. As the temperature increases crystals start to deviating perfectly ordered arrangement. Point defects are the deviations from the ideal arrangement. Point defects may be classified into three types. i) stoichiometric defects ii) impurity defects and iii) non stoichiometric defects. 1) Cations are present in the interstitial sites in i) schottky defect ii) Frenkel defect iii) Metal deficiency defect iv) Vacancy defect	**Answers** ii)
2.	2) schottky defect is observed in crystals when i) some cations move from their lattice site to interstitial sites ii) equal number of cations and anions are missing from the lattice iii) some lattice sites are occupied by electrons iv) some impurity is present in the lattice	ii)
3.	3) Which of the point defects are shown by AgBr crystals? a) schottky defect b) Frenkel defect c) Metal deficiency defect d) Metal excess defect i) a) and b) ii) c) and d) iii) a) and c) iv) b) and d)	i)
4.	4) Alkali metal halide on heating with same alkali metal vapors imparts particular color to the crystal. What kind of defect is it? i) Due to impurity defect ii) Metal excess defect due to interstitial cation iii) Metal deficiency defect iv) Metal excess defect due to anionic vacancies	iv)

1.	**Passage II** **Read the passage given below and answer the questions that follow:** In solids, the constituent particles are close packed, leaving the minimum vacant space, considering the constituent particles as identical hard spheres and build up the three dimensional structure in three steps. a) close packing one-dimension b) close packing in two-dimension c) close packing in three dimension. Two types of voids namely tetrahedral voids and octahedral voids involved in close packed structures. 1) What is the coordination number in a square close packed structure in two dimensions? i) 3 ii) 4 iii) 6 iv) 2	ii)
2.	2) The correct order of packing efficiency in different types of unit cells is i) bcc < fcc > simple cubic ii) fcc < bcc <simple cubic iii) fcc > bcc > simple cubic iv) fcc < bcc > simple cubic	iii)
3.	3) The total number of tetrahedral voids in the face centered unit cell is i) 12 ii) 6 iii) 8 iv) 10	iii)
4.	4) The percentage of empty space in a face centered cubic arrangement is i) 74 ii) 68 iii) 32 iv) 26	iv)

1.	**Passage III** **Read the passage given below and answer the questions that follow:** Crystalline solids can be classified in different types on the basis of nature of intermolecular forces or bonds that hold the constituent particles together. These are Vander Waals forces, ionic bonds, covalent bonds and metallic bonds. on this basis Crystalline solids further classified in to molecular, ionic, metallic and covalent solids. Crystalline solids are anisotropic in nature whereas amorphous solids are isotropic in nature. 1) Which of the following is not a characteristic of a Crystalline solids? i) A regular periodically repeated pattern of arrangement of constituent in the crystal lattice ii) Definite and characteristic heat of fusion iii) properties of crystalline solids like electrical resistance or refractive index show different values when measured along different directions iv) properties of crystalline solids like electrical conductivity or refractive index show same values when measured in all directions	iv)
2.	2) CCl4 molecules are held in the crystal lattice by i) dipole- dipole interactions ii) dispersion forces iii) columbic forces iv) dipole –induced dipole interactions	ii)
3.	3) Which of the following is a network solid? i) H2 O (ice) ii) SO2 (solid) iii) diamond iv) I2	iii)
4.	4) The lattice site in a pure crystal cannot be occupied by i) ion ii) electron iii) molecule iv) atom	iv)

1.	**Assertion and Reason Questions:** **In the following questions a statement of Assertion (A) followed by a statement of Reason (R) is given. Choose the correct answer out of the following choices.** Assertion and Reason both are correct statements and Reason is correct explanation for Assertion. Assertion and Reason both are correct statements but Reason is not correct explanation for Assertion. Assertion is correct statement but Reason is wrong statement. Assertion is wrong statement but Reason is correct statement. 1) Assertion (A): Tetrahedral void is bigger than octahedral void. Reason (R): Octahedral void refers to six touching spheres, whereas tetrahedral void refers to four touching spheres.	a)
2.	2) Assertion (A): Packing efficiency is maximum in face centered cubic structure. Reason (R): In fcc structure, each sphere is in contact with twelve spheres.	a)
3.	3) Assertion (A): The total number of atoms present in a simple cubic unit cell is one. Reason (R): Simple cubic unit cell has atoms at its corners, each of which is shared between eight adjacent unit cells.	a)
4.	4) Assertion (A): Graphite is a good conductor of electricity, however diamond belongs to the category of insulators Reason (R): Graphite is soft nature on the other hand diamond is very hard.	b)
5.	5) Assertion (A): Crystalline solids exhibit isotropy. Reason (R): The constituent particles in a crystalline solid are arranged in an orderly arrangement	d)
6.	6) Assertion (A:) The density of a crystalline substance remains the same. Reason (R): Due to schottky defect.	c)
7.	7) Assertion (A): AgCl shows Frenkel defect. Reason (R): The substance in which there is a large difference in the size of ions.	a)
8.	8) Assertion (A): Due to frenkel defect there is no effect on the density of the crystalline solid Reason (R:) In frenkel defect no cation and anion leaves the crystal lattice	a)

9.	9. Assertion**:** Metal deficiency defect can be seen in FeO.	c)

	Reason**:** Li compound (LiCl) has pink colour due to F- centre. Ans: (b)	
10.	10. Assertion: The number of tetrahedral voids is double the number of octahedral voids. Reason: The size of tetrahedral voids is half that of the octahedral void. Ans: (c)	c)

1.	**LESSON:1. SOLID STATE(2)** **SAMPLE QUESTIONS ON ASSERTION AND REASON TYPE:** **Note: In the following questions of Solid State 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 true and the reason is the correct explanation of assertion. (b) Both assertion and reason are true but the reason is not the correct explanation of assertion. (c) Assertion is true but reason is false. (d) Assertion is false but reason is true. 1.Assertion : The total number of atoms present in a face centered cubic unit cell is four. Reason : Face centered cubic unit cell has atoms at its corners, each of which is shared between eight adjacent unit cells and atom at the center of the six faces. Ans: (a)	a)
2.	2.Assertion : Total number of octahedral voids present in unit cell of cubic close packing including the one that is present at the body center is four. Reason : Besides the body center there is one octahedral void present at the center of each of the six faces of the unit cell and each of which is shared between two adjacent unit cells. Ans: (c)	c)
3.	3. Assertion: Group-13 doped crystals of silicon are responsible for the semi-conducting properties. Reason: Holes (positive in charge) are responsible for the semi-conducting properties. Ans: (a)	a)
4.	4. Assertion : Due to the Frenkel defect the density of the crystalline solid remains same. Reason: In Frenkel defect, no cations or anions leave the lattice Ans: (a)	a)
5.	5. Assertion: In an ionic solid [MX] with Schottky defects, the number of missing positive and negative ions is the same. Reason: Equal number of cation and anion vacancies are present. Ans: (a)	a)

6.	6. Assertion: The Frenkel defect is not shown by alkali metal halides. Reason: The size of the cation is too big to be accommodated in the interstitial space. Ans: (a)	a)
7.	7. Assertion: The radius of copper atom is 128pm. it crystallizes in a face centered cubic structure. Reason: The length of the edge of the unit cell is 256pm. Ans: (c)	c)
8.	8. Assertion: $CaCO_3$ shows polymorphism. Reason: $CaCO_3$ exists in two forms called aragonite and calcite. Ans: (a)	a)
9.	9. Assertion: Metal deficiency defect can be seen in FeO. Reason: Li compound (LiCl) has pink colour due to F-centre. Ans: (b)	b)
10.	10. Assertion: The number of tetrahedral voids is double the number of octahedral voids. Reason: The size of tetrahedral voids is half that of the octahedral void. Ans: (c)	c)
1.	**Case Based Questions:** Packing refers to the arrangement of constituent units in such a way that the force of attraction among the constituent particles is maximum and the constituents occupy the maximum available space. In two-dimensions there are square close packing and hexagonal close packing. In three-dimensions, however, there are hexagonal close packing, cubic close packing and body-centered cubic packing. hcp: AB AB AB AB… arrangement co-ordination number is =12 percentage occupied space is= 74 ccp: ABC ABC …..arrangement co-ordination number is =12 percentage occupied is= 74 bcc: 68% space is occupied co-ordination number is 8 Answer the following questions:	c)

	1.The empty space left in hcp in three-dimensions is (a) 52.4% (b) 80% (c) 26% (d) 74% Ans: (c)	
2.	2. In closed packed lattice containing n particles, the number of tetrahedral and octahedral voids are (a). 2n, n (b). n, n (c). n,2n (d). 2n ,n/2 Ans: (a)	a)
3.	3. The pattern of successive layers of hcp arrangement can be designed as (a). AB AB AB AB… (b). ABC ABC… (c). AB ABC AB ABC … (d). AB BA AB BA … Ans: (a)	a)
4.	4. The space occupied by spheres in bcc arrangement is (a) 70% (b) 68% (c) 74% (d) 26% Ans: (b)	b)
5.	5. A certain oxide of metal M crystallizes in such a way that O2- occupy hcp arrangement following AB AB ….. . pattern the metal ions however, occupy 2/3rd of the octahedral voids. The formula of the compound is (a). MO2 (b). M3O (c). M2O3 (d). M8/3 O3 Ans: (c)	c)
6.	6. Which type of stacking pattern is found in sodium chloride crystal lattice (a). A-B-A-B (b). A-A-A (c). ABC-ABC-ABC (d). None of these Ans: ©	c)

7.	7.Ionic solids are composed of anions and cations that are held together by electrostatic forces. For example, common salt, NaCl, contains Na+ and Cl- ions. Ionic solids have high melting points, they are hard and brittle and conduct electricity when molten or in solution. Covalent solids are made up of atoms of the same or different elements held together by a network of covalent bonds. Diamond is the moist example of a covalent solid. Silicon and silicon dioxide are also covalent solids. These solids are very hard, strong and have high melting points due the presence of strong covalent bonds. The oxide of silicon, SiO_2 exists in several forms with crystal structures. Such different forms of the compound are called polymorphs and the phenomenon, polymorphism. 7. During the formation of a solid, (a) Some energy is lost (b) some energy is gained (c) Energy remains constant (d) some energy may be gained or lost depending on the system Ans: (a)	a)
8.	8. Molecular solids have (a) Very low melting points (b) Very high melting points (c) fairly low melting points (d) None of these Ans: (c)	c)
9.	9. Among the following, the strongest bond is the (a) hydrogen bond (b) metallic bond (c) covalent bond (d) Ionic bond Ans: (d)	d)
10	10. Metallic solids are generally (a) soft and plastically deformable (b) Malleable and ductile (c) hard brittle (d) none of these Ans: (b)	b)

Q.no	Topic: solid state(3) Questions: Multiple choice questions:	Answers:
1.	1) The edge length of the unit cell in terms of the radius of spheres constituting body centred cubic unit cell a) a= 4r/ √3 b) a= 2r c) a=4r d) a= 2 √2r	a)
2.	2) Graphite cannot be classified as a) Network solid b) conducting solid c) ionic solid d) covalent solid	c)
3.	3) Which of the following statements is not true about amorphous solids? a) They are anisotropic in nature b) On heating they may become crystalline on certain temperature c) They may become crystalline on keeping for long time d) Amorphous solids can be moulded by heating	a)
4.	4) Schottky defect is generally appears in a) KCl b) Cscl c) NaCl d) all of these	d)
5.	5) Which statement does not make sense ? a) Frenkel defect is not found in alkali metal halides b) Schottky defect lowers the density of the crystal c) Frenkel defect lowers the density of the crystal d) Schottky defect is very common in alkali metal halides	c)
6.	6) Doping of AgCl crystals with $CdCl_2$ results in a) Formation of F^- centres b) substitutional cation vacancy c) schottky defect d) frenkel defect	b)
7.	7) Cations are present in the interstitial sites in a) Metal deficiency defect b) vacancy defect c) frenkel defect d) schottky defect	c)

8.	8) Which of the following also known as dislocation defect ? a) Metal excess defect b) frenkel defect c) non stoichiometric defect d) schottky defect	a)
9.	9) Which of the following crystals does not exhibit frenkel defect ? a) a) ZnS b) Agcl c) KBr d) AgBr	c)
10.	10) The crystal with metal deficiency defect is a) FeO b) NaCl c) NaI d) ZnO	a)
11.	11) What type of solid ‘quartz’ is ? a) Molecular solid b) Covalent solid c) Ionic solid d) Metallic solid	b)
12.	12) Which type of solid conduct electricity in molten state but not in solid state ?. a) Covalent b) metallic c) ionic d) molecular	c)
13.	13) Which of the following is an amorphous solid ? a) Graphite (C) b) Quartz glass (SiO_2) c) Chrome alum d) Silicon carbide (SiC)	b)
14.	14) Which of the following is true about the value of refractive index of quartz glass? a) Same in all directions b) Different in different directions c) Cannot be measured d) Always zero	a)
15.	15) What is the coordination number in a hexagonal close packed structure in three dimensions? a) 9 b) 6 c)12	c)

	d) 4	
16.	16) What type of defect is produced when NaCl is doped with $SrCl_2$? a) Dislocation defect b) impurity defect c) metal excess defect d) schottky defect	b)
17.	17) The Appearance of colour in solid alkali metal halides is generally due to a) vacancy defect b) F^-centres c) interstitials d) metal deficiency defect	b)
18.	18) In FCC crystal lattice , Number of atoms per unit cell : a) 2 b) 1 c) 4 d) none of the above	c)
19.	19) A compound is formed by two elements M and N . The element N forms hcp and atoms of M occupy 2/3 rd of octahedral voids . What is the formula of the compound ? a) M_2N_3 b) MN c) M_3N_2 d) MN_3	c)
20.	20) Which of the following arrangements correctly represents ccp and hcp in three dimensions respectively ? a) ABCABC.... and ABAB... b) ABAB... and ABCABC... c) Both have ABAB .... arrangement d) ABCABC.... arrangement	a)

1.	**LESSON 2: SOLUTIONS(1)** **CASE-STUDY PASSAGE BASED MULTIPLE CHOICE.** 1.Scuba divers must cope with high concentrations of dissolved gases while breathing air at high pressure underwater. Increased pressure increases the solubility of atmospheric gases in blood. When the divers come towards surface, the pressure gradually decreases. This releases the dissolved gases and leads to the formation of bubbles of nitrogen in the blood. This blocks capillaries and creates a medical condition known as bends, which are painful and dangerous to life. To avoid bends, as well as the toxic effects of high concentrations of nitrogen in the blood, the tanks used by scuba divers are filled with air diluted with helium, nitrogen, and oxygen. 1.Scuba divers carry the cylinder consisting the mixture of gases diluted in air A) O_2, He, CO_2 B) O_2, He, N_2 C) O_2, He, Ne D) O_2, Ar, N_2	B)
2.	2.The people living longer at high altitudes suitably suffer from the disease known as A) High blood pressure B) Breathlessness c) suffocation D) Anoxia	D)
3.	3.Soft drinks are prepared by dissolution of CO_2, by applying more pressure, this can be understood by A) Daltons law B) Charles law C) Henrys law D) Avogadro law	C)
4.	4.What is the effect of temperature on solubility of gases in liquids. A) No effect B) Increase in temperature decreases solubility C)Increase in temperature increases solubility D) It cannot be correlated.	B)
5.	5)If scuba divers do not carry the proper diving device along with appropriate cylinder containing suitable mixture of required gases, meant for breathing support, when they come to surface they experience A) Blood clots B) Scratches on the skin C) Burst capillaries	D)

	D) causes bends	
6.	2. Our Human body has portions of organs at different osmotic pressure and an active pumping mechanism is required to offset osmosis. The cells of the transparent tissues of exterior eye, the cornea, have a more concentrated optical fluid than does the aqueous humor, a solution just behind the cornea. To prevent the cornea from taking up additional water from the aqueous humor, cells that pump water are located in the corneal tissues adjacent to aqueous humour. Answer the following questions, in few words? 6)What is the direction of osmosis between corneal tissues and aqueous humor? Ans : Osmosis takes place from hypotonic to hypertonic solution .Thus ,in our eyes, osmosis takes place from aqueous humor to cornea	Ans : Osmosis takes place from hypotonic to hypertonic solution .Thus ,in our eyes, osmosis takes place from aqueous humor to cornea
7.	7) Corneas that are used for transplants must be removed from the globe of eye, soon after donor's death. Explain Why? Ans: Corneas that are to be stored and used for transplants must be removed from the globe of eye soon after the donor's death. This prevents the clouding that occurs when pumping mechanism fails after death.	Ans: Corneas that are to be stored and used for transplants must be removed from the globe of eye soon after the donor's death. This prevents the clouding that occurs when pumping mechanism fails after death.
8.	3.PASSAGE: In winter season, aqueous solution of NaCl is sprinkled along road side of hill stations, to clear the roads after heavy snow fall. On the other hand, freezing mixture of salt and ice is used in the manufacture of ice cream. Answer following questions with few words. 8)What is the principle behind the clearance of road after snow fall? Ans: When solution of NaCl is sprinkled over snow, the freezing point	Ans: When solution of NaCl is sprinkled over snow, the freezing point is lowered and

	is lowered and snow melts. Thus, roads are cleared for traffic.	snow melts. Thus, roads are cleared for traffic.
9.	9). Why the liquid material of ice cream freezes soon when the cane containing material is dipped in freezing mixture. Ans: In the freezing mixture (combination of salt and ice) the freezing point is lowered to -200 C hence the liquid material of ice cream freezes.	Ans: In the freezing mixture (combination of salt and ice) the freezing point is lowered to -200 C hence the liquid material of ice cream freezes.
10.	10) What is the value behind this kind of Act? Ans: One should keep the surrounding clean.	Ans: One should keep the surrounding clean
11.	4.Passage: one day a dental check-up was conducted for particular class in a school .it was found that some students had cavities in their teeth. The teacher asked them how many chocolates or sweets do they eat? Which tooth paste do they use for brushing their teeth, does it contain fluoride or not. Answer the following with few words 11). What values are expressed by teacher? Ans: one should not eat too many chocolates or sweets as they damage our teeth.	Ans: one should not eat too many chocolates or sweets as they damage our teeth.
12.	12)What is the limiting value of fluoride that should be present in the tooth paste? What happens if this limit is exceeded? Ans: The fluoride present in the paste would be up to 1ppm. If it exceeds up to 1.5 ppm, the teeth become mottled. If it exceeds above 1.5 ppm it becomes a poison. Mainly rats poison is NaF, that contains more amount of fluoride.	Ans: The fluoride present in the paste would be up to 1ppm. If it exceeds up to 1.5 ppm,

		the teeth become mottled. If it exceeds above 1.5 ppm it becomes a poison. Mainly rats poison is NaF, that contains more amount of fluoride.
13.	**MULTIPLE CHOICE QUESTIONS** 13.What is the normality of 1M H3PO4 solution? A) 0.5 N B)1.0 N C)2.0 N D)3.0 N	D)
14.	14). An azeotropic mixture of two liquids boils at a temperature lower than either of them when A) it is saturated B) it does not deviate from Raoults law C) it shows positive deviation from Raoults law D) it D)shows negative deviation from Raoults law.	C)
15	15.The hard cell of an egg was dissolved in HCl. The egg was then placed in a concentrated solution of Nacl. What will happen? A) The egg will shrink B) The egg will swell C)The egg will become harder D) There will be hardly any change	A)
16.	16. A substance will be deliquescent, if its vapour pressure is A) equal to the atmospheric pressure B) equal to that of water vapour in air C)lesser than that of water vapour in air D)greater than that of water vapour in air.	C)
17.	17.solutions A, B, C, D are 0.1M glucose,0.05M NaCl,0.05M BaCl2 and 0.1M AlCl3 respectively. Which of the following pairs is isotonic? A) B and C B) A and B C) A and D D) A and C	B)

18.	18.Camphor is often used in molecular mass determination because A) it is readily available B) it has very high cryoscopic constant C)It is volatile D) It is solvent for organic substances	B)
19.	19.If an Aqueous solution of glucose is allowed to freeze, then crystals of which will be separated out first? A) Glucose B) Water C) both of these D) None of these	B)
20.	20.The depression in freezing point for 1M urea, IM glucose, and 1M NaCl are in the ratio A) 1:2:3 B) 3:2:2 C) 1:1:2 D) None of these	C)

21.	21.. A substance will be deliquescent ,if its vapour pressure is A)equal to the atmospheric pressure B)equal to that of water vapour in air C)lesser than that of water vapour in air D)greater than that of water vapour in air.	C)

22.	**REASONING-ASSERTION TYPE QUESTIONS.** A) Assertion and reason both are correct statements and reason is correct explanation for assertion. B) Assertion and reason both are correct statements but reason is not correct explanation for assertion. C)Assertion is correct statement but reason is wrong statement. D)Assertion is wrong statement but reason is correct statement. 22.Assertion: Molarity of a solution in liquid state changes with temperature. Reason: The volume of a solution changes with change in temperature	A)
23.	23. Assertion: 0.1 M HCl solution has higher osmotic pressure than 0.1 M NaCl solution. Reason: Cl- ions being common, the small size H+ ions have greater ionic mobility than large size Na+ ions.	D)

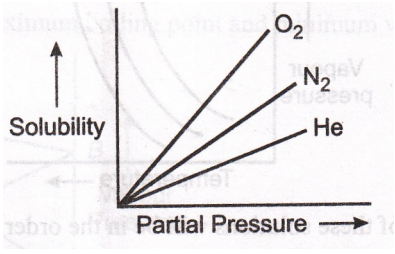
24.	24.Assertion: If on mixing the two liquids, the solution becomes hot, it implies that it shows negative deviation from Raoults law. Reason: Solution which show negative deviation are accompanied by decrease in volume.	B)
25.	25.Assertion: Vapor pressure of water is less than 1.013 bar at 373 K Reason: Water boils at 373 K as the vapour pressure at this temperature becomes equal to atmospheric pressure.	D)
26.	26.Assertion: Any concentration of NaCl solution can be injected intravenously as NaCl being a common table salt, is a harmless chemical. Reason: 0.9% (mass/volume) NaCl solution is isotonic with the fluid inside the body cells.	D)
27.	27.Assertion: Vant Hoff factor for benzoic acid in benzene is less than one. Reason: Benzoic acid behaves as a weak electrolyte in benzene.	C)
28.	28.Assertion: One molar aqueous solution has always a higher concentration than one molal solution. Reason: The molality of a solution depends on the density of solution whereas molarity does not.	C)
29.	29. Assertion: Out of various colligative properties, osmotic pressure is used for determination of molecular masses of polymers. Reason: Polymer solutions do not possess a constant boiling point or freezing point.	A)
30.	30.Assertion: The Vapour pressure of 0.1M sugar solution is less than that of 0.1 M KCl solution. Reason: Lowering of vapour pressure is directly proportional to the number of solute particles present in the solution.	A)
31.	31.Assertion: Ethylene glycol is used as antifreeze in the radiator of a car. Reason: Ethylene glycol is insoluble in water due to lack of its ability to form hydrogen bond with water molecules.	C)

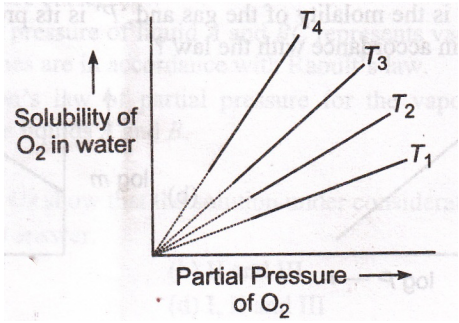
1.	**CLASS XII** **TOPIC: SOLUTIONS(2)** **Read the assertion and reason carefully to mark the correct option out of the options given below:** (a)If both assertion and reason are true and the reason is the correct explanation of the assertion. (b)If both assertion and reason are true but reason is not the correct explanation of the assertion. (c)If assertion is true but reason is false. (d)If assertion is false but reason is true. 1.Assertion : One molal aqueous solution of urea contains of urea in water. Reason:Solution containing one mole of solute in solvent is called as one molal solution.	A)
2.	2.Assertion: 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 : The composition of the vapour phase is same as that of the liquid phase of an azeotropic mixutre.	B)
3.	3.Assertion: Molecular mass of polymers cannot be calculated using boiling point or freezing point method. Reason : Amorphous polymers solutions do not possess a constant boiling point or freezing point.	B)
4.	4.Assertion: Reverse osmosis is used in the desalination of sea water. Reason : When pressure more than osmotic pressure is applied; pure water is squeezed out of the sea water through the membrane.	A)
5.	5.Assertion: Elevation in boiling point and depression in freezing point are colligative properties. Reason : All colligative properties are used for the calculation of molecular masses.	B)
6.	6.Assertion: Use of pressure cooker reduces cooking time. Reason: At higher pressure cooking occurs faster.	A)

7.	7.Assertion: Isotonic solution do not show the phenomenon of osmosis. Reason: Isotonic solutions have equal osmotic pressure.	A)
8.	8.Assertion: Henry's law and Roult's law are not independent, i.e., one can be derived from the other. Reason : The partial pressure is directly proportional to the mole fraction of the concerned species for ideal solutions.	B)
9.	9.Assertion: An ideal solution obeys Raoult's law Reason : In an ideal solution, solute-solute as well as solvent-solvent interactions are similar to solute-solvent interactions	A)
10.	10.Assertion: One molar solution is always more concentrated than one molal solution (assume density of solution is 1 gm/mL) Reason : The amount of solvent in 1 M solution is always less than 1 m aqueous solution	A)
1.	**Passage I** The osmotic pressure ( ) depends on the molar concentration of the solution (=CRT). If two solutions are of equal solute concentration and, hence, have the same osmotic pressure, they are said to be isotonic. If two solutions are of unequal osmotic pressure, the more concentrated solution is said to be hypertonic and the more diluted solution is described as hypotonic. Osmosis is the major mechanism for transporting water upward in the plants. Answer the following questions. 1. A plant cell shrinks when it is kept in: a) Hypotonic solution b) Hypertonic solution c) Isotonic solution d) pure water.	B)
2.	2. What would be the percent strength of solution of urea that would be isotonic with 4.5% solution of glucose? a) 4.5% b) 13.5% C) 1.5 % d) 9 %	C)
3.	3. The glucose solution to be injected into the bloodstream and the blood itself should have the same; a) Molarity b) Molality c) Osmotic pressure	C)

	d) Viscocity	
4.	4. Isotonic solution have same a) Density b) Molefraction c) Molality d) Osmotic pressure	D)
5.	5. Osmotic pressure is based on the which of the following concentration terms a) Molarity b) Molality c) Molefraction d) Normality	A)
6.	**Passage II** The solution which boil at constant temperature like a pure liquid and possess same composition in liquid as well as vapor state are called azeotropes. The components of azeotropes cannot be separated by fractional distillation. Only non-ideal solutions form azeotropes. Solutions with negative deviation form maximum boiling azeotrope and solutions with positive deviation forms minimum boiling azeotrope. The boiling point of an azeotrope is never equal to the boiling points of any of the components of the azeotrope. **Answer the following questions** 6. The azeotropic solutions of the two miscible liquids A) Can be separated by simple distillation B) May show positive or negative deviation from Raoult's law C) Are supersaturated D)Behave like single pure component and does not boil at a fixed temperature	B)
7.	7. Solutions which distill without any change in composition or temperature are called a) Saturated b) Supersaturated c) Ideal d) Azeotrope	D)
8.	8. The azeotropic mixture of water and HCl boils at 108.5oC. The solution is a) Ideal b) Non ideal with positive deviation c)Non ideal with negative deviation d) None of these	C)
9.	9. 100 mL of liquid A and 50 mL of liquid B are mixed to form 138 mL of solution, it is a) Ideal solution	B)

	b) High boiling azeotrope c)Low boiling azeotrope d) None of these	
10.	10. Which among the following combinations is a maximum boiling azeotrope. a) $H_2O + CH_3OH$ b) CCl_4+CHCl_3 c) $(CH_3)_2CO + C_2H_5OH$ d) H_2O+HNO_3	D)

1.	**TOPIC : SOLUTIONS(3)** **Multiple choice questions:** 1.The vapour pressure of a solution of 5 g of non-electrolyte in 100 g of water at a particular temperature is 2985 N/m^2 . The vapour pressure of water is 3000 N/m^2 . The molecular mass of the solute is: 1) 60 2) 12 3) 180 4) 380	3)
2.	2.The Henry's law constant for the solubility of N_2 gas in water at 298 K is 1×10^5 atm. The mole fraction of N_2 in air is 0.8. The number of mole of N_2 from air dissolved in 10 moles of water at 298 K at 5 atm pressure is: 1) $4x10^{-4}$ 2) $4x10^{-5}$ 3) $5x10^{-5}$ 4) $4x10^{-5}$	1)
3.	3. Mixture of volatile components A and B has total vapour pressure (in torr): $P = 254 - 119X_A$ where, X_A is mole fraction of A in mixture. Hence P_A^0 , and P_B^0 are (in torr) : 1) 254,119 2) 119,254 3) 135,254 4) 154,119	3)
4.	4.Molar solubility of helium, nitrogen and oxygen are plotted against partial pressure of the gas at constant temperature. 	2)

	Henry's law constant for these gases will lie in following sequence ? 1) $O_2 > N_2 > He$ $O_2 < N_2 < He$ $O_2 = N_2 = He$ $O_2 > N_2 < He$	
5.	5.Solubility of oxygen gas in water follows Henry's law. When the solubility is plotted against partial pressure at a definite temperature, we get following plots.  Which of the following sequence of temperature is correct ? 1) $T_1 = T_2 = T_3 = T_4$ $T_1 > T_2 > T_3 > T_4$ $T_1 < T_2 < T_3 < T_4$ $T_1 > T_2 < T_3 > T_4$	2)
6.	6. 620 g glycol is added to 4 kg water in the radiator of a car. What amount of ice will separate out at -6°C? $K_f = 1.86 K\ kg\ mol^{-1}$ 1) 800 g 2) 900g 3) 600g 4) 1000g	2)
7.	7.Two liquids A and B form ideal solutions. At 300 K, the vapour pressure of solution containing 1 mole of A and 3 mole of B is 550mm Hg. At the same temperature, if one more mole of B is added to this solution, the vapour pressure of the solution increases by 10 mm Hg. Determine the vapour pressure of A and B in their pure states (in mm Hg.) 1) 400, 600 2) 500, 500 3) 600, 400 4) 300,500	1)

8.	8. Two liquids A and B have vapour pressure in the ratio $P_A^0 : P_B^0 = 1:3$ at a certain temperature Assume A and B form an ideal solution and the ratio of mole fractions of A to B in the vapour phase is 4:3. Then the mole fraction of B in the solution at the same temperature is : 1) $\frac{1}{5}$ 2) $\frac{2}{3}$ 3) $\frac{4}{5}$ 4) $\frac{1}{4}$	1)
9.	9.When 36.0 g of a solute having the empirical formula CH_2O is dissolved in 1.20 kg of water, which freezes at -. $0.93^0 C$ What is the molecular formula of the solute ? ($K_f = 1.86^0 C\ kg\ mol^{-1}$) 1) C_2H_4O 2) $C_2H_2O_2$ 3) $C_2H_4O_3$ 4) $C_2H_4O_2$	4)
10.	10.At 300 K, 40 mL of O3 (g) dissolves in 100g of water at 1.0 atm. What mass of ozone dissolves in 400 g of water at a pressure of 4.0 atm at 300 K ? 1) 0.1 g 2) 1.2 g 3) 0.48 g 4) 4.8 g	2)

11.	11.Ratio of $\frac{\Delta T_b}{K_b}$ of 10 g AB2 and 14 g A2B per 100 g of solvent in their respective, solution (AB2 and A2B both are non-electrolytes) is 1 mol/kg in both cases. Hence, atomic wt.of A and B are respectively: 1) 100,40 2) 60,20 3) 20,60 4) 40,60	2)
12.	12.Which of the following is correct for an ideal solution 1) $\Delta H_{mix} = 0, \Delta V_{mix} = 0$ 2) $\Delta V_{mix} = 0, \Delta S_{mix} = 0$ 3) $\Delta H_{mix} < 0, \Delta V_{mix} > 0$ 4) $\Delta H_{mix} > 0, \Delta V_{mix} < 0$	1)
13.	13.The properties of solutions which depend only on the number of particles of solute but independent of the nature of solute are called 1) extensive property 2) intensive property 3) colloidal property 4) Colligative property	4)
14.	14. At $10^0 C$ the osmotic pressure of urea solution is 500mm. The solution is diluted and temperature is raised to $25^0 C$ the osmatic pressure of dilute solution is 105.3mm at $25^0 C$. If V_i and V_f are initial and final volumes of solution, the extent of dilution can be shown as 1) $V_f = 5V_i$ 2) $V_i > V_f$ 3) $V_f = 4V_i$ 4) $V_f = 6V_i$	1)
15.	15.Solution distilled without change in composition at a temperature is called 1) amorphous 2) Azeotropic mixture 3) Ideal solution 4) Super staturated solution	2)

16.	16.On mixing o $10ml$ f acetone with o $40ml$ f chloroform the total volume of solution is 1) $< 50ml$ 2) $> 50ml$ 3) equal to 50ml 4) cannot be predicted	3)
17.	17. A mixture of Bezene and Toluene forms 1) An ideal solution 2) Non Ideal solution 3) Suspension 4) Emulsion	1)
18.	18.The relationship between osmotic pressure at 273 K when 10 g glucose (P1), 10 g urea(P2) and 10 g sucrose(P3) are dissolved in 250 ml of water is 1) P1>P2>P3 2) P3>P1>P2 3) P2>P1>P3 4) P2>P3>P1	3)
19.	19.an aqueous solution of ethanol in water has vapour pressure 1) equal to the water 2) equal to that of ethanol 3) more than that of water 4) less than that of water	3)
20.	20.The relative lowering of Vapour Pressure dissolving $71.3\,gm$ of a substance in $1000\,gm$ of water is 7.13×10^{-3} the molecular mass of the substance is 1) 180 2) 218 3) 134 4) 80	1)

21. Match the following:	
Coloumn I	**nColoumn II**
a. Hypertonic	p. solutions having same osmotic pressure
b. Isotonic	q. One solution has higher osmatic pressure than the second solution
c. Hypotonic	r. solutions which obeys Roults law
d. Ideal solutions	s. One solution has lower osmatic pressure than the second solution
1)A-q, B-p, C- s, D- r 2)A-p, B-q, C- s, D- r 3)A-q, B-p, C- r, D- s 4)None of these	Ans: 1)

22. Match the following: **Column I**	**Coloumn II**
a. Molality	p. Number of gram moles of solute per Kg of solvent
b. Molarity	q. Number of moles of solute per lit of solution
c. Molefraction of solute	r. Number of moles of solute/ number of moles of solute+ number of moles of solvent
d. Ppm	s. parts per million
1. A-p, B-q, C- s, D- r 2. A-p, B-q, C- r, D- s 3. A-q, B-p, C- r, D- s 4. None of these	Ans: 2)

23. Match the following: **Column I**	**Column II**
a). Chloroform + Nitric acid	p. effect of pressure on solubility of a gas in liquid
b). Henry's law	q. Ideal solution
c). Alcohol+water	r. non ideal with positive deviation
d). Benzene + Tolune	s. non ideal with negative deviation
1)A-p, B-q, C- s, D- r 2)A-p, B-q, C- r, D- s 3)A-s, B-p, C- r, D- q 4)None of these	Ans: 3)

21.	**Match the following:** **COLUMN 1**	**COLUMN 2**	**Answers**
	1.Soda water 2.Sugar solution 3.German silver 4.Air 5.Hydrogen gas in palladium	a) A solution of gas in liquid. b) A solution of gas in gas c) A solution of solid in solid d) A solution of solid in solid e) A solution of gas in liquid f) A solution of liquid in solid	1-e 2-c 3-d 4-b 5-a

i)	**LESSON :P-BLOCK ELEMENTS(1)** 1.The Noble gases have closed shell electronic configuration and are mono atomic gases under normal conditions. The low boiling points of the lighter noble gases are due to the weak dispersion forces between the atoms and the absence of other interatomic interactions. The direct reaction of Xenon with fluorine leads to a series of compounds with Oxidation numbers +2,+4 and +6. XeF6 reacts violently with water to give XeO3. The compounds of Xenon exhibit rich stereochemistry and their geometries can be deduced considering the total number of electron pairs in the valence shell. i)The gas used in magnetic resonance imaging (MRI) system is a) Argon b) Neon c) Helium d) Xenon	c)
ii)	ii)The hydrolysis of XeF6 lead to a reaction a) Oxidation b) Reduction c) Redox d) Non	d)
iii)	iii)The structure and hybridization of XeO3 is a)T-Shaped SP3d b) Linear SP c)Pyramid,SP3 d)Tetrahedral,SP3	c)
iv)	iv)Argon is used in arc welding because of its a) Flammability b) low reactivity with metals c)Ability to lower melting points of metals d) High calorific value	b)
v)	v)XeF4 and XeF6 are expected to be a) Oxidizing b) unreactive c) reducing d) Strongly Basic	a)

i)	2.Among Noble gases, Xe forms with F and O, XeF2, XeF4 and XeF6 are colourless crystalline solids, they sublime readily at 298K due to weak vander waal's forces of attraction. They are powerful fluorinating and oxidizing agents. They are hydrolyzed even by traces of water. Xenon Flourides react with fluoride ion acceptors to form cationic species and fluoride ion donors to form anionic species. i). The compound that cannot formed by Xenon is a) XeCl4 b) XeO3 c) XeF2 d) XeO2F2	a)
ii)	ii) The noble gases can be separated by a) Passing them through some chemical b) Adsorption and desorption on coconut charcoal. c) Electrolysis of their fluorides d) Adsorption and desorption on activated platinum.	b)
iii)	iii)Which of the following Xenon compound has the same number of lone pairs a)XeO4 b) XeF2 c) XeF4 d)XeO3	b)
iv)	iV)XeF6 and XeF2 are separately hydrolyzed a)XeF6 alone gives O2 b) neither of the give HF c)XeF6 gives O2 d) both give out O2	a)
v)	V) MF+XeF6 'A' (M= Alkali metal). The state of hybridization of the central atom 'A' and shape of the complex formed is a) SP3d3, Pentagonal planar b) SP3, Tetrahedral c) SP3d2, distorted octahedral d) SP3d, Trigonal bipyramidal	c)

i)	3.In 1961 Neil Bartlett while experimenting with fluorine and platinum had accidently produced a deep red solid whose exact chemical composition remained a mystery. After much research, he found that the known gaseous Fluorine, platinum hexa fluoride (PtF6) was able to oxidize oxygen and produce the red solid (O2+ PtF6-) He then realized that the first ionization enthalpy of molecular oxygen was identical with xenon. And he was successful in preparing another compound(Xe +Pt 6-) by mixing PtF6 and Xenon. At room temperature. Later other compounds of Xe with F2 and O2 are synthesized. Recently Oganesson has been synthetically produced by Radio active transmutation as follows. 24898cf + 4820Ca -- 249118Og +3 0n1 [24898cf(48 Ca, 3n) 249118Og] i).The electronic configuration of last element in the Modern periodic table is a)[Rn] 5f14 6d10 7S2 7P6 b) [Xe] 5f14 6d10 7S2 7P6 c)[Xe] 6f14 5d10 7S2 7P6 d) [Rn] 6d10 7S2 7P6	a)
ii)	ii) Complete hydrolysis of XeF6 produces along with HF a)XeOF4 b) XeO2F2 c) XeO3 d) Xe	c)
iii)	iii) XeF4 is a) Square planar and acts as a fluoride donor with PF5 b) Sea-saw shape and acts as a fluoride donor with AsF5 c) Square planar and acts as fluoride donor with NaF d) Tetrahedral and acts as a fluoride donor with SbF5	a)
iv)	iv) Which of the following noble gas not form clathrate compound a)Kr b) Ar c) Xe d) Ne	c)
v)	v) Which of the following is not true about Helium? a) It was first discovered by observing solar spectrum b) It can diffuse through rubber and plastic material c) It has highest boiling point d) It has the highest first ionization energy	c)

i)	4.When two different halogens react each other, inter halogen compounds are formed. They can be assigned general compositions as XX',XX'3,XX'5,XX'7. Where X is of larger size and X' of smaller size and X is more electropositive than X'. as the ratio between radii of X and X' increases the number of atoms per molecule also increases. The inter halogen compounds can be prepared by the direct combination or by the action of halogen on lower inter halogen compounds. i) Which of the following is more reactive? a) Cl2 b) Br2 c) I2 d) ICl	d)
ii)	ii) The structure and hybridization of BrF5 is a)Square pyramid SP3d2 b) bent T-shape SP3d3 c) Pentagonal bi pyramidal,SP3d3 d) octahedral SP3d3	a)
iii)	iii) Which inter halogen is used for the production of UF6 in the enrichment of Fissionable isotope of uranium used in Nuclear reactor. a)ClF b) IF7 c) BrF3 d) ICl3	c)
iv)	iv) BrF3+H2O …… + ……. a) HF +HOBr b)HBr + HOF c) HBr+HF d) F2+HOBr	a)
v)	v)Br2+F2(excess) ……> a)BrF5 b) BrF c) BrF3 d) BrF7	a)

i)	5.Glauber prepared hydrochloric acid in 1648 by heating common salt with concentrated sulphuric acid (king of acids or oil of vitriol). Davy in 1810 showed that it is a compound of Hydrogen and Chlorine. It is colourless and pungent smelling gas. It is easily liquefied to a colourless liquid as it has high critical temperature. It also freezes to a white crystalline solid. It is extremely soluble in water and ionizes to maximum due to high Ka value it reacts with ammonia and forms white fumes. Con.HCl is used in aqua regia it decomposes salts of weaker acids. i) Which of the following equations not true. a) Fe + 2HCl FeCl2+H2 b) 2Fe + 6 HCl 2FeCl3 +3H2 c) Na2CO3+2HCL 2NaCl +H2O +CO2 d) NH3 + HCl NH4Cl	b)
ii)	ii) Hydro chloric acid can be dried by passing through a) Ammonia b) baking soda c) caustic soda d) sulphuric acid	d)
iii)	iii) Aqua Regia (super solvent) is a)1 part Con HCl + 3 parts Con. Sulphuric acid b)3 parts Con HCl + 1 Part Con.Nitric acid c)3 parts Con HCl + 1 part Con. Sulphuric acid d)1 pat Con. Hcl + 3 parts Con.Nitric acid	b)
iv)	iv) Acid used for permanent engravement on glass surface is a)HF b) HCl c) HBr d) HI	a)
v)	v) HCl produces an acid with a)CH3COO-Na+ b) Na2SO4 c) KNO3 d)Na3PO4	a)

i)	6.Chlorine was discovered in 1774 by sheele. In 1810 Davy established its elementary nature and suggested the name chlorine. (chloros = Greenish yellow). It is present in 17th group of modern periodic table. F and Cl gases, Br liquid, I,At,Ts solids. The only group follow gases to solid state trend down the group. Cl_2 is greenish yellow gas with pungent and suffocating odour. It has great affinity for hyderogen. Hence upon reacting with hydrogen containing compounds and produces HCl Cl_2 undergoes disproportion (Redox) reaction with caustic soda and slaked lime. It also reacts with Hydro Carbons and Under goes substitution and addition reactions with saturated and unsaturated respectively. Cl_2 forms four types of Oxo acids. It exhibits oxidizing & bleaching properties in moisture. Bleaching is due to oxidation and it is permanent. i) Which of the following compounds don't react with chlorine gas a) HF b) CH_4 c) C_2H_4 d) H_2S	a)
ii)	ii) Which of the following is not a disproportional reaction a) $2NaOH + Cl_2 \rightarrow NaCl + NaOCl + H_2O$ b) $SO_2 + Cl_2 + H_2O \rightarrow H_2SO_4 + 2HCl$ c) $2Ca(OH)_2 + 2Cl_2 \rightarrow Caq\ (OCl)_2 + CaCl_2 + H_2O$ d) $6NaOH + 3Cl_2 \rightarrow 5NaCl + NaClO_3 + 3H_2O$	b)
iii)	iii) Which is not product of chlorine gas a)Phosgene b) tear gas c) mustard gas d) oleum	d)
iv)	iv) Chlorine gas is not prepared by a)Haber process b) Deacon's process c) Castner kellner's process d) Nelson Cell	a)
v)	v) Correct order of negative electron gain enthalpy. a) F>Cl>Br>I b) F<Cl<Br<I c) F<Cl>Br>I d) I > Br<F>Cl	c)

i)	7..The halogens have the smallest atomic radii in their respective periods. Fluorine atomic size is extremely small. It is also called super halogen. All 17th group elements exhibit -1 oxidation state. Except fluorine other halogens exhibit +1,+3,+5 and +7 oxidation states. Based on compound. Fluorine exhibits anomalous behavior. For example electro negativity, oxidizing power and ionization enthalpy high. Bond dissociation enthalpy, electron gain enthalpy, m.p and b.p are low than expected. All halogens are di atomic and exhibit colour. i) Which of the following hydro halic acid exhibit inter hydrogen bonding even in gaseous state. a) HI b) HF c) HBr d) HCl	b)
ii)	ii) Which oxide don't exist a)Br2O7 b) Br2O c) BrO3 d) BrO2	a)
iii)	iii) Which oxide is used to estimate carbon monoxide a)O2F2 b) ClO2 c) BrO3 d) I2O5	d)
iv)	iv) Which of the following halides cannot be hydrolysed? (I) NF3 (II) NCl3 (III) TeF6 (IV) SF6 a)II and IV b) III and IV c) I,II and IV d) I & IV	d)
v)	v) Which of the following halogen disproportionate in water a)Cl2 b) F2 c) I2 d) None	a)
vi)	vi) In oxygen fluoride compounds oxygen exhibits the following a) a) a)oxidation states b) -2,+1 c) -2,+2	c)

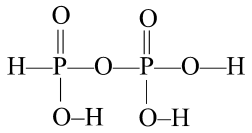
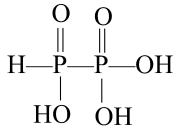
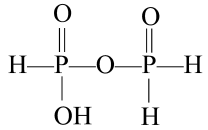
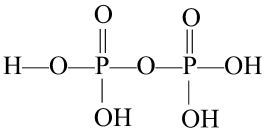
	d) +1,+2	

1.	**ASSERTION- REASON TYPE QUESTIONS** 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 correct explanation of (A) c)if (A) is true but (R) is false d) if (A) is false but (R) is true. 1.(A): When two gaseous 'OF' molecules dimerise Though O-atom (R): O2F2 is having one peroxy linkage	c)
2.	2.(A): Liquid IF5 conducts electricity (R): In liquid state IF5 changes as (IF4+)(IF5)-	a)
3.	3.(A): Cl2 gas disproportinates when combine with slaked lime O-Cl+ (R): ca bleaching powder forms oxidation state of Cl changes from zero to Cl-	a)
4.	4.(A): I2 is sparingly soluble in water. (R):When KI salt added to above solution I2 becomes KI3 complex and solubility increases.	a)
5.	5.(A): Bond dissociation energy of F2 is lesser than Cl2 molecule (R): In F2 molecule due to lonepair. Lone pair repultions bond enthalpy is very low	d)
6.	6.(A): AgI does not dissolve in Ammonia (R): Due to Ionic character of AgI	c)
7.	7.(A): Helium gas is used in diving apparatus (Scuba divers) (R): It will easily come out from body after coming out from water avoid bends.	a)
8.	8.(A) : F2 gas is used to separate U235 and U238 (R) : Fluorine atomic size small.	b)
9.	9.(A) : Noble gases have large positive values of electron gain enthalpy (R) :They have high electro negativity	c)
10.	10.(A) :Noble gases form inter hydrogen bonds among themselves. (R): Helium has the lowest boiling point (4.2 K) of any known substance.	d)
11.	11.(A) : Og (Z=118) atomic mass 294 has half life period 0.7 m seconds (R) :It is radio active due to very high nuclear density and n/p ratio	a)
12.	12.(A) :Among 1% of noble gases in the atmosphere Argon is the Major constituent (R) :All noble gases occur in the earths atmosphere.	c)

	P-BLOCK ELEMENTS (2) **NITROGEN FAMILY:** **Passage # 1 (Q. 1 to 5)** An important phosphate fertilizer it super phosphate of lime by the action of 60–70% of H_2SO_4 on the apatite ($Ca_3(PO_4)_2$) and fluoroapatite. The mixture of monocalcium phosphate and $CaSO_4$ constitute super phosphate of lime. Super phosphate of lime contains 16–18 % available P_2O_5. Triple super phosphate of lime is prepared by digersting apatite with conc H_3PO_3	
1.	1.Which of the following properties should not be associated with the fertilizer– (A)Insolubility in water (B)It should not change the pH. (C)It should be nontoxic to the nitrifying bacteria. (D)It should be suitable in the soil	(A)
2.	2.Which of the following represent the preparation of superphosphate of lime from fluoroapatite – (A) $Ca_3(PO_4)_2 \cdot CaF_2 + 6H_3PO_4 \rightarrow 4Ca(H_2PO_4)_2 + 2HF\uparrow$ (B) $Ca_3(PO_4)_2 \cdot CaF_2 + 4H_2SO_4 \rightarrow 4CaSO_4 + 2H_3PO_4 + 2HF\uparrow$ (C) $3[Ca_3(PO_4)_2 \cdot CaF_2] + 7H_2SO_4 \rightarrow 3Ca(H_2PO_4)_2 + 7CaSO_4 + 2HF\uparrow$ (D) $Ca_3(PO_4)_2 + 3H_3PO_4 \rightarrow 3Ca(HPO_4)_2$	(C)
3.	3.Triple super phosphate of lime approximately contain (X) % available P_2O_5. Thus (X) is - (A) (X) ≡ 32 % (B) (X) ≡ 90 % (C) (X) ≡ 96 % (D) (X) ≡ 48 %	(D)

4.	4.What happens when urea is slowly hydrolyses in soil– (A)$CO(NH_2)_2 \rightarrow NH_4CNO$	(D)

	(B)$CO(NH_2)_2 \rightarrow CO\uparrow + NH_3\uparrow$ (C) $CO(NH_2)_2 \rightarrow CH_4\uparrow + N_2O\uparrow$ (D) $CO(NH_2)_2 + 2H_2O \rightarrow (NH_4)_2CO_3$ Q.5 5.What is the disadvantages of using $(NH_4)_2SO_4$ as a fertilizer– (A) $(NH_4)_2SO_4$ is water soluble (B) $(NH_4)_2SO_4$ decomposes slowly to NH_3 and NH_4HSO_4 in the soil. (C) $(NH_4)_2SO_4$ increases the pH of the soil. (D) $(NH_4)_2SO_4$ decreases the pH of the soil. **Passage # 2 (Q. 6 to 8)** Compared to the oxyacids of nitrogen, phosphorus presents a much more complicated picture particularly due to the formation of condensed phosphates. Phosphorus forms oxyacids in the oxidation numbers, +1, +3, +4 and +5. The oxyacids with oxidation number +3 and +5 occur in metal, pyro and ortho-forms. The three oxyacids, H_3PO_2, H_3PO_3 and H_3PO_4 are based on sp^3 hybridized phosphorus and may be conceived to be formed from hypophosphorus acid by stepwise replacement of H by OH	[D]
6.	6.$H_3PO_2 + CuSO_4 \rightarrow$ (X); a red ppt (X) is – (A) Cu (B) Cu_2O (C) CuO (D) Cu_2H_2	(D)
7.	7.P_4(white) + P (an alkaline solution) $\rightarrow$ Q (reducing gas) + R R + dil $H_2SO_4 \rightarrow$ T (ppt) + S (oxyacid of P) T gives apple green colour in the flame. Thus, P, Q, R, S and T respectively are– (A) $Ba(OH)_2$; PH_3 ; $Ba(H_2PO_2)_2$; H_3PO_2; $BaSO_4$ (B) $Ca(OH)_2$; P_2H_4; $Ca(H_2PO_2)_2$;H_3PO_2; $CaSO_4$ (C) $Ba(OH)_2$; PH_3; $Ba(H_2PO_3)_3$; H_3PO_3; $BaSO_4$ (D) $Ba(OH)_2$; P_2H_4; $Ba(H_2PO_2)_2$; H_3PO_3; $BaSO_4$	(A)
8.	8.Which of the following represent the isopolyacid of phosphorus–	(D)

	(A)  (B)  (C)  (D) 	
9.	**Passage # 3 (Q.9 to 11)** There are some deposits of nitrates and phosphates in earth's crust. Nitrates are more soluble in water. Nitrates are difficult to reduce under the laboratory conditions but microbes do it easily. Ammonia forms large number of complexes with transition metal ions. Hybridization easily explains the ease of sigma donation capability of NH3 and PH3. Phosphine is a flammable gas and is prepared from white phosphorous. 9.Among the following, the correct statement is- (A)Phosphates have no biological significance in humans (B)Between nitrates and phosphates, phosphates are less abundant in earth's crust (C)Between nitrates and phosphates, nitrates are less abundant in earth's crust (D)Oxidation of nitrates is possible in soil	(C)
10.	10.Among the following, the correct statement is- (A) Between NH3 and PH3, NH3 is a better electron donor because the lone pair of electrons occupies spherical 's' orbital and is less directional	(C) Sol. In PH3 p-character is mostly

	(B) Between NH3 and PH3, PH3 is a better electron donor because the lone pair of electrons occupies sp3 orbital and is more directional (C) Between NH3 and PH3, NH3 is a better electron donor because the lone pair of electrons occupies sp3' orbital and is more directional (D) Between NH3 and PH3, PH3 is a better electron donor because the lone pair of electrons occupies spherical 's' orbital and is less directional	used for bonding while lone pair is in predominantly s-character orbital which is diffused & less reactive..
11.	11.White phosphorus on reaction with NaOH gives PH3 as one of the products. This is a- (A) Dimerization reaction (B) Disproportionation reaction (C) condensation reaction (D)precipitation reaction	(B)

1.	**P- BLOCK ELEMENTS(3)** **Multiple choice questions:**	(.)

	Which of the following is not tetrahedral? a.SF4 b. SiCl4 c. NH4+ d. SO4-2	
2.	Which of the following statement is true? a.Hydrolysis of XeF6 is a redox reaction b.Xenon Fluorides are not reactive c.He and Ne forms compounds with highest electronegative fluorine d.Ionization enthalpy of dioxygen is very close to Xenon	(.)
3.	If chlorine gas is passed cold Sodium Hydroxide solution, two changes in Oxidation state of chlorine happen , they are a.+1,-1 b. +1,+1 c. -1,-1 d. 0,1	(.)
4.	Which statement is true a.Xenon Fluorides are unreactive b.Xenon Fluoriddes are highly reactive and readily even by traces of water c.Neon forms compounds only with fluorine d.Xenon fluorides undergo disproportionation.	(.)
5.	Which of the following don't exist a.HOCl2 b. HOBr2 c. HOF2 d. HOI2	(.)
6.	Molecule having two types of bond angles a.PCl3 b. XeF4 c. SF6 d. PCl5	(.)
7.	A neutral oxide is a.CO2 b. SO3 c. XeO3 d. SO2	(.)
8.	The gas which diffuses through rubber, glass and plastic a.Helium b. Xenon c. Argon d. Krypton	(.)
9.	Chlorine gas discovered by	(.)

	a.Davy b. Sheele c. Haber d. Lechateler	
10.	Which molecule is not linear in shape a.XeF2 b. ICl c. C2H2 d. SO2	(.)

Q.1 S.No	**COLUMN-I**	**COLUMN-II**	**Answer**:
1.	Xenon Tetra Fluoride	(A) XeF6	1-D
2.	The partial hydrolysis does not change oxidation state of central atom	(B) Discovered first Xenon compound	2-A
3.	Neil Bartlett	(C) Helium	3-B
4.	High temperature metallurgical process	(D) SP3d2-Square planar	4-E
5.	It is used in modern diving apparatus	(E) Argon	5-C

Q2 S.No	**COLUMN-I**	**COLUMN-II**. Answers:	
1.	Sea saw shaped molecule	(A) BrO3.	1-E
2.	Pyramidal Shaped	(B) CCl4.	2-A
3.	Tetrahedral shaped	(C) I3-.	3-B
4.	Linear Shaped	(D) BrF3.	4-C
5.	Bent T-Shaped	(E) SF4.	5-D

Q3 S.No	**COLUMN-I**	**COLUMN-II**	Answers:
1.	Xe +F2	(A) XeF6 + O2.	1-D
2.	XeF4 + O2F2	(B) HCl + C	2-A
3.	C10H16 +8Cl2	(C)XeO3 + HF.	3-B
4.	Fe + HCl	(D) XeF2.	4-E
5.	XeF6 + 3H2O	(E) FeCl2 + H2.	5-C

1.	**P-BLOCK ELEMENTS(4)** **Multiple choice questions:** Which of the following pairs of ions are isoelectronic and iso structural? A) CO_3^{2-},NO_3^- B)ClO_3^-,CO_3^{2-} C)SO_3^{2-},NO_3^- D)ClO_3^-,SO_3^{2-}	A)
2.	In the preparation of HNO_3, we get NO's gas by catalytic oxidation of ammonia. The moles of NO's produced by the oxidation of two moles of NH_3 will be A) 2 B) 3 C) 4 D) 6	A)
3.	The brown gas formed when HNO_3 is reduced by metal is A) N_2O B) N_2O_3 C) NO_2 D) NO	C)
4.	Which of the following is least volatile A) H_2O B) H_2S C) H_2Se D) H_2Te	A)
5.	Which of the following oxide is neutral A) CO B) SnO_2 C) ZnO D) SiO_2	A)
6.	Which of the statement given below is incorrect A) ONF is isoelectronic with O_2N B) O_3 molecule is bent C) OF_2 is an oxide of fluorine D) Cl_2O_7 is an anhydride of perchloric acid	C)
7.	On addition of conc H_2SO_4 to a chloride salt colourless fumes are evolved but in a case of iodine salt violet fumes come out. This is because A) H_2SO_4 reduces HI to I_2 B) HI is of violet colour C) HI gets oxidised to iodine (I_2) D) HI changes to HIO_3	C)

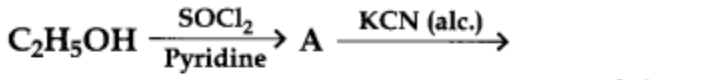
8.	SO_2 act as an A) Oxidizing agent B) Reducing agent C) Bleaching agent D) All of the above	D)
9.	The paramagnetic Oxides of nitrogen are A) N_2O and NO B) NO and NO_2 C) NO_2 and NO_3 D) NO_3 and N_2O_4	B)
10.	Which of the following has –O—O—linkage A) H_2SO_4 B) $H_2S_2O_8$ C) $H_2S_2O_3$ D) $H_2S_4O_6$	B)
11.	Which of the following has least basic A) NI_3 B) NBr_3 C) NCl_3 D) NF_3	D)
12.	Ammonia can be dried by A) Con.H_2SO_4 B) P_4O_{10} C) CaO D) Anhyd. $CaCl_2$	C)
13.	Ozone can be tested by A) Ag B) Hg C) Zn D) Au	B)
14.	On heating ammonia dichromate, the gas evolved is A) O_2 B) NH_3 C) HNO_3 D) N_2	D)
15.	The stability of +5 oxidation state decreases and that Of +3 increases down the group of 15 elements due A)Inert pair effect B) Decreases in I.E C) Increases in size D) Shielding effect	A)

16.	Acidic character of hydrides of group 16 elements in The order of A)H2O < H2S < H2Se< H2Te B)H2S < H2Se< H2Te< H2O C)H2O <H2Se < H2Se< H2S D)H2O <H2S <H2Te < H2Se	A)
17.	Out of the following halides of groups 16 which does not possess reducing property A)H2Te B) H2Se C) H2S D) H2O	D)
18.	A brown ring is formed in the ring test for NO-3 Ion. It is due to formation of A) [Fe (H2O)5(NO)]2+ B) FeSO4 NO2 C) [Fe (H2O)4 NO2] D) FeSO4.HNO3	A)
19.	Maximum covalency of nitrogen is A) 3 B) 5 C) 4 D) 6	C)
20.	The oxidation state of central atom in the anion of compound NaH2PO2 Will be A)+3 B) +5 C) +1 D) -3	C)

Match the items of column 1 and column 2 in the following questions and mark the correct option (for Q1 to Q3 below) **Column1**	**Column2**	**Answer**:
a)Pb_3O_4	1) Neutral Oxide	B
b) N_2O	2) Acetic Oxide	
c) Mn_2O_7	3) Basic Oxide	
d) Bi_2O_3	4) Mixed oxide	
A .a) 1 b) 2 c) 3 d) 4 B .a) 4 b) 1 c) 2 d) 3 C .a) 3 b) 2 c) 4 d) 1 D .a) 4 b) 3 c) 1 d) 2		

1. Column1	**Column2**	**Answer**
a) H2SO4	1) Highest electron gain enthalpy	A
b) CCl3NO2	2) Chalcogen	
c) Cl2	3) Tear gas	
d) Sulphur	4) storage batteries	
A) a) 4 b) 3 c) 1 d) 2 B) a) 3 b) 4 c) 1 d) 2 C) a) 4 b) 1 c) 2 d) 3 D) a) 2 b)1 c)3 d) 4		

1. **COLUMN1**	**COLUMN 2**	**Answer**
1.CUO+ NH3	a) nitric oxide (NO) GAS evolved	A
2. CU + HNO3 conc	b) CO_2 gas evolved	
3.CU + HNO3 dil	c) N_2 gas evolved	
4. ZnS + O3	d) Oxygen gas evolved	
A)1-c 2-e 3-a 4-d B)1-d 2-c 3-b 4-a C)1-c 2-b 3-a 4-e D)1-e 2-c 3-b 4-a	e) NO_2 gas evolved	

1.	**HALOALKANES AND HALOARENES(1)** **MULTIPLE CHOICE QUESTIONS:** Which of the following compounds can yield only one mono chlorinated product upon free radical chlorination? (a) 2, 2-Dimethylpropane (b) 2-Methylpropane (c) 2-Methylbutane (d) n-Butane	A)
2.	The negative part of the addendum (the molecule to be added) adds on the carbon atom of the double bond containing the least number of hydrogen atoms. This rule is known as (a) Saytzeffs rule (b) Peroxide rule (c) Markovnikov's rule (d) van't hoff rule	C)
3.	Which of the following compounds has the highest boiling point? (a)CH3CH2CH2Cl (b) CH3CH2CH2CH2Cl (c) CH3CH(CH3)CH2Cl (d) (CH3)3CCl	B)
4.	SN1 reaction of alkyl halides lead to (a) Retention of configuration (b) Racemisation (c) Inversion of configuration (d) None of these	B)
5.	Fitting reaction can be used to prepare (a) Toluene (b) Acetophenone (c) Diphenyl (d) Chlorobenzene	C)
6.	p-dichlorobenzene has higher melting point than its o- and m-isomers because (a) p-dichlorobenzene is more polar than o- and m- isomer. (b) p-isomer has a symmetrical crystalline structure. (c) boiling point of p-isomer is more than o-and m-isomer. (d) All of these are correct reasons.	B)
7.	Identify the end product (C) in the following sequence:  (a) $C_2H_5CH_2NH_2$ (b) $C_2H_5CONH_2$ (c) C_2H_5COOH (d) $C_2H_5NH_2 + HCOOH$	C)

8.	The reaction of toluene with chlorine in presence of FeCl3 gives predominantly. (a) a mixture of o-and p-chlorotoluene (b) benzyl chloride (c) m-chlorotuluene (d) benzoyl chloride	A)
9.	Arrange the following compounds in-decreasing order of their boiling points (i) CH3Br (ii) CH3CH2Br (iii) CH3CH2CH2Br (iv) CH2CH2CH2CH2Br (a) (i) > (ii) > (iii) > (iv) (b) (iv) > (iii) > (ii) > (i) (c) (i) > (iii) > (ii) > (iv) (d) (iii) > (iv) > (i) > (ii)	B)
10.	Alkyl halides are insoluble in water though they are polar because (a) they react with water to give alcohols (b) C -X bond cannot be broken easily (c) they cannot form hydrogen bonds with water (d) they are stable compounds and are not reactive	C)
11.	Methyl bromide reacts with AgF to give methyl fluoride and silver bromide. This reaction is called (a) Fittig reaction (b) Swartz reaction (c) Wurtz reaction (d) Finkelstein reaction	B)
12.	In SN2 reactions with the sequence of bond breaking and bond formation is as follows (a) bond breaking is followed by formation (b) bond formation is followed by breaking (c) bond breaking and formation are simultaneously (d) bond breaking and formation take place randomly	C)
13.	Which of the following is the most reactive towards nucleophilic substitution reaction? (a) ClCH2– CH = CH2 (b) CH2 = CH-Cl (c) CH3CH = CH-Cl (d) C6H5Cl	A)

14.	The order of reactivity of following alcohols with halogen acid (HX) is (i) CH3 —CH2 —CH2 —OH (ii) CH3—CH2 —CH—OH CH3 CH3 (iii) C6H5—CH2—C—OH CH3 (a) i > ii > iii (b) iii > ii > i (c) ii > i > iii (d) i > iii > ii	B)
15.	Which of the following statements are correct? (a) Benzyl halides are less reactive than vinyl and aryl halides (b) Vinyl halides are more reactive than alkyl halides (c) Aryl halides are less reactive than alkyl halide (d) Aryl halides are more reactive than benzyl halides	C)
16.	Which reagent will you use for the following reaction? CH3CH2CH2CH3 → CH3CH2CH2CH2Cl + CH3CH2CH(Cl)CH3 (a)Cl2 /UV light (b)NaCl + H2SO4 (c)Cl2 gas in dark (d)Cl2 gas in the presence of iron in dark	A)
17.	Chlorobenzene is formed by reaction of chlorine with benzene in the presence of AlCl3. Which of the following species attacks the benzene ring in this reaction? (a)Cl – (b)Cl + (c)AlCl3 (d) [AlCl4] –	B)
18.	**Match the items of column 1 and column 2** **Column1** **Column 2** (A) CH2 Cl2 P. Antiseptic (B) CCl4 Q. Insecticide (C) (p-Cl C6H4)2CHCCl3 R. Pyrene (D) CHI3 S. Refrigerent (a) A–R, B–Q, C–S, D–P (b) A–S, B–R, C–Q, D–P	B)

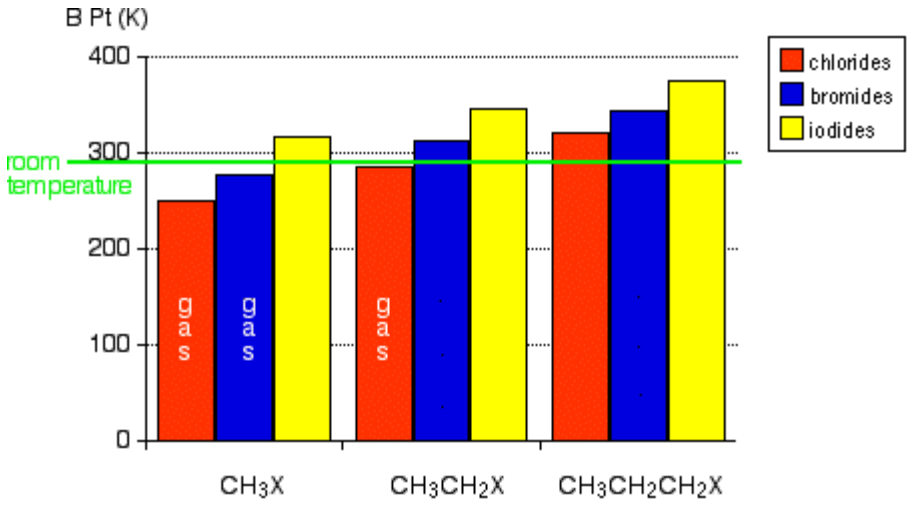
	(c) A–Q, B–P, C–S, D–R (d) A–P, B–S, C–R, D–Q	
19.	**Match the items of column 1 and column 2** **Column1** **Column 2** (A) $CH_3—\underset{X}{CH}—CH_3$ P. Aryl halide (B) $C_6H_5—X$ Q. Alkyl halide (C) $CH_2=CH—CH_2—X$ R. Vinyl halide (D) $CH_2=CH—X$ S. Allyl halide (a) A–P, B–Q, C–S, D–P (b) A–S, B–R, C–Q, D–P (c) A–Q, B–P, C–S, D–R (d) A–P, B–S, C–R, D–Q	C)
20.	**Match the items of Column I and Column II.** **Column I** **Column II** (i) SN1 reaction (a) vic-dibromides (ii) Chemicals in fire extinguisher (b) Saytzeff rule (iii) Bromination of alkenes (c) Racemisation (iv) Elimination of HX from alkyl halide (d) Chlorobromocarbons (i) - (c) (ii) - (d) (iii) - (a) (iv) - (b) (i) - (b) (ii) - (d) (iii) - (c) (iv) - (a) (i) - (c) (ii) - (a) (iii) - (d) (iv) - (b) (i) - (a) (ii) - (d) (iii) - (c) (iv) - (b)	A)

1.	**HALOALKANES and HALOARENES(2)** **MULTIPLE CHOICE QUESTIONS (MCQs):** **In the following questions four options are given. Select one correct option.** C2H5Cl + KCN -----> X + KCl and C2H5Cl + AgCN -----> Y + AgCl The wrong statement regarding X and Y is (a) In X the CN- group is linked to ethyl carbon through the carbon (b)In Y the CN- group is linked to ethyl carbon through the nitrogen (c)X and Y are position isomers (d)X is propionitrile and Y is propioisonitrile	c)
2.	Compound A reacts with PCl5 to give B which on treatment with KCN followed by hydrolysis gave propanoic acid. What are A and B respectively (a)C3H8 and C3H7Cl (b)C2H6 and C2H5Cl (c)C2H5OH and C2H5Cl (d)C2H5OH and C2H4Cl2	c)
3.	CH3- Cl + AgF ----> CH3-F + AgBr. The reaction is called as (a)Swarts reaction (b)Finkelstein reaction (c)Groove's reaction (d)Wurtz reaction	a)
4.	Among the isomeric alkanes of the molecular formula C5H12, the one which gives a single monochloride on photochemical chlorination is (a)2-Methyl butane (b(2,2-Dimethyl propane (c)n- Pentane (d)Isopentane	b)
5.	Most reactive halide towards SN1 reaction is (a)n- Butyl chloride (b)sec- Butyl chloride (c)tert-Butyl chloride (d)Allyl chloride	d)
6.	C2H5Cl aqKOH A Na B C2H5Cl C. In this reaction C is (a)C2H5OH (b)C2H5ONa (c)C4H10 (d)C2H5-O-C2H5	d)

7.	Which of the following isomers has the highest melting point? (a)1,2- Dichlorobenzene (b)1,3- Dichlorobenzene (c)1,4- Dichlorobenzene (d)All isomers have the same melting points	c)
8.	Which reagents are required for the one step conversion of chlorobenzene to toluene? (a)CH3Cl, Na, Dry ether (b)CH3Cl/ AlCl3 (c)CH3Cl/Fe dark (d)NaNO2/HCl/ 0-50 C	a)
9.	Tertiary alkyl halides are practically inert to substitution by SN2 mechanism because of (a)Insolubility (b)Inductive effect (c)Instability (d)Steric hinderance	d)
10.	In which of the followinghalides Csp2 –X bond is present? (a)Allyl halide (b)Aryl halide (c)Benzyl halide (d)Alkyl halide	b)
11.	The correct increasing order of boiling points for the following is: (a)RCl < RF < RI < RBr (b)RF < RCl < RBr < RI (c)RI < RBr < RCl < RF (d)RCl < RBr < RI < RF	b)
12.	IUPAC name of CH2 = CH- CH2Cl is (a)Allyl chloride (b)Vinyl chloride (c)1- Chloro-3-propene (d)3-Chloro-1-propene	d)
13.	C3H8 + Cl2 UV light ____> C3H7Cl + HCl is an example of (a)Free radical substitution (b)Free radical addition (c)Electrophilic addition (d)Electrophilic substitution	a)
14.	The best method for conversion of an alcohol into an alkyl chloride is by treating alcohol with (a)PCl5	c)

	(b)Dry HCl + anhyd. $ZnCl_2$ (c)$SOCl_2$ in presence of pyridine (d)PCl_3	
15.	Which of the following reactions is an example of nucleophilic substitution reaction? (a)$RX + H_2 \xrightarrow{\quad} RH + HX$ (b)$RX + Mg \xrightarrow[\text{Ether}]{\quad} RMgX$ (c)$2\,RX + 2\,Na \xrightarrow[\text{Ether}]{\quad} R - R + 2\,NaX$ (d)$RX + \text{aq } KOH \xrightarrow{\quad} R\text{-}OH + KX$	d)
16.	Which among MeX, RCH_2X, R_2CHX and R_3CX is most reactive towards SN2 reaction? (a)MeX (b)R_3CX (c)R_2CHX (d)RCH_2X	a)
17.	Racemic mixture has (a)Equimolar mixture of enantiomers (b)1:1 mixture of enantiomers and diastereomers (c)1:1 mixture of diastereomers (d)1:2 mixture of enantiomer and diastereomers	a)
18.	Which of the following compounds is optically active? (a)$(CH_3)_2CHOH$ (b)$CH_3CHClCOOH$ (c)$CH_3CH_2CH_2CH_3$ (d)$(CH_3)_3CCl$	b)
19.	An alkyl halide forms its Grignard reagent followed by treating with water yields propane. The original alkyl halide is (a)Methyl iodide (b)Ethyl bromide (c)Propyl bromide (d)Butyl bromide	c)
20.	Haloarenes are ortho and para directing due to (a)+ I effect of halogen atom (b)– I effect of halogen atom (c)Resonance in aryl halides (d)Both b and c	c)

II.	**Match the items of Column 1 and column 2.**	Answers:
1)	**Column 1** — **Column 2** i)Saytzeff rule — a) Racemic mixture ii)Markonikovv's rule — b) 2,4,6 -Trinitrophenol iii)SN1 reaction — c) gem- dihalide iv)SN2 reaction — d) Addition of HBr to propene v)Picric acid — e) Dehydrohalogenation of alkyl halides vi)Alkylidene halide — f) Inversion in configuration	i-e ii-d iii-a iv-f v-b vi-c
2)	**Match the items of Column 1 and column 2.**	Answers:
	Column 1 — **Column 2** i)C6H5CH2Cl — a) Vinyl halide ii)C6H5Cl — b) Alkyl halide iii)CH2=CH-CH2-Cl — c) Aryl halide iv)CH2=CH-Cl — d) Benzyl halide v)CH3CH2Cl — e) Allyl halide	i-d ii-c iii-e iv-a v-b
3)	**Match the items of Column 1 and column 2.**	
	Column 1 — **Column 2** i) 2R-X Na, D.E R-R — a) Carbocation intermediate ii)R- X + R-ONa ____> R –O-R — b) Electrophilic addition iii)SN1 reaction — c)Wurtz reaction iv)SN2 reaction — d) Williamson's synthesis v)Halogenation of alkanes in presence of sunlight — e)Takes place in one step the vi)Bromination of alkene in dark — f) Free radical substitution	i-c ii-d iii-e iv-a v-f vi-b

1.	**HALOALKANES AND HALOARENES(3)** **CASE-BASED/PASSAGE-BASED INTEGRATED QUESTIONS** **1. Observe the histogram related by comparison of boiling points of some alkyl halides and answer the questions that follow:** Melting and boiling points: Methyl chloride, methyl bromide, ethyl chloride and some chlorofluoromethanes are gases at room temperature. Higher members are liquids or solids. As we have already learnt, molecules of organic halogen compounds are generally polar. Due to greater polarity as well as higher molecular mass as compared to the parent hydrocarbon, the intermolecular forces of attraction (dipole-dipole and van der Waals) are stronger in the halogen derivatives. That is why the boiling points of chlorides, bromides and iodides are considerably higher than those of the hydrocarbons of comparable molecular mass. The attractions get stronger as the molecules get bigger in size and have more electrons. The pattern of variation of boiling points of different halides is depicted in Fig.  For the same alkyl group, the boiling points of alkyl halides decrease in the order: RI> RBr> RCl> RF. This is because with the increase in size and mass of halogen atom, the magnitude of van der Waal forces increases. Q.1) Name the alkyl halides in gaseous state. i) CH3CH2Br ii) CH3CH2Cl iii) CH3I iv) CH3CH2CH2Cl Ans. (ii)	ii)
2.	Q.2) Why do alkyl iodides have highest boiling points among alkyl halides? i) It is due to higher molar mass ii) It is due to	iv)

	bigger size iii) It is due to more van der Waals' forces of attraction. iv) All the above Ans. (iv)	
3.	Q.3) Which of the following have highest boiling point? i) CH3CH2CH2CH2Cl ii) CH3CH2CH2Cl iii) CH3Cl iv) CH3CH2Cl Ans. (i) As the carbon chain increases, surface area increases, van der Waals' forces of attraction increases, hence boiling point increases	i)
4.	Q.4) Arrange the following compounds in increasing order of their boiling points. (a) (CH3)2CHCH2Br (b) CH3CH2CH2CH2Br (c) (CH3)3CBr (i) (b) < (a) < (c) (ii) (a) < (b) < (c) (iii) (c) < (a) < (b) (iv) (c) < (b) < (a) Ans: (iii) As the number of branches increases, the surface area decreases. Hence boiling points decreases with branching.	iii)
5.	Q.5) Which of the following set of arrangement is correct in order of increasing boiling points? i) Bromomethane, Bromoform, Chloromethane, Dibromomethane. ii) Bromoform, Chloromethane, Dibromomethane, Bromomethane iii) Chloromethane, Dibromomethane, Bromomethane, Bromoform iv) Chloromethane, Bromomethane, Dibromomethane, Bromoform Ans: (iv) As molar mass increases, the boiling point also increases.	iv)

	2. Read the passage given below and answer the following questions: Nucleophilic substitution reaction of halo alkane can be conducted according to both SN 1 and SN 2 mechanisms. However, which mechanism it is based on is related to such factors as the structure of halo alkane, and properties of leaving group, nucleophilic reagent and solvent. Influences of halogen: No matter which mechanism the nucleophilic substitution reaction is based on; the leaving group always leave the central carbon atom with electron pair. This is just the opposite of the situation that nucleophilic reagent attacks the central carbon atom with electron pair. Therefore, the weaker the alkalinity of leaving group is , the more stable the anion formed is and it will be more easier for the leaving group to leave the central carbon atom; that is to say, the reactant is more easier to be substituted. The alkalinity order of halogen ion is $I^- < Br^- < Cl^- < F^-$ and the order of their leaving tendency should be $I^- > Br^- > Cl^- > F^-$. Therefore, in four halides with the same alkyl and different halogens, the order of substitution reaction rate is RI > RBr > RCl > RF. In addition, if the leaving group is very easy to leave, many carbocation intermediates are generated in the reaction and the reaction is based on SN 1 mechanism. If the leaving group is not easy to leave, the reaction is based on SN 2 mechanism. Influences of solvent polarity: In SN 1 reaction, the polarity of the system increases from the reactant to the transition state, because polar solvent has a greater stabilizing effect on the transition state than the reactant, thereby reduce activation energy and accelerate the reaction. In SN 2 reaction, the polarity of the system generally does not change from the reactant to the transition state and only charge dispersion occurs. At this time, polar solvent has a great stabilizing effect on Nu than the transition state, thereby increasing activation energy and slow down the reaction rate. In a word, the level of solvent polarity has influence on both SN 1 and SN 2 reactions, but with different results. Generally speaking, weak polar solvent is favorable for SN 2 reaction, while strong polar solvent is favorable for SN 1 reaction, because only under the action of polar solvent can halogenated hydrocarbon dissociate into carbocation and halogen ion and solvents with a strong polarity is favorable for solvation of carbocation, increasing its stability. Generally speaking, the substitution reaction of tertiary halo alkane is based on SN 1 mechanism in solvents with a strong polarity (for example, ethanol containing water). The following questions are multiple choice questions. Choose the most appropriate answer: Q. 1. SN1 mechanism is favored in which of the following solvents: (A) benzene (B) carbon tetrachloride (C) acetic acid (D) carbon disulphide Ans. Option (C) is correct	C)

1.		
2.	Q. 2. Nucleophilic substitution will be fastest in case of: (A) 1-Chloro-2,2-dimethyl propane (B) 1-Iodo-2,2-dimethyl propane (C) 1-Bromo-2,2-dimethyl propane (D) 1-Fluoro-2,2-dimethyl propane Ans. Option (B) is correct.	B)
3.	Q. 3. SN 1 reaction will be fastest in which of the following solvents? (A) Acetone (dielectric constant 21) (B) Ethanol (dielectric constant 24) (C) Methanol (dielectric constant 32) (D) Chloroform (dielectric constant 5) Ans. Option (C) is correct.	C)
4.	Q. 4. Polar solvents make the reaction faster as they: (A) destabilize transition state and decrease the activation energy (B) destabilize transition state and increase the activation energy (C) stabilize transition state and increase the activation energy (D) stabilize transition state and decrease the activation energy Ans. Option (D) is correct.	D)
5.	Q. 5. SN1 reaction will be fastest in case of: (A) 1-Chloro-2-methyl propane (B) 1-Iodo-2-methyl propane (C) 1-Chlorobutane (D) 1-Iodobutane Ans. Option (B) is correct.	B)

1.	**3. Read the passage given below and answer the following questions:** The substitution reaction of alkyl halides occurs in SN1 or SN2 mechanism whatever mechanism alkyl halide follow for substitution reaction to occur; the polarity of the carbon-halogen bond is responsible for the substitution reaction. The rate of SN1 reactions is governed by the stability of carbocation where as for SN2 reactions steric factor is the deciding factor. If the starting material is a chiral compound, we may end up with an inverted product or racemic mixture depending upon the type of mechanism followed by alkyl halide. Aryl halides are extremely less reactive towards nucleophilic substitution reactions due to the following reasons: (i) In haloarenes, the electron pairs on halogen atom are in conjugation with π-electrons of the ring. (ii) In haloalkane, the carbon atom attached to halogen is sp3 hybridized while in case of haloarene, the carbon atom attached to halogen is sp2 -hybridized. (iii) In case of haloarenes, the phenyl cation formed as a result of self-ionization will not be stabilized by resonance. The following questions are Multiple Choice Questions. Choose the most appropriate answer: Q. 1. A primary alkyl halide would prefer to undergo _____. (A) SN1 reaction (B) SN2 reaction (C) α-Elimination (D) Racemization Ans. Option (B) is correct.	B)
2.	Q. 2. Which of the following alkyl halides will undergoes SN1 reaction most readily? (A) (CH3)3C—F (B) (CH3)3C—Cl (C) (CH3)3C—Br (D) (CH3)3C—I Ans. Option (D) is correct	D)
3.	Q. 3. Which of the following statements are correct about the reaction intermediate in SN1 reaction? (A) Intermediate is unstable because in this carbon is attached to 5 atoms. (B) Intermediate is unstable because carbon atom is sp2 hybridized. (C) Intermediate is stable because carbon atom is sp2 hybridized. (D) Intermediate is more stable than the reactant. Ans. Option (C) is correct.	C)

4.	Q. 4. Reaction of C6H5CH2Br with aqueous sodium hydroxide follows_____. (A) SN1 mechanism (B) SN2 mechanism (C) Any of the above two depending upon the temperature of reaction (D) Saytzeff rule. Ans. Option (A) is correct.	A)
5.	Q.5. Molecules whose mirror image is non-superimposable over them are known as chiral. Which of the following molecules is chiral in nature? (A)2-Bromobutane (B)1-Bromobutane (C) 2-Bromopropane (D) 2-Bromopropan-2-ol Ans. Option (A) is correct.	A)
1.	**4.Read the given passage and answer the questions that follow:** Halo alkanes are colorless (when pure), sweet smelling liquids. CH3Cl, CH3Br and C2H5Cl and freons are gases. Boiling point increases with increase in molecular weight and increase in carbon chain and decreases with branching. They are insoluble in water due to inability to form H-bonds with water. Dipole moment increases with polarity, density increases with increase in molar mass. They are non-inflammable, therefore, CCl4 is used as fire extinguisher under the name pyrene. p-dichloro benzene has zero dipole moment, higher melting point than o-dichloro benzene due to symmetry, fits into crystal lattice readily. Halo alkanes undergo nucleophilic substitution reaction by SN2 mechanism, 1° > 2° > 3°, SN1 if carbocation formed is stable. They also undergo nucleophilic elimination reactions with alcoholic KOH. Haloarenes are less reactive than halo alkanes towards nucleophilic substitution due to resonance. Haloarenes undergo electrophilic substitution reaction like nitration, sulphonation, Friedel Crafts alkylation, acylation. Chloroform is used as solvent, Freon is used as refrigerant, dichloromethane is used as paint remover. Iodoform is used as antiseptic. DDT is insecticide but non-biodegradable. Q.1. Arrange R—F, R—Br, R—I, R—Cl in increasing order of boiling point. (A)R—F < R—Cl < R—Br < R—I (B)R—Cl < R—Br < R—I <R—F (C)R—Br < R—I <R—F< R—Cl (D)R—I <R—F< R—Cl <R—Br Ans. A	A)

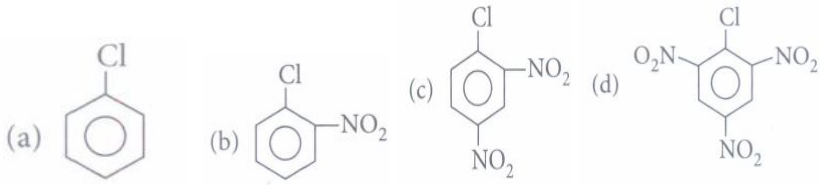
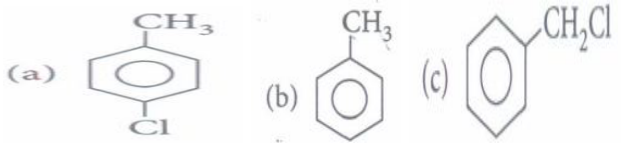
2.	Q.2. Name the chlorine containing drug used in treatment of coronavirus and malaria. (A)Chloroquin (B)Hydroxychloroquin (C)Pencillin (D)Pyrene Ans. B (OR) Which of the following have highest boiling point? (A) CH3CH2Br (B) CH3CH2Cl (C) CH3CH2CH2I (D) CH3CH2CH2F Ans: (C) As the size of halogen atom increases the boiling points also increase due to more molar mass.	B) or C)
3.	Q.3. Toluene reacts with a halogen in the presence of iron (III) chloride giving ortho and para halo compounds. The reaction is (A)Electrophilic elimination reaction (B) Electrophilic substitution reaction (C) Free radical addition reaction (D) Nucleophilic substitution reaction Ans. B	B)
4.	Q4. What is the stereochemistry of the product formed if (+) 2-bromopentane reacts with aqueous KOH by SN2 mechanism. (A)(-) (+) 2-pentanol (B)(+) 2-pentanolA) (C)(-) 2-pentanol (D)None of the above. Ans. C	C)
5.	Q5. Out of the following which one undergoes SN1 mechanism faster? (A) CH2=CH—CH2Cl (B) CH3CH2CH2Cl (C) (CH3)2CHCl (D) CH3CH2CH2Cl Ans. (A) CH2=CH—CH2Cl because CH2=CH—CH2$^{\oplus}$ is more stable due to resonance	A)

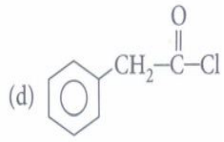
1.	**Assertion and Reason Type Questions** **Note: In the following questions a statement of assertion followed by a statement of reason is given. Choose the correct answer out of the following choices.** (i) Assertion and reason both are correct and reason is correct explanation of assertion. (ii) Assertion and reason both are wrong statements. (iii) Assertion is correct but reason is wrong statement. (iv) Assertion is wrong but reason is correct statement. (v) Assertion and reason both are correct statements but reason is not correct explanation of assertion. 1. Assertion: Phosphorus chlorides (tri and penta) are preferred over thionyl chloride for the preparation of alkyl chlorides from alcohols. Reason: Phosphorus chlorides give pure alkyl halides.	ii)
2.	2. Assertion: The boiling points of alkyl halides decrease in the order: RI > RBr > RCl > RF Reason: The boiling points of alkyl chlorides, bromides and iodides are considerably higherthan that of the hydrocarbon of comparable molecular mass.	V)
3.	3. Assertion: KCN reacts with methyl chloride to give methyl isocyanide Reason: CN – is an ambident nucleophile.	iv)
4.	4. Assertion: tert-Butyl bromide undergoes Wurtz reaction to give 2, 2, 3, 3- tetramethylbutane. Reason: In Wurtz reaction, alkyl halides react with sodium in dry ether to give hydrocarbon containing double the number of carbon atoms present in the halide.	i)
5.	5. 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.	i)
6.	6. Assertion: In monohaloarenes, further electrophilic substitution occurs	i)

	at ortho and para positions. Reason: Halogen atom is activating the benzene ring at ortho and para positions by resonance effect.	
7.	7. Assertion: Aryl iodides can be prepared by reaction of arenes with iodine in the presence of an oxidising agent. Reason: Oxidising agent oxidises I_2 into HI.	iii)
8.	8. Assertion: It is difficult to replace chlorine by –OH in chlorobenzene in comparison to that in chloroethane. Reason: Carbon- Chlorine (C—Cl) bond in chlorobenzene has a partial double bond character due to resonance.	i)
9.	9. Assertion: Hydrolysis of (–)2-bromooctane proceeds with formation of racemic mixture. Reason: This reaction proceeds through the formation of a carbocation.	i)
10.	10. Assertion: Nitration of chlorobenzene leads to the formation of m-nitrochlorobenzene Reason: —NO_2 group is a m-directing group.	iv)

1.	**HALOALKANES AND HALOARENES(4)** **I) Assertion and Reasoning Type questions:** **Directions: These questions consist of two statements, each printed as Assertion and Reason. While answering these questions, you are required to choose any one of the following four responses.** (a) Assertion and Reason both are correct and the Reason is a correct explanation of the Assertion. (b) Assertion and Reason both are correct but Reason is not a correct explanation of the Assertion. (c) Assertion is correct but reason is wrong statement. (d) Assertion is wrong but reason is correct statement. 1. Assertion: Thionyl chloride is preferred for the preparation of alkyl chlorides from alcohols. Reason: Thionyl chloride is preferred because the other two products are escapable gases.	a)
2.	2. Assertion: The boiling point of 1-Chloropropane is greater than that of Isopropyl chloride. Reason: As the molecular mass increases magnitude of van der Waal forces increases.	b)
3.	3. Assertion: Aryl halides can be prepared by reaction of phenol with HCl in the presence of $ZnCl_2$ Reason: The carbon-oxygen bond in phenols has partial double bond character.	d)
4.	4. Assertion: It is necessary to avoid even traces of moisture during the use of a Grignard reagent. Reason: Grignard reagents are least reactive.	c)
5.	5. Assertion: Allylic and benzylic halides show high reactivity towards	a)

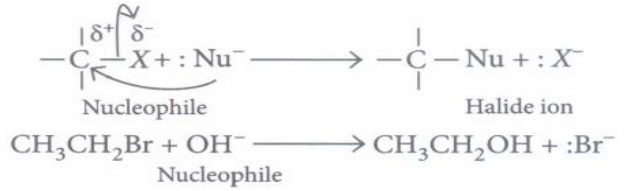
	the SN1 reaction. Reason: The carbocation formed from them gets stabilized through resonance.	

i)	**II) Case Study Based Questions:** **Read the given Passage and answer the following questions:** **Passage1**. Haloarenes are less reactive than halo alkanes. The low reactivity of haloarenes can be attributed to (i) resonance effect (ii) sp2 hybridisation of C of C - X bond in haloarenes (iii) polarity of C - X bond (iv) instability of phenyl cation (formed by self-ionisation of haloarene) (v) repulsion between the electron rich attacking nucleophiles and electron rich arenes. Reactivity of haloarenes towards nucleophilic substitution can be increased or decreased by the presence of certain groups at certain positions. For example, nitro (-NO2) group at o- or p- positions increases the reactivity of haloarenes towards nucleophilic substitution reactions. The following questions are multiple choice questions. Choose the most appropriate answer: (i) Aryl halides are less reactive towards nucleophilic substitution reaction as compared to alkyl halides due to a)the formation of less stable carbocation b)partial double bond character of C – X bond due to resonance c)Larger C – X bond length d) inductive effect.	b)
ii)	(ii) Which of the following aryl halides is the most reactive towards nucleophilic substitution? 	d)
iii)	(iii) Which one of the following will react fastest with aqueous NaOH? 	c)

		
iv)	iv) The reactivity of the compounds (i) MeBr (ii) PhCH2Br (iii) MeCl (iv) p-MeOC6H4Br towards nucleophilic substitution decreases as (a) (i) > (ii) >(iii) > (iv) (b) (iv) > (ii) >(i) > (iii) (c) (iv) > (iii) >(i) > (ii) (d) (ii) > (i) > (iii) > (iv)	d)

i)	**Passage 2:** Nucleophilic substitution reactions are of two types; substitution nucleophilic bimolecular (SN2) and substitution nucleophilic unimolecular (SN1) depending on molecules taking part in determining the rate of reaction. Reactivity of alkyl halide towards SN1 and SN2 reactions depends on various factors such as steric hindrance, stability of intermediate or transition state and polarity of solvent. SN2 reaction mechanism is favoured mostly by primary alkyl halide or transition state and polarity of solvent, SN2 reaction mechanism is favoured mostly by primary alkyl halide then secondary and then tertiary. This order is reversed in case of SN1 reactions. The following questions are multiple choice question. Choose the most appropriate answer: i) Which of the following is most reactive towards nucleophilic substitution reaction? (a) C6H5Cl (b) CH2=CHCl (c) ClCH2CH=CH2 (d) CH3CH=CHCl	c)
ii)	ii) Isopropychloride undergoes hydrolysis by (a) SN1 mechanism (b) SN2 mechanism (c) SN1 and SN2 mechanism (d) neither SN1 nor SN2 mechanism	c)
iii)	iii) Tertiary alkyl halides are practically inert to substitution by SN2 mechanism because of (a) insolubility (b) instability (c) inductive effect	d)

	(d) steric hindrance	
iv)	iv) Which of the following is the correct order of decreasing SN2 reactivity? (a) RCH2X > R2CHX > R3CX (b) R3CX > R2CHX >RCH2X (c) R2CHX >R3CX > RCH2X (d) RCH2X >R3CX >R2CHX	a)

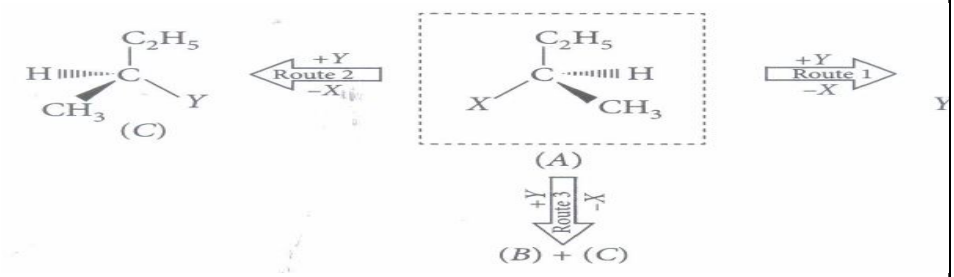
	Passage 3: In haloalkanes, when a nucleophile stronger than the halide ion approaches the positively charged carbon atom of an alkyl halide, the halogen atom along with its bonding electron pair gets displaced and a new bond with the carbon and the nucleophile is formed. These reactions are called nucleophilic substitution reactions.  In these reactions the atom or group of atoms which loses its bond from carbon and takes on an additional pair of electrons is called leaving group. Halide ions are good leaving groups. Some important nucleophilic substitution reactions of halo alkanes with common nucleophiles are given in the table below.	

S.No	**Reagent**	**Nucleophile (Nu-)**	**Substitution product R-Nu**	**Class of main product**
1.	NaOH or KOH or moist Ag2O	OH-	ROH	Alcohol
2.	H2O	H2O	ROH	Alcohol
3.	NaI	I-	R-I	Alkyl iodide
4.	R'NH 2	R′NH2	RNHR'	Sec. amine
5.	KCN	$C^{-}\equiv N:$	RCN	Nitrile (cyanide)

6.	KNO_2	O=N-O-	R-O-N=O	Alkyl nitrite

i)	**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**. (a) Assertion and reason both are correct statements and reason is correct explanation for assertion. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion. (c) Assertion is correct statement but reason is wrong statement. (d) Assertion is wrong statement but reason is correct statement. Assertion: Alkyl halides are hydrolyzed to alcohols by moist silver oxide. Reason: Hydroxide ion is a stronger nucleophile than halide ion.	a)
ii)	Assertion : Alkyl halides form alkenes when heated with alc KOH above 300°C. Reason: Substitution reaction predominates over elimination reaction.	c)
iii)	Assertion : RBr reacts with $AgNO_2$ to give nitro alkane. Reason: Silver nitrite ($AgNO_2$) is an ionic compound, therefore the negative charge on nitrogen is the attacking site.	c)
iv)	Assertion: Among CH_3CH_2I and CH_3CH_2Cl, ethyl chloride undergoes substitution easily. Reason: Iodide is a good leaving group compared to chloride ion.	d)

i)	**PASSAGE 4:** When a chemical reaction involves bond cleavage or bond formation at an asymmetric carbon atom, three different products may be formed. For example, during the substitution of a group X by Y in the following reaction, the three possible products may be shown below:	a)

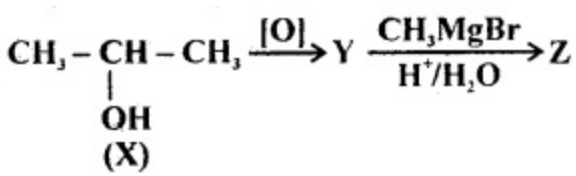
	 (i) If B is the only product, the process is called retention of configuration because B has the same configuration as the starting reactant (A). (ii) If C is the only product, the process is called inversion of configuration because C has the configuration opposite to the starting reactant (A). (iii) If an equimolar mixture of B and C (i.e., a 50 : 50 mixture) is formed, then the process is called racemization and the product is optically inactive because one isomer will rotate the light in the direction opposite to another. **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**. (a) Assertion and reason both are correct statements and reason is correct explanation for assertion. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion. (c) Assertion is correct statement but reason is wrong statement. (d) Assertion is wrong statement but reason is correct statement. (i) Assertion: SN1 substitution of a 30 alkyl halide produces racemic mixture. Reason: A stable planar carbocation is formed as an intermediate in SN1 substitution.	
ii)	(ii) Assertion: tert- Butyl iodide undergoes SN2 substitution. Reason: SN2 reactions involves attack by nucleophile from rear side	d)
iii)	(iii) Assertion: Optically active 2-iodobutane on treatment with NaI in acetone undergoes recemization. Reason: Repeated Walden inversions on the reactant and its product eventually gives a racemic mixture.	c)
iv)	(iv) Assertion: SN2reaction of an optically active alkyl halide with an aqueous solution of KOH always gives an alcohol with opposite sign of rotation. Reason: SN2 reactions always proceed with inversion of configuration.	a)

i)	**PASSAGE 5:** Alkyl halides are more polar than alkanes and hence	b)

	have more boiling point than those of alkanes. Among alkyl halides with same alkyl group alkyl iodides have greater boiling point than other alkyl halides due to their greater size and mass. Among alkyl chlorides the molar mass increases with increase in bulkiness of alkyl group and hence boiling point of higher members of alkyl chlorides will be higher, Among isomeric alkyl chlorides the boiling point increases with increase in the surface area. Alkyl halides are insoluble in water. **The following questions are multiple choice question. Choose the most appropriate answer:** i) Which of the following will have highest boiling point? a) Bromomethane b) Bromoform c) Chloromethane d)Dibromomethane	
ii)	ii) Among the following which one will have lowest boiling point? a) 1- Chloropropane b) Isopropyl chloride c) Isobutyl chloride d) 1- Chlorobutane	b)
iii)	iii) Among the following which one will be soluble in water? a)Chloroethane b) Ethane c) Bromopropane d) Ethyl alcohol	d)
iv)	iv) Among the following which one will have highest boiling point? a)Butane b) Pentane c) n-Pentyl chloride d) Isopentane	c)

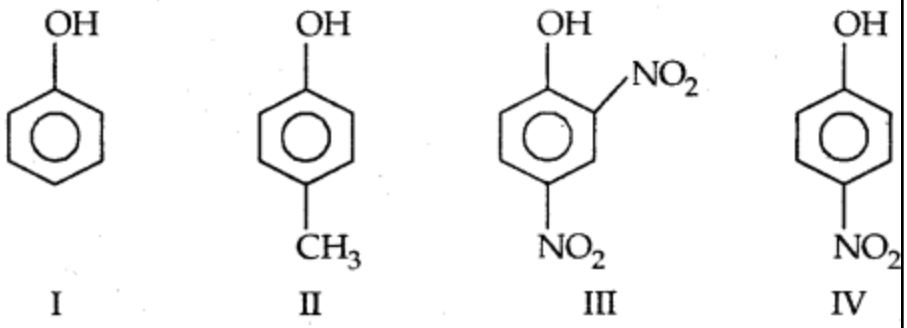
1.	**ALCOHOLS,PHENOLS AND ETHERS(1)** **MULTIPLE CHOICE QUESTIONS (MCQs):** **In the following questions four options are given. Select one correct option.** 1.What happens when tertiary butyl alcohol is passed over heated copper at 300°C? (a) Secondary butyl alcohol is formed (b) 2-methylpropene is formed (c) 1-butene is formed (d) Butanol is formed	b)
2.	2.A compound X with the molecular formula C3H8O can be oxidised to another compound Y whose molecular formulae is C3H6O2. The compound X may be (a) CH3CH2OCH3 (b) CH3CH2CHO (c) CH3CH2CH2OH (d) CH3CHOHCH3	c)
3.	3.The decreasing order of boiling point of the following alcohols is (a) 3-methylbuan-2-ol > 2-methylbutan-2-ol > pentan-1-ol (b) Pentan-1-ol > 3-methylbutan-2-ol > 2-methylbutan-2-ol (c) 2-methylbutan-2-ol > 3-methylbutan-2-ol > pentan-1-ol (d) 2-methylbutan-2-ol > pental-1-ol > 3-methylbutan-2-ol	b)
4.	4.Propanone on reaction with alkyl magnesium bromide followed by hydrolysis will produce (a) primary alcohol (b) secondary alcohol (c) tertiary alcohol	c)

	(d) carboxylic acid	
5.	5.Phenol when treated with excess of bromine water gives a white precipitate of (a) 2, 4, 6-tribromophenol (b) o-bromophenol (c) p-bromophenol (d) bromobenzene	a)
6.	6.The reaction between phenol and chloroform in the presence of aqueous NaOHis (a) nucleophilic substitution reaction (b) electrophilic addition reaction (c) electrophilic substitution reaction (d) nucleophilic addition reaction	c)
7.	7.The most suitable reagent for the conversion of $RCH_2OH \rightarrow RCHO$ is (a) $K_2Cr_2O_7$ (b) CrO_3 (c) $KMnO_4$ (d) PCC	d)
8.	8.Tertiary butyl alcohol gives tertiary butyl chlorideon treatment with (a) ConcHCl/anhydrous $ZnCl_3$ (b) KCN (c) NaOCl (d) Cl_2	a)
9.	9.Conversion of phenol to salicyclic acid and to salicyaldehyde are known as (respectively) (a) Reimer-Tiemann reaction and Kolbe's reaction (b) Williamson's synthesis and Hydrobration-oxidation (c) Kolbe's reaction and Williamson's synthesis (d) Kolbe's reaction and Reimer-Tiemann reaction	d)
10.	10.Benzoquinone is prepared by reaction of phenol with (a) $Na_2Cr_2O_7$, H_2SO_4 (b) $KMnO_4$, H_2SO_4 (c) Na_2CrO_4,HCl (d) K_2MnO_4, H_2SO_4	a)
11.	11.In the following reaction sequence Z is	c)

	 (a) butan-1-ol (b) butan-2-ol (c) 2-methylpropan-2-ol (d) 1, 1-dimethylethanol	
12.	12.Arrange the following alcohols in order of increasing reactivity towards sodium metal. (i) (CH3)3C-OH (ii) (CH3)2CH-OH (iii) CH3CH2OH (a) (iii) < (ii) < (i) (b) (ii) > (i) < (iii) (c) (i) < (ii) < (iii) (d) (iii) < (i) < (ii)	c)
13.	13.An unknown alcohol is treated with “Lucas reagent” to determine whether the alcohol is primary, secondary or tertiary. Which alcohol reacts fastest and by what mechanism? (a) Tertiary alcohol by SN1 (b) Secondary alcohol by SN1 (c) Tertiary alcohol by SN2 (d) Secondary alcohol by SN2	a)
14.	14.An alcohol X when treated with hot cone. H2SO4 gave an alkene Y with formula C4H8. This alkene on ozonolysis gives single product with molecular formula C2H4O. The alcohol is (a) butan-1-ol, (b) butan-2-ol (c) 2-methylpropan-1-ol (d) 2,2-dimethylbutynal-1-ol	b)
15.	15.The compound which gives the most stable carbonium ion on dehydration is (a) (CH3)2CHCH2OH (b) (CH3)3COH (c) CH3CH2CH2CH2OH (d) CH3CH OH CH2 CH3	b)
16.	16.Which of the following cannot be made by using Williamson Synthesis: (a) Methoxybenzene	d)

	(b) Benzyl p-nitrophenyl ether (c) tert. butyl methyl ether (d) Ditert. butyl ether	
17.	17.The I.U.P.A.C. name of the ether CH2 = CH-CH2O CH3 is (a) Alkyl methyl ether (b) l-Methoxy-2-propene (c) 3-Methoxy-l-propene (d) Vinyl dimethyl ether	c)
18.	18.Dehydration of alcohol to ethers is catalysed by (a) conc. H2SO4 at 413 K (b) Hot NaOH (c) Hot HBr (d) Hot HNO3	a)
19.	19.Ethers are (a) Neutral (b) Basic (c) Acidic (d) Amphoteric	b)
20.	20.An ether is more volatile than alcohol having the same molecular formula. This is due to (a) intermolecular hydrogen bonding in alcohols. (b) dipolar character of ethers (c) alcohols, having resonance structures (d) intermolecular hydrogen bonding in ethers	a)

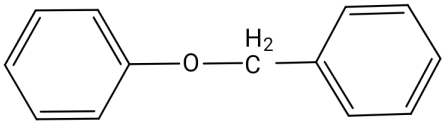
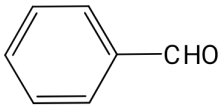
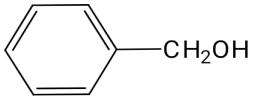
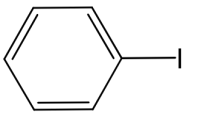
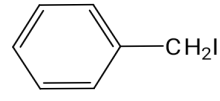
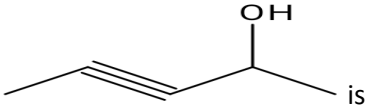
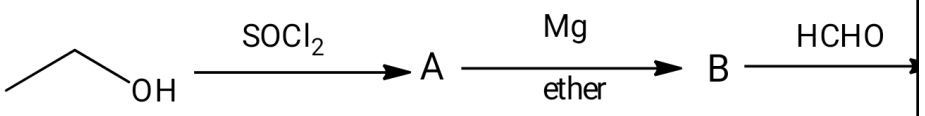
21.	21.Strength of acidity is in order:	b)

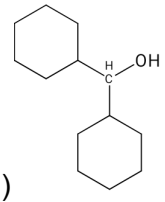
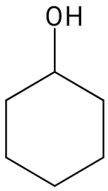
	 I II III IV (a) II > I > III > IV (b) III > IV > I > II (c) I > IV > III > n (d) IV > III > I > II	
22.	22.During dehydration of alcohols to alkenes by heating with cone. H2SO4 the initial step is (a) formation of an ester (b) protonation of alcohol molecule (c) formation of carbocation (d) elimination of water	b)
23.	$HC \equiv CH \xrightarrow[H_2SO_4]{HgSO_4} \xrightarrow[H_2O]{CH_3MgBr} \xrightarrow{PBr_3}$ (a) CH3CH Br CH3 (b) CH3 CH2 CH2 Br Br (c) CH2 = CH-Br (d) Br CH = CH-CH3	a)
24.	24.When Phenol is distilled with zinc dust, it gives (a) Benzene (b) Toluene (c) Benzaldehyde	a)

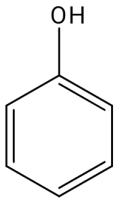
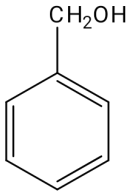
	(d) Benzoic acid	
25.	25.In the reaction of phenol with $CHCl_3$ and aqueous NaOH at 343 K, the electrophile attacking the ring is: (a) $CHCl_3$ (b) $CHCl_2$ (c) CCl_2 (d) $COCl_2$	c)
26.	26.Phenol reacts with Br_2 in CS_2 at low temperature to give (a) o-Bromophenol (b) o-and p-Bromophenols (c) p-Bromophenol (d) 2, 4, 6Tribromophenol	b)
27.	27.1-Propanol and 2-propanol can be best distinguished by (a) Oxidation with $KMnO_4$ followed by reaction with Fehling solution? (b) Oxidation with acidic dichromate followed by reaction with Fehling solution. (c) Oxidation by heating with copper followed by reaction with Fehling solution. (d) Oxidation with cone. H_2SO_4 followed by reaction with Fehling solution.	c)
28.	28.Ethylene reacts with Baeyer's reagent to give (a) ethane (b) ethyl alcohol (c) ethylene glycol (d) None of these	c)
29.	29.By which of the following methods alcohol can be prepared in excellent yield? (a) From alkenes (b) By hydroboration-oxidation (c) From carbonyl compounds (d) From Grignard reagent	b)
30.	30.Lucas reagent is (a) Conc. HCl and anhydrous $ZnCl_2$ (b) Conc. HNO_3 and hydrous $ZnCl_2$ (c) Conc. HCl and hydrous $ZnCl_2$ (d) Conc. HNO_3 and anhydrous $ZnCl_2$	a)
II. 1.	**Match the items of Column 1 and column 2.** **Column 1** — **Column 2** i) PCC — a) Neutral $FeCl_3$ ii)Lucas reagent — b) Conc. HNO_3 + Conc.	i-d ii-e iii-a iv-c

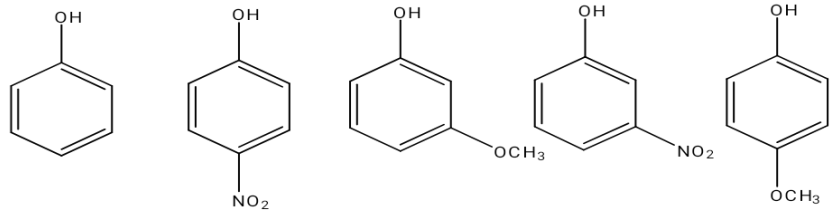
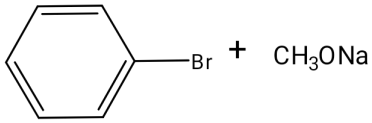
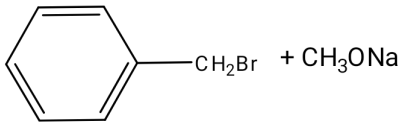
	H2SO4 iii)Reagent for detection of Phenol c) Alkyl magnesium halide iv)Grignard reagent d) CrO3 + Pyridine + HCl v)Nitration mixture e) Conc. HCl + anhydrous ZnCl2	v-b
2.	**Match the items of Column 1 and column 2**. **Column 1** **Column 2** i)Kolbe's reaction a) Ethyl alcohol ii) Reimer Tiemann reaction b) Alkyl halide to ether iii)Williamsons synthesis c) Sodium Phenoxide tosalicylic acid iv)Fermentation d) Ethylene glycol v)Antifreeze used in car engines e) Phenol to salicylaldehyde	i-c ii-e iii-b iv-a v-d
3.	**Match the items of Column 1 and column 2** **Column 1** **Column 2** i) Ethanol to ethene a) PCC ii) Ethene to ethanol b) tert- Butyl alcohol iii) Oxidation of propan-1-ol with alk KMnO4 c) Picric acid iv) Oxidation of 10 alcohol to aldehyde d) Conc. H2SO4 /1800 C v) Phenol, Conc. HNO3 e) H2O/ H+ vi) Acetone, CH3MgBr, H2O f) Propanoic acid	i-d ii-e iii-f iv-a v-c vi-b

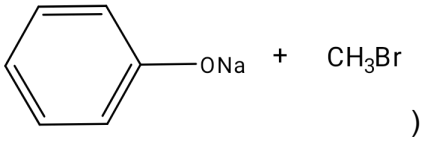
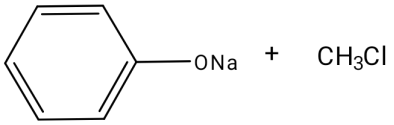
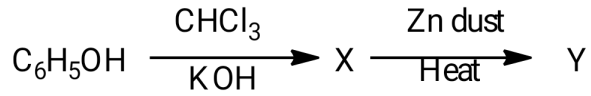
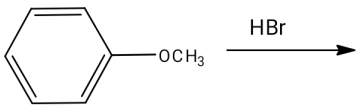
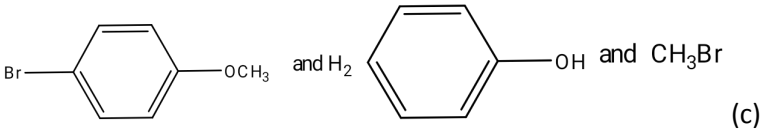
	Alcohols, Phenols and Ethers(2)	**Answers**:
1.	**Match the items of Column 1 and column 2.** **Sl.No**. **Column 1.** **Column 2** i. Isopropyl benzene p. Anisole ii. Benzene-1,2-diol q. Salicylic acid iii. o-hydroxybenzoic acid r. Cumene iv. 2,4,6-trinitrophenol s. Catechol v. Methoxy benzene t. Picric acid (a) i-r , ii-s, iii-p , iv-t , v-q (b) i-r , ii-q, iii-p , iv-t , v-s (c) i-r , ii-s, iii-q , iv-t , v-p (d) i-r , ii-s, iii-t , iv-q , v-p	C) i-r ii- s iii- q iv- t v- p

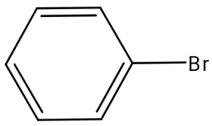
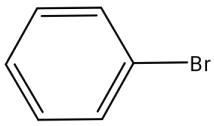
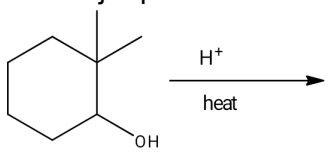
1.	**MULTIPLE CHOICE QUESTIONS (MCQs):** **In the following questions four options are given. Select one correct option.**  1. The ether reacts with HI to form  (a)  (b)  (c)  (d)	d)
2.	The IUPAC name of o  is (a)Pent-2-yn-4-ol (b)Pent-3-yne-2-ol (c)Pent-3-yn-4-ol (d)Pent-3-yn-2-ol	d)
3.	The major product obtained on heating excess of ethanol with Conc.H2SO4 at 413K is (a)CH2=CH2 (b)(C2H5)2O (c)But-2-ene (d)(CH3CH2)2SO4	b)
4.	Identify D in the following reaction sequence  (a)n-butylalcohol (b)Propanal (c)n-propylalcohol	c)

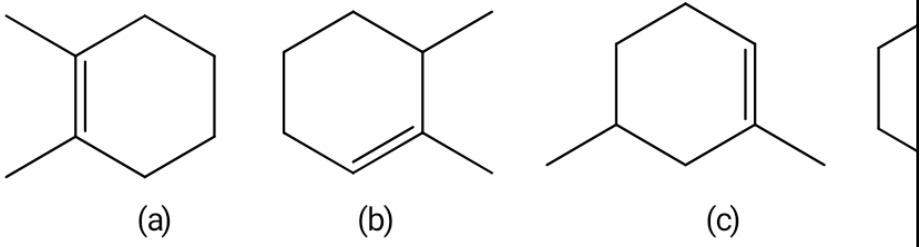
	(d)Butanal	
5.	The most acidic among the following is  (a) (b)  	c)

	(c)  (d) 	
6.	Correct statements in case of n-butanol and t-butanol are: (i) both are having equal solubility in water (ii) t-butanol is more soluble in water than n-butanol (iii) boiling point of t-butanol is lower than n-butanol (iv) boiling point of n-butanol is lower than t-butanol (a) Only (iii) (b)Both (ii) and (iii) (c)Both (iii) and (iv) (d)(i), (iii) and (iv)	b)
7.	Which of the following alcohols has the highest vapour pressure at room temperature? (a)n-butyl alcohol (b)sec-butyl alcohol (c)tert-butyl alcohol (d)iso-butyl alcohol	c)
8.	Which of the following forms the least stable carbocation? (a)(CH3)3COH (b)CH2=CH-OH (c)CH2=CHCH2OH (d)C6H5CH2OH	b)
9.	Though the molecular mass of ethanol and propane is same, the boiling point of ethanol is higher than propane, this is because (a)Ethanol is polar and propane is non polar (b)Ethanol involves in intermolecular hydrogen bonding but propane doesn't (c)Both (a) and (b) (d)Only (b)	c)
10.	Aspirin is obtained by acetylation of	a)

	(a)o-hydroxy benzoic acid (b)m-hydroxy benzoic acid (c)o-dihydroxy benzene (d)p-dihydroxy benzene	
11.	The common name of Benzene-1,3-diol is (a)Catechol (b)Quinol (c)Resorcinol (d)glycerol	c)
12.	The correct order of decreasing acid strength of the following compounds is  I II III IV V (a)V > IV > II > I > III (b)II > IV > I > III > V (c)IV > V > III > II > I (d)II > IV > III > V > I	b)
13.	Which of the following will not produce an ether by Williamson synthesis (a)  (b)  	a)

	(c ) (d) 	
14.	Identify Y in the following reaction sequence  (a)Benzene (b)Benzaldehyde (c)Phenol (d)None of these	b)
15.	In the reaction  the products formed are  . (a) (c)	c)

	 and CH_3Br  and CH_3OH (d) (	
16.	Which of the following statements is not correct? (a)Phenol is used to prepare analgesic drugs (b)Solubility of phenol in water is more than that of chlorobenzene (c)Phenol is neutralised by sodium carbonate (d)Boiling point of o-nitrophenol is Lower than that of p-nitrophenol	c)
17.	Carbolic acid is (a)C6H5CHO (b)C6H6 (c)C6H5COOH (d)C6H5OH	d)
18.	Alcohols are (a)Bronsted acids (b)Lewis base (c)Reducing agents (d)All of (a), (b) and ©	d)
19.	The correct order of acid strength of the following substituted phenol in water is (a)p-nitrophenol<p-fluorophenol<p-chlorophenol (b)p-chlorophenol < p-fluorophenol < p-nitrophenol (c)p-fluorophenol < p-chlorophenol < p-nitrophenol (d)p-fluorophenol < p-nitrophenol < p-chlorophenol	c)
20.	The major product in the following reaction is 	a)

1.	**ALCOHOLS, PHENOLS AND ETHERS(3)** **I) Assertion and Reasoning Type questions:** **Directions: These questions consist of two statements, each printed as Assertion and Reason. While answering these**	d)

	questions, you are required to choose any one of the following four responses. (a) Assertion and Reason both are correct and the Reason is a correct explanation of the Assertion. (b) Assertion and Reason both are correct but Reason is not a correct explanation of the Assertion. (c) Assertion is correct but reason is wrong statement. (d) Assertion is wrong but reason is correct statement. 1.Assertion: PKavalue of Ortho-nitrophenol is more than ortho-methoxyphenol. Reason: NO2 group is an electron withdrawing group while methoxy group is electron donating in nature.. Answer: d	
2.	2.Assertion: Phenol is more reactive than benzene towards electrophilic substitution reactions. Reason: -OH group in phenols is electron donating ring activating group.	a)
3.	3.Assertion: The boiling point of ethanol is more than that of methoxy methane, Reason: In ethanol intramolecular hydrogen bonding is present.	c)
4.	4.Assertion: (CH3)3C-O-CH3 on reaction with HI gives (CH3)3C-I. Reason: The reaction takes place by SN1 mechanism.	a)
5.	5.Assertion: Oxidation of ethyl alcohol with acidified potassium permanganate produces aldehydes. Reagent: Acidified potassium permanganate is a strong oxidizing agent.	d)

1.	**II) Case Study Based Questions:** **Read the given Passage and answer the following questions:** **PASSAGE 1:** In alcohols, the oxygen of the –OH group is attached to carbon by a sigma (σ) bond formed by the overlap of a sp3 hybridized orbital of carbon with a sp3 hybridized orbital of oxygen. The bond angle in alcohols is slightly less than the tetrahedral angle. In phenols, the –OH group is attached to sp2 hybridized carbon of an aromatic ring. In ethers, the four electron pairs, i.e., the two bond pairs and two lone pairs of electrons on oxygen are arranged approximately in a tetrahedral arrangement. 1. The bond angle in alcohols is less than the tetrahedral angle because of a) Repulsion of electron pairs on oxygen	a)

	b) Difference in hybridization c)High electronegativity of oxygen d) Repulsion between the bulky alkyl groups	
2.	2. The C-O bond length in phenol is less than that in methanol because of a) Partial double bond character b) conjugation of unshared electron pair of oxygen with the aromatic ring c)sp2 hybridized state of carbon to which oxygen is attached d) All of these.	d)
3.	3. The C–O bond length in ether is a) Same as that in alcohols b) Greater than that of alcohols c)Less than that in alcohols d) None of these.	a)
4.	4. Identify the incorrect statement a) The bond angle in ether is greater than tetrahedral angle. b) The bond angle in ether is less than tetrahedral angle. c)There is strong repulsive interaction between the two bulky (–R) groups in ether. d)The C-O bonds in ethers are polar.	b)

i)	**PASSAGE 2:** A compound (X) containing C, H and O is unreactive towards sodium. It also does not react with Schiff's reagent. On refluxing with an excess of hydroiodic acid, (X) yields only one organic product (Y). On hydrolysis, (Y) yields a new compound (Z) which can be converted into (Y) by reaction with red phosphorous and iodine. The compound (Z) on oxidation with potassium permanganate gives a carboxylic acid. The equivalent weight of this acid is 60. The following questions are multiple choice question. Choose the most appropriate answer: (i) The compound (X) is an (a) acid (b) aldehyde (c) alcohol (d) ether	d)
ii)	ii) The IUPAC name of the acid formed is (a) methanoic acid (b) ethanoic acid (c) propanoic acid (d) (d) butanoic acid	b)
iii)	(iii) Compound (Y) is (a) ethyl iodide (b) (b)methyl iodide	a or b)

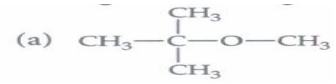
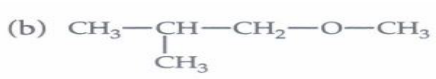
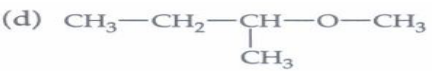
	(c) propyl iodide (d) (d)mixture of (a) and (b) or Compound (Z) is (a) methanol (b) ethanol (c) propanol (d) butanol	
iv)	(iv) Compound (X) on treatment with excess of Cl2 in presence of light gives (a) α-chlorodiethyl ether (b) α, α'-dichlorodiethyl ether (c) perchlorodiethyl ether (d) none of these	c)

1.	**PASSAGE 3:** Alcohols and phenols react with active metals such as sodium, potassium and aluminium to yield corresponding alkoxides /phenoxides and hydrogen. The above reactions show that alcohols and phenols are acidic in nature. In fact, alcohols and phenols are Brönsted acids i.e., they can donate a proton to a stronger base (B:). The acidic character of alcohols is due to the polar nature of O–H bond. Alcohols are acidic in nature due to the polar nature of O-H bond but they are weak acids and donate proton only to a strong base. Alcohols are weaker acids than water. Phenols are acidic in nature because its conjugate base i.e phenoxide ion is more resonance stabilized than phenol. 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. (a) Assertion and reason both are correct statements and reason is correct explanation for assertion. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion. (c) Assertion is correct statement but reason is wrong statement. (d) Assertion is wrong statement but reason is correct statement. 1. Assertion : p-nitrophenol is more acidic than phenol. Reason : Nitro group helps in the stabilisation of the phenoxide ion by dispersal of negative charge due to resonance.	a)
2.	2 Reason: Alkoxide ions are not stabilised by resonance. Assertion: Alcohols are better proton donors than water.	d)
3.	3. Assertion: o-cresol is less acidic than phenol. Reason: Alkyl groups due to its +I effect destabilises the phenoxide ion and decreases the acidity.	a)

4.	4. Assertion: Ethanol is a weaker acid than phenol. Reason: Alkoxide ion is stabilised by resonance while phenoxide ion is destabilised by resonance.	c)

i).	**PASSAGE 4:** Due to intermolecular hydrogen bonding, the boiling points of alcohols and phenols are much higher than those of corresponding halo alkanes, haloarenes, aliphatic and aromatic hydrocarbons. Among isomeric alcohols, the boiling points follow the order: primary > secondary > tertiary. Boiling points of ethers are much lower than those of isomeric alcohols. The solubility of alcohols in water decreases as the molecular mass of alcohols increases. The solubility of phenols in water is much lower than that of alcohols. Lower ethers such as dimethyl ether and ethyl methyl ether are soluble in water, but the solubility decreases as the molecular mass increases. **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.** (a) Assertion and reason both are correct statements and reason is correct explanation for assertion. (b) Assertion and reason both are correct statements but reason is not correct explanation for assertion. (c) Assertion is correct statement but reason is wrong statement. (d) Assertion is wrong statement but reason is correct statement. (i) Assertion: Alcohols have higher boiling points than ethers of comparable molecular masses. Reason: Alcohols and ethers are isomeric in nature.	b)
ii).	(ii) Assertion: The solubility of phenols in water is much lower than that of alcohols. Reason: Phenols do not form H-bonds with water.	c)
iii).	(iii) Assertion : Among n-butane, ethoxyethane,1-propanol and 1-butanol, the increasing order of boiling points is,1-butanol < 1-propanol < ethoxyethane < n-butane. Reason: Boiling point increases with increase in molecular mass.	d)
iv).	(iv) Assertion: Dimethyl ether and diethyl ether are soluble in water. Reason: As the molecular mass increases, solubility of ethers in water decreases.	c)

1.	**PASSAGE 5:** Ethers are the least reactive of the functional groups. The cleavage of C-O bond in ethers takes place under drastic conditions with excess of hydrogen halides. The reaction of dialkyl ether gives two alkyl halides. Alkyl aryl ethers are cleaved at the	a)

	alkyl-oxygen bond due to the more stable aryl-oxygen bond. The order of reactivity of hydrogen halides is as follows: HI >HBr>HCl. The cleavage of ethers takes place with concentrated HI or HBr at high temperature. 1.Identify the products in the reaction of anisole with HBr (a)C6H5OH and CH3Br (b)C6H5Br and CH3OH (c)C6H5OH and C2H5Br (d)C6H5Br and C2H5OH	
2.	2. tert-Butyl methyl ether on heating with HI gives a mixture of (a) tert-Butyl alcohol and methyl iodide (b) tert-Butyl iodide and methanol (c) Isobutylene and methyl iodide (d) Isobutylene and methanol.	b)
3.	3. Among the following ethers, which one will produce methyl alcohol on treatment with hot concentrated HI?   (c) CH3-CH2-CH2-CH2-O-CH3 	a)
4.	4. Chloroethane reacts with which of the following to give Diethyl Ether? (a)NaOH (b)H2SO4 (c)C2H5Ona (d)Na2S2O3	c)

1.	**ALCOHOLS, PHENOLS AND ETHERS(4)** **I. ASSERTION AND REASONING QUESTIONS:** **Two statements are given - one labelled**	(ii.) Reason is a correct statement, but it's not an

	Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (i), (ii), (iii) and (iv) as given below: i.Both Assertion (A) and Reason (R) are correct statements, and Reason (R) is the correct explanation of the Assertion (A). ii.Both Assertion (A) and Reason (R) are correct statements, but Reason (R) is not the correct explanation of the Assertion (A). iii.Assertion (A) is correct, but Reason (R) is incorrect statement. iv.Assertion (A) is incorrect, but Reason (R) is correct statement Assertion(A): Acid Catalyzed hydration of But-1-ene yields Butan-2-ol as the major product. Reason(R): Addition of water to alkene in acidic medium proceeds through carbocation Intermediate.	explanation for assertion. Butan-2-ol is the major product because of the higher stability of the 20 carbocation formed.
2.	Assertion(A): The solubility of alcohols in water decreases with increase in molecular weight. Reason(R): As molecular weight increases the length of hydrocarbon chain increases, this increases the chances of hydrogen bonding with water.	(iii) As the length of hydrocarbon chain increases the tendancy to form hydrogen bonding with water decreases.
3.	Assertion(A): Secondary alcohol reacts faster with metal like Na than primary alcohol Reason(R) : O-H bond in secondary alcohol is less polar than primary alcohol	(iv). Assertion is incorrect. The order of reactivity of alcohol with metal is CH3OH > 10>20>30. Reason is correct because with increase in number of alkyl groups attached to C containing –OH group the polarity in O-H bond decreases due to the +I effect of alkyl groups
4.	Assertion (A): Acidic dehydration of alcohols is an elimination reaction. The order of reactivity is 10<20<30. Reason(R) : Dehydration of alcohols involves a carbocation intermediate,formed due to the cleavage	i)
5.	Assertion(A): Lucas reagent can be used to distinguish between ethanol and propan-1-ol	(iv) Assertion is incorrect

	Reason(R) : The reactivity of Lucas reagent with 10,20 and 30 alcohol are different	because both ethanol and propan-1-ol are 10 alcohols and Lucas reagent cannot be used to distinguish between them.
6.	Assertion(A): Phenols are more reactive towards nucleophilic substitution reaction compared to benzene Reason(R) : -OH group in phenol increases the electron density in ortho and para position due to resonance	iv)
7.	Assertion(A): o-nitrophenol and p-nitrophenol are more acidic than m-nitrophenol Reason(R) : Effective delocalisation of negative charge in phenoxide ion takes place when electron withdrawing groups are present in ortho and para position.	i)
8.	Assertion (A): CH3OCH2CH2CH3 is named as 1-Methoxypropane in IUPAC system. Reason(R): According to IUPAC system of nomenclature, ethers are regarded as hydrocarbon derivatives in which a hydrogen atom is replaced by an –OR or –OAr group. The larger (R) group is chosen as the parent hydrocarbon.	i)
9.	Assertion(A): Arylhalides are not used in the preparation of ethers by Williamson's synthesis Reason(R) : Aryl halides undergo elimination reaction in presence of alkoxide	(iii) Reason is incorrect statement. Aryl halides do not undergo elimination reaction. Arylhalides are not used in Williamson's synthesis because they are less reactive towards nucleophilic substitution reaction.
10.	Assertion(A): The C-O-C bond length in ethers is slightly greater than the normal tetrahedral angle. Reason(R) : Due to the repulsive interaction between the two alkyl groups in ethers	i)

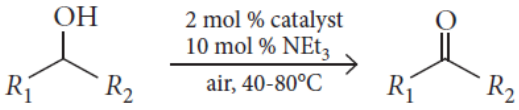
i)	**I. CASE BASED MCQs:** **Read the passage given below and answer the**	**ANSWERS TO CASE BASED**

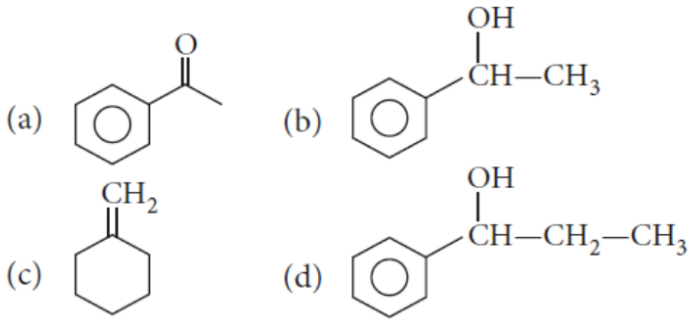
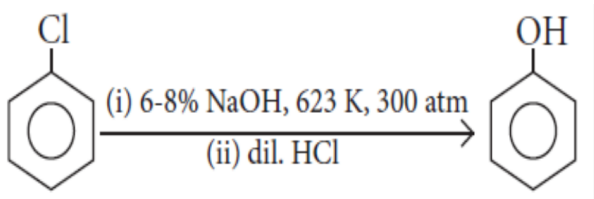
	questions following it. The questions have four alternatives select the most appropriate one. Phenols and Alcohols both have the same functional group(-OH) but phenols are stronger acids than alcohols. This is mainly due to the reason that phenoxide ion left after the release of H+ ion in phenol is resonance stabilized while alkoxide ion does not show similar characteristics. The electron withdrawing groups tend to increase the acidic strength of phenols while electron releasing groups tend to decrease it. The effect of both types of groups is more pronounced when present at the para position than when these are present at the ortho position in the ring. However, their effect at the meta position is relatively very small. (i) The increasing order of reactivity of 10,20 and 30 alcohols towards sodium metal is (a) 10 < 20 < 30 (b) 10 < 30 <20 (c) 30 < 20 < 10 (d) 20 < 10 < 30 (ii) Which of the following is the strongest acid? (a) ClCH2CH2CH2CH2OH (b) CH3CH2CH2CH(Cl)OH (c) CH3CH2CH(Cl)CH2OH (d) CH3CH(Cl)CH2CH2OH (iii) The acidic strength increases in the order (a) p-Cresol < m-Cresol < o-Cresol (b) p-Cresol < o-Cresol < m-Cresol (c) m-Cresol < o-Cresol < p-Creso (d) o-Cresol < p-Cresol < m-Cresol (iv) The strongest acid among the following is? (a) o-nitrophenol (b) m-nitrophenol (c) p-nitrophenol (d) phenol	**MCQS** (i) (c) 30 < 20 < 10 (ii) (b) CH3CH2CH2CH(Cl) OH (iii) (d) o-Cresol < p-Cresol < m-Cresol (iv) (c) p-nitrophenol
ii)	ii)An organic compound A having molecular formula C6H6O gives a characteristic colour with aq. FeCl3 solution. When a is treated with CO2 and NaOH at 400K and 4 to 7 atm pressure, compound B is obtained. The compound B on acidification gives compound C. C reacts with acetyl chloride to form D. D is a popular analgesic. (i) Name the reaction by which A is converted to C	(i) (b) Kolbe's reaction (ii) (d) Electrophilic substitution reaction (iii) (a) 2-hydroxybenzoicacid (iv) (b) phenolic

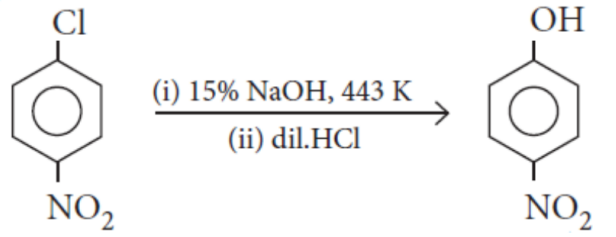
	(a) Reimer-Tiemann Reaction (b) Kolbe's reaction (c) Alkylation (d) Acylation (ii) The conversion of A to B is (a) Nucleophile substitution reaction (b) Addition reaction (c) decarboxylation (d) Electrophilic substitution reaction (iii) The IUPAC name of C is (a) 2-hydroxybenzoicacid (b) 3-hydroxybenzoicacid (c) 4-hydroxybenzoicacid (d) Benzoicacid (iv) The functional group in the organic compound A is (a) Alcoholic (b) phenolic (c) Carboxylicacid (d) Amine	
iii)	The boiling point of alcohols and phenols are much higher than those of corresponding haloalkanes, haloarenes, ethers and hydrocarbons. Among isomeric alcohol the boiling point decreases in the order primary > secondary > tertiary. Solubility of alcohols and phenols in water is due to their ability to form hydrogen bonds with water molecules as shown. The solubility decreases with increase in size of alkyl/aryl (hydrophobic) groups. Several of the lower molecular mass alcohols are miscible with water in all proportions. The miscibility of ethers with water resembles those of alcohols of the same molecular mass. This is due to the fact that just like alcohols, oxygen of ether can also form hydrogen bonds with water **In the questions (i) to (iv) below a statement of Assertion and a statement of Reason is given. Choose the correct answer out of the following**. (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 Assertio (c). Assertion is correct, but Reason is incorrect statement. (d). Assertion is incorrect, but Reason is correct statement. (i) Assertion: 1-Propanol has less boiling point than 2-Propanol.	(i) (d). (ii) (a) (iii) (c). (iv) (b)

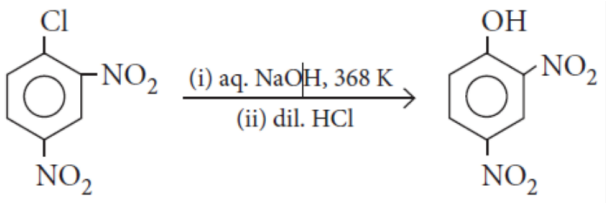
	Reason: as branching increases boiling point decreases (ii) Assertion: Ethers do not contain a Hydrogen attached to O but are soluble in water Reason: Ether form hydrogen bonding with water through O. (iii) Assertion: Propanol has more boiling point than ethanol. Reason: As molecular mass increases the intermolecular force of attraction decreases. (iv) Assertion: The boiling point of methoxymethane is lesser than ethanol Reason : methoxy methane and ethanol are isomers	
iv)	Grignard reagents react with aldehydes and ketones to form an addition product, which on hydrolysis gives primary, secondary and tertiary alcohol. Formaldehyde gives primary alcohol whereas all other aldehydes give secondary alcohols and ketones give tertiary alcohol. (i) The tertiary alcohol among the following is (a) 2,2-Dimethylpropan-1-ol (b) 3-Methylbutan-2-ol (c) 2-Methylbutan-2-ol (d) 3,3-Dimethylbtan-2-ol (ii) CH3MgBr reacts with acetone to form an adduct which on hydrolysis gives (a) 2-Methylpropan-2-ol (b) 2-Methylpropan-1-ol (c) 2-Butanol (d) 3-Pentanol (iii) Consider the following statement about Grignard reagent (X)the carbon – Mg bond is covalent but polar (Y)the Mg – halogen bond is ionic (Z)They are highly reactive The correct statement about Grignard reagent is (a) only Z (b) only X and Z (c) only Y and Z (d) X, Y and Z (iv) Formaldehyde reacts with which among the following to form 1-butanol (a) Isopropylmagnesiumbromide (b) Propylmagnesiumbromide (c) Butylmagnesiumbromide (d) Isobutylmagnesiumbromide	(i) (c) 2-Methylbutan-2-ol (ii) (a) 2-Methylpropan-2-ol (iii) (d) X,Y and Z (iv) (b) Propylmagnesiumbromide
v)	Ethers are the least reactive of the functional groups. The cleavage of C-O bond in ethers takes place under drastic	(i) (a) The bond in ether is less polar

	conditions with excess of hydrogen halides. The reaction of dialkyl ether gives two alkyl halide molecules. Alkyl aryl ethers are cleaved at the alkyl-oxygen bond due to the more stable aryl-oxygen bond. The cleavage of ethers takes place with concentrated HI or HBr at high temperature. in the cleavage of mixed ethers with two different alkyl groups, the alcohol and alkyl iodide formed, depend on the nature of alkyl groups. When primary or secondary alkyl groups are present, it is the lower alkyl group that forms alkyl iodide However, when one of the alkyl group is a tertiary group, the halide formed is a tertiary halide. (i) Ethers are less reactive than alcohols and phenols because (a) The bond in ether is less polar and stronger compared to bond in alcohols and phenols. (b) The bond in ether is more polar and stronger compared to bond in alcohols and phenols. (c) The bond in ether is less polar and weaker compared to bond in alcohols and phenols. (d) The bond in ether is more polar and weaker compared to bond in alcohols and phenols. (ii) The order of reactivity of hydrogen halides towards ether is (a) HI<HBr<HCl (b) HI > HBr > HCl (c) HI>HBr<HCl (d) HCl >HI>HBr (iii) Reaction of CH3CH2OCH3 with HI involves (a) SN2 attack of I- on the CH3CH2OCH3 (b) SN1 attack of I- on the CH3CH2OCH3 (c) SN2 attack of I- on the oxonium ion of CH3CH2OCH3 (d) SN1 attack of I- on oxonium ion of CH3CH2OCH3 (iv) (CH3)3C-O-CH3 reacts with HI to form (CH3)3CI and CH3OH because (a) it involves SN1 mechanism (b) it involves SN2 mechanism (c) less stable intermediate (d) None of the above	and stronger compared to bond in alcohols and phenols (ii) (b) HI > HBr > HCl (iii) (c) SN2 attack of I- on the oxonium ion of CH3CH2OCH3 (iv) (a) it involves SN1 mechanism
vi)	Williamson synthesis is an important laboratory method for the preparation of symmetrical and unsymmetrical ethers. In this method, an alkyl halide is allowed to react with sodium alkoxide to form ethers. Better results are obtained if the alkyl halide is primary. (i) Identify the symmetrical ether among the following (a) CH3OCH2Cl	(i) (d) PhCH2OCH2Ph (ii) (c) In primary alkyl halide substitution competes over elimination (iii) (b) alkoxide are not only nucleophiles but also strong bases (iv) (a) ether and

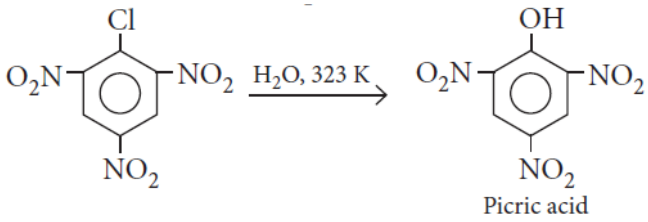
	(b) CH3CH2OCH3 (c) CH3CH2OCH2Ph (d) PhCH2OCH2Ph (ii)When primary alkyl halide is used in the synthesis the yield of ether is higher because (a) In primary alkyl halide elimination competes over substitution (b) In primary alkyl halide substitution and elimination takes place at the same rate (c) In primary alkyl halide substitution competes over elimination (d) None of the above (iii) The correct statement about alkoxides among the following is (a) alkoxide are not only nucleophiles but also weak bases (b) alkoxide are not only nucleophiles but also strong bases (c) alkoxide are not only electrophiles but also strong bases (d) alkoxide are not only electrophiles but also weak bases (iv) When tertiary butyl halide is reacted with CH3ONa the product obtained is (a) ether and alcohol (b) alkene and alcohol (c) only alcohol (d) only ether	alcohol
vii)	The oxidation of alcohols to carbonyl compounds is one of the most fundamental reactions in synthetic organic chemistry. An efficient vanadium-based catalyst has been discovered recently for the aerobic oxidation of benzylic, allylic and propargylic alcohols to their corresponding aldehydes or ketones in good yields.  where, R1 = aryl, vinyl, alkynyl R2 = H, CH3, aryl The catalyst can be easily prepared under air using commercially available reagents and is effective for a wide range of primary and secondary alcohols. Reactions proceed under mild conditions and in a variety of environmental friendly solvents. (i) The vanadium-based catalyst mention in the study	(i) (b) benzyl alcohol to benzaldehyde (ii) (c) (iii) (a) (iv) (b)

	above can be used to convert (a) acetone to t-butyl alcohol (b) benzyl alcohol to benzaldehyde (c) 2-phenylpropan-2-ol to 2-phenylpropan-2-one (d) 1-methyl cyclopentene to 1-methyl cyclopentanol (ii) Which of the following is secondary allylic alcohol? (a) 2-Methylbut-3-en-2-ol (b) Prop-2-enol (c) 1-phenylbut-2-en-1-ol (d) 2-phenylbut-3-en- 2-ol (iii) An unknown organic compound, X having molecular formula, C8H10O undergoes oxidation in presence of this vanadium-based catalyst and gives a compound, Y. Compound, Y on treatment with aq. Na2CO3 and I2 solution gives yellow ppt. The compound, Y is  (iv) Isopropyl alcohol is oxidised with this vanadium-based catalyst to give (a) CH3CHO (b) CH3COCH3 (c) CH3CH==CH2 (d) CH3CH2CH2COOH	
viii)	When haloarenes are heated with an aqueous solution of NaOH at 623 K and under 300 atmospheric pressure, sodium phenoxides are formed which upon acidification yield phenols.  This process is called Dow process. The presence of electron withdrawing group at ortho and para Position increases the reactivity of haloarenes.	(i) (d) II > III > I (ii) (d) nucleophilic substitution reaction (iii) (d) (iv) (b) Phenols



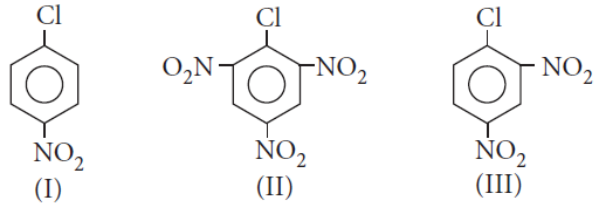


Only warm water is required in the formation of picric acid from 2, 4, 6 –trinitrochlorobenzene



Picric acid

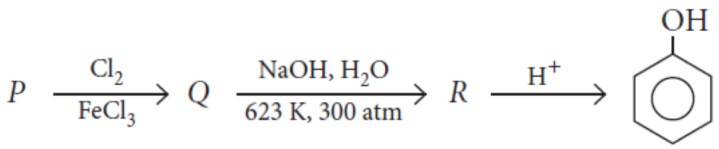
(i) The correct order of reactivity towards nucleophilic substitution reaction with CH3ONa of the following compound is

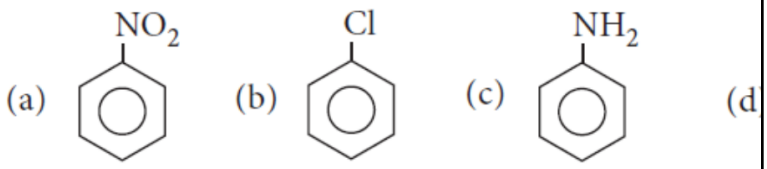


(a) I > II > III
(b) III > II > I
(c) I > III > II
(d) II > III > I

(ii) Dow's process involves
(a) electrophilic addition reaction
(b) nucleophilic addition reaction
(c) electrophilic substitution reaction
(d) nucleophilic substitution reaction

(iii) Identity (P) in the following sequence of reactions:



	 (iv) Dow's process is used for the preparation of which of the following: (a) Esters (b) Phenols (c) Alcohols (d) Ethers	
ix)	Phenol, also known as carbolic acid, was first isolated in the early nineteenth century from coal tar. Phenol is manufactured from the hydrocarbon, cumene. Cumene is oxidised in the presence of air to cumene hydroperoxide. It is converted to phenol and acetone by treating it with dilute acid. Acetone, a by-product of this reaction, is also obtained in large quantities by this method. (i) The IUPAC name of Cumene is (a) Isobutybenzene (b) Isopropylbenzene (c) Phenylpropane (d) 1-phenylpropane (i) Phenol is obtained as a product when HI is added to (a) Ph-CH2OCH3 (b) Ph-O-CH3 (c) both (a) and (b) (d) None of these (iii) Acetone is used as (a) Solvent (b) nail polish remover (c) both (a) and (b) (d) None of these (iv) The correct statement among the following is (X) Cumenehydroperoxide has a sinle bond between two oxygen (Y) High yield of acetone is one of the main reason for preparation of phenol from Cumen (Z) Cumene has a branched structure (a) Only X (b) X and Y only (c) Z only (d) X, Y and Z	(i) (b) Isopropylbenzene (ii) (b) Ph-O-CH3 (iii) (c) both (a) and (b) (iv) (d) X, Y and Z

x)	Oxidation of alcohols involves the formation of a carbonoxygen double bond with cleavage of an O-H and C-H bonds. Such a cleavage and formation of bonds occur in oxidation reactions. These are also known as dehydrogenation reactions as these involve loss of dihydrogen from an alcohol molecule. Depending on the oxidising agent used, a primary alcohol is oxidised to an aldehyde which in turn is oxidised to a carboxylic acid. Secondary alcohols are oxidised to ketones. Tertiary alcohols do not undergo oxidation reaction under normal conditions. (i) The best reagent to convert ethanol to ethanal is (a) alk. KMnO4 (b) CrO3 (c) PCC (d) Conc. HNO3 (ii) Butan-2-ol is oxidised using CrO3. The product obtained is (a) Butanoicacid (b) Butanal (c) 2-Butanone (d) 2-Propanone (iii) Tertiary alcohols on oxidation with Conc. HNO3 (a) Undergoes dehydrogenation to form ketone (b) Undergoes dehydrogenation to form an alkene (c) Undergoes dehydration to form an alkene (d) Undergoes dehydration to form a ketone (iv) An alcohol on oxidation using strong oxidising agent like acidic K2Cr2O7 give an organic acid of same molecular mass. The alcohol is (a) CH3CH2CH2OH (b) CH3CH(OH)CH3 (c) (CH3)3COH (d) CH3CH2OH	(i) (c) PCC (ii) (c) 2-Butanone (iii) (c) Undergoes dehydration to form an alkene (iv) (b) CH3CH(OH)CH3

1.	**BIOMOLECUELS(1)** **Case Study based Question No :1:** **Read the passage given below and answer the following questions:** When a protein in its native form, is subjected to physical changes like change in temperature or chemical changes like change in pH, the hydrogen bonds are disturbed. Due to this, globules unfold and helix gets uncoiled and protein loses its biological activity. This is called denaturation of protein. The denaturation causes change in its secondary and tertiary structures but primary structures remains intact. Examples of denaturation of protein are coagulation of egg white on boiling, curding of milk, and formation of cheese when an acid is added to milk. The following 1 to 5 questions are multiple choice questions. Choose the most appropriate answer Q1. Find the wrong statement about denaturation of proteins. (a) The primary structure of the protein does not change. (b) Globular proteins are converted into fibrous proteins. (c) Fibrous proteins are converted into globular proteins. (d) The biological activity of the protein is destroyed. Answer: (c) Fibrous proteins are converted into globular proteins (Wrong)	(c)
2.	Q2. Which statement(s) of protein remain(s) intact during denaturation process? (a) Both secondary and tertiary structures (b) primary structure only (c) secondary structure only (d) tertiary structure only Answer: (b) primary structure only	(b)
3.	Q3. α-helix and β-pleated structures of proteins are classified as, (a) primary structure of protein (b) secondary structure of protein (c) tertiary structure of protein (d) quaternary structure of protein Answer: (b) secondary structure of protein	(b)
4.	Q4. Cheese is a (a) globular protein (b) conjugated protein (c) denatured protein (d) derived protein Answer:(c) denatured protein	(c)

5.	Q5. Secondary structure of protein refers to, (a) mainly denatured of proteins and structures of prosthetic groups (b) three-dimensional structure, especially the bond between amino acid residues that are distant from each other in the polypeptide chain (c) linear sequence of amino acid residues in the polypeptide chain (d) regular folding patterns of continuous portions of the polypeptide chain. Answer: (d) regular folding patterns of continuous portions of the polypeptide chain	(d)
6.	**Case Study based Question No :2:** Carbohydrates are polyhydroxy aldehydes and ketones and in addition to that, those compounds which on hydrolysis give such compounds are also carbohydrates. The carbohydrates which are not hydrolysed are called monosaccharides. Monosaccharides with aldehyde group are called aldose and those with free ketonic group are called ketose. Carbohydrates are optically active. The number of optical isomers = 2n, where n= number of asymmetric carbons or chiral carbons. Carbohydrates are mainly synthesized by plants during photosynthesis. The monosaccharides give the characteristic reactions of alcohols and carbonyl group (Aldehyde and Ketones). It has been found that these monosaccharides exist in the form of cyclic structures. In cyclization, the –OH group (generally C-5 or C-4 in aldohexoses and C-5 or C-6 in ketohexoses) combine with the aldehyde or keto group. As a result, cyclic structures of five of six membered rings containing one oxygen atom are formed, e.g, glucose forms a ring structure. Glucose contains one aldehyde group, one primary alcoholic group and four secondary alcoholic groups in its open structure. The following questions 6 to 10 are multiple choice questions. Choose the most appropriate answer Q6. The first member of Ketose sugar is, (a) Ketotriose (b)Ketotetrose (c) Ketopentose (d) Ketohexose Answer: (a) Ketotriose	(a)
7.	Q7. In CH2(OH)-CH(OH)-CH(OH)-CH(OH)-CH(OH)-CHO the number of optical isomers will be, (a) 16 (b) 8 (c) 32 (d) 4 Answer: (a) 16 (Because, 2n where n = number of chiral carbons: glucose has 4 chiral carbons)	(a)

8.	Q8. Some statements are given below: 1. Glucose is an aldohexose 2. Naturally occurring glucose is dextrorotatory 3. Glucose contains three chiral carbons 4. Glucose contains one primary alcoholic group and four secondary alcoholic groups Among the above, correct statements are, (a) 1 and 2 (b) 3 and 4 (c) 1,2 and 4 (d) 1,2,3 and 4 Answer: (c) 1,2 and 4 (Glucose contains 4 chiral carbons but not 3)	(c)
9.	Q9. Two hexoses form the same osazone, find the correct statement about these hexoses. (a) both of them must be aldoses (b) They are epimers at C-3 (c) The carbon atoms of 1 and 2 in both have the same configuration (d) The carbon atoms of 3, 4 and 5 in both have the same configuration Answer: (d) The carbon atoms of 3, 4 and 5 in both have the same configuration	(d)
10.	Q10. Which of the following reactions of glucose can be explained only by its cyclic structure? (a) Glucose forms cyanohydrin with HCN (b) Glucose reacts with hydroxyl amine to form and oxime (c) Pentaacetate of glucose does not react with hydroxyl amine (d) Glucose is oxidized by nitric acid to give gluconic acid Answer: (c) Pentaacetate of glucose does not react with hydroxyl amine	(c)
11.	**Case Study based Question No :3**: The sequence of bases along the DNA and RNA chain establishes its primary structure which controls the specific properties of the nucleic acid. The RNA molecule is usually a single chain of ribose-containing nucleotide. On the basis of X-ray analysis of DNA, J D Watson and F H C Crick (Shared the Nobel prize in 1962) proposed a three dimensional secondary structure of DNA. The DNA molecule is a long and highly complex, spirally twisted, double helix, ladder like structure. The two polynucleotide chains or strands are linked up by hydrogen bonds between the nitrogenous base molecules of their nucleotide monomers. Adenine (purine) always links with Thymine (Pyrimidine) with two hydrogen bonds and Guanine (purine) links with Cytosine (Pyrimidine) with three hydrogen bonds. Hence, the two strands extend in opposite direction, i.e. are anti-parallel and complimentary to each other.	(d)

	Directions: Q No: 11 to 15 are of Assertion (A) followed by a statement of Reason (R) is given. Choose the correct answer out of the following choices. (a) Assertion (A) and Reason (R) both are correct statements, and Reason (R) is correct explanation for Assertion (A) (b) Assertion (A) and Reason (R) both are correct statements but Reason (R) is not correct explanation for Assertion (A) (c) Assertion (A) is correct statement, but Reason (R) is wrong statement (d) Assertion (A) is wrong statement, but Reason (R) is correct statement Q11. Assertion (A): DNA molecules and RNA molecules are found in the nucleus of a cell. Reason (R): There are two types of nitrogenous bases, purines and pyrimidines. Adenine (A) and Guanine (G) are substituted purines, Cytosine (C), Thymine (T) and Uracil (U) are substituted pyrimidines. Answer: (d) (Only DNA molecules are present in the nucleus of a cell)	
12.	Q12. Assertion (A): In both DNA and RNA, heterocyclic base and phosphate ester linkages are at C-1' and C-5' respectively of the sugar molecule Reason (R): Nucleotides and Nucleosides mainly differ from each other in presence of phosphate units Answer: (b) Purine or pyrimidine bases links at C-1 and Phosphate ester links at C-5 of Ribose sugar	(b)
13.	Q13. Assertion (A): The backbone of RNA molecule is a linear chain consisting of alternating units of a heterocyclic base, D-ribose and a phosphate Reason (R): The segment of DNA which acts as the instruction manual for the synthesis of protein in ribose Answer: (c) (Reason: explained about DNA but not RNA)	(c)
14.	Q14. Assertion (A): The double helical structure of DNA was proposed by Emil Fischer Reason (R): A nucleoside is an N- glycoside of heterocyclic base. Answer: (d) (The double helical structure of DNA was proposed by Watson and Crick)	(d)
15.	Q15. Assertion (A): In DNA, the complementary bases are Adenine & Guanine and Thymine & Cytosine Reason (R): The phenomenon of mutation is a chemical change in DNA molecule. Answer: (d) (In DNA, the complementary bases are Adenine & Thymine & Guanine and Cytosine)	(d)

16.	**QUESTIONS BASED ON ASSERTION AND REASON TYPE** **Directions: Q No: 16 to 30 are of Assertion (A) followed by a statement of Reason (R) is given. Choose the correct answer out of the following choices.** (a) Assertion (A) and Reason (R) both are correct statements, and Reason (R) is correct explanation for Assertion (A) (b) Assertion (A) and Reason (R) both are correct statements but Reason (R) is not correct explanation for Assertion (A) (c) Assertion (A) is correct statement, but Reason (R) is wrong statement (d) Assertion (A) is wrong statement, but Reason (R) is correct statement Q16. Assertion (A): Glucose gets oxidized to gluconic acid on reaction with mild oxidizing agent like bromine water. Reason (R): Glucose contains a keto group Answer: (c) (Glucose contains aldehyde group)	(c)
17.	Q17. Assertion (A): Glucose is correctly named as D- (+)-glucose. Reason (R): 'D' before the name of glucose represents its dextrorotatory nature Answer: (c) ('D' before the name of glucose represents its configuration, 'd' represents dextrorotatory)	(c)
18.	Q18. Assertion (A): The two cyclic hemiacetal forms of glucose, α-form and β form are called anomers Reason (R): Anomers differ only in the configuration of the hydroxyl group at C-1 Answer: (a) (Correct Assertion and Correct explanation)	(a)
19.	Q19. Assertion (A): Fructose is a keto hexose. Reason (R): It has aldehyde functional group Answer: (c) (Fructose has a ketone functional group)	(c)
20.	Q20. Assertion (A): Purine bases present in DNA are Adenine and Guanine Reason (R): The base Thymine is present in RNA while base uracil is present in DNA Answer: (c) (Thymine is not present in RNA, but Uracil is present)	(c)

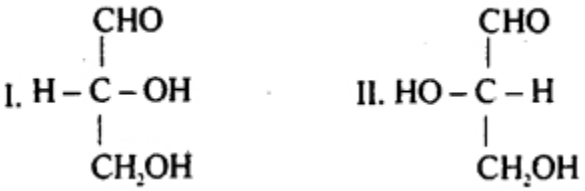
21.	Q21. Assertion (A): The two strands of DNA are complementary to each other Reason (R): Adenine specifically forms hydrogen bonds with Guanine whereas Cytosine forms hydrogen bonds with Thymine Answer: (c) (In DNA, A = T, two hydrogen bonds: G ≡ C, three hydrogen bonds)	(c)

22.	Q22. Assertion (A): α- amino acids exist as dipolar ions or zwitter ions Reason (R): α- amino acids are the building blocks of protein Answer: (b) (Zwitter ion has both positive and negative charges)	(b)
23.	Q23. Assertion (A): DNA undergoes replication Reason (R): DNA contains cytosine and thymine as pyrimidine bases Answer: (b) (DNA contains long - double helix strand, spirally twisted having ladder type structure and can undergo replication as the strands are complementary to each other)	(b)
25.	Q24. Assertion (A): Haemoglobin is a globular protein Reason (R): Globular proteins are insoluble in water Answer: (c)(Globular proteins are soluble in water)	(c)
25.	Q25. Assertion (A): In DNA, Nucleotides are phosphate esters of nucleosides Reason (R): In DNA, the various nucleotides are linked either through purine or pyrimidine bases. Answer: (c) (Linked through ribose to ribose through phosphate ester, not linked through bases)	(c)
26.	Q26. Assertion (A): Glycine is not an essential amino acid. Reason (R): Glycine need not be taken through diet as it is synthesized by our body Answer: (a) (both are correct with correct explanation)	(a)
27.	Q27. Assertion (A): All naturally occurring α-amino acids except glycine are optically active. Reason (R): Most naturally occurring amino acids have L-configuration. Answer: (b) (All amino acids have chiral carbons except glycine)	(b)
28.	Q28. Assertion (A): Glycylalanine is a dipeptide, consists of peptide linkage Reason (R): The bond between glycine and alanine is -CO-NH- bond Answer: (a) (both are correct with correct explanation)	(a)
29	Q29. Assertion (A): Disruption of the native structure of a protein is called denaturation Reason (R): The change in colour and appearance of egg during cooking is due to denaturation Answer: (b) Disruption of secondary and Tertiary structure of protein is called denaturation)	(b)

30.	Q30. Assertion (A): DNA has double helical structure Reason (R): The two strands in DNA molecule are exactly similar in same direction Answer: (c) The two strands in DNA molecule are complementary to each other (in opposite direction)	(c)
31.	**SOME MORE IMPORTANT COMMON MCQs** Question 31. During acetylation of glucose it needs, x moles of acetic anhydride. The value of x would be, (a) 3 (b) 5 (c) 4 (d) 1 Answer: (b) 5 (because it forms pentaacetate)	(b)
32.	Question 32. On oxidation with a mild oxidising agent like Br2/H2O, the glucose is oxidized to, (a) saccharic acid (b) glutamic acid (c) gluconic acid (d) valeric acid Answer: (c) gluconic acid	(c)
33.	Question 33. 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 Answer: (d) mixture of glucose and fructose in equimolar quantities	(d)
34.	Question 34. Which reagent is used to convert glucose into saccharic acid? (a) Br2/H2O (b) Nitric acid (c) Alkaline solution of iodine (d) Ammonium hydroxide Answer: (b) Nitric acid	(b)
35.	Question 35. Which of the following is an example of an aldopentose? (a) D-Ribose (b) Glyceraldehyde (c) Fructose (d) Glucose Answer: (a) D-Ribose	(a)

36.	Question36. The α-and β-forms of glucose are, (a) isomers of D (+) glucose and L (-) glucose respectively (b) diastereomers of glucose (c) anomers of glucose (d) isomers which differ in the configuration of C-2 Answer: (c) anomers of glucose	(c)
37.	Question 37. The anomeric carbon in D (+) glucose is, (a) C-1 carbon (b) C-2 carbon (c) C-5 carbon (d) C-6 carbon Answer: (a) C-1 carbon	(a)
38.	Question 38. Glucose Product is, (a) hexanoic acid (b) gluconic acid (c) saccharic acid (d) bromohexane Answer: (b) gluconic acid	(b)
39.	Question39. How many carbon atoms and oxygen atoms are there with in a pyranose ring respectively? (a) 3, 2 (b) 5, 1 (c) 6, 0 (d) 7, 0 Answer: (b) 5, 1	(b)
40.	Question 40. The letter ‘D’ in carbohydrates signifies, (a) dextrorotatory (b) configuration (c) diamagnetic nature (d) mode of synthesis Answer: (b) configuration	(b)

4.	Question 41. 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 Answer: (c) glucose increases the blood sugar level almost instantaneously	(c)

42.	Question 42. Among the naturally occurring carbohydrates, furanose ring is found in, (a) Glucose unit of cane sugar (b) Glucose unit of cellulose (c) Fructose unit of cane sugar (d) Galactose unit of lactose Answer: (c) Fructose unit of cane sugar	(c)
43.	Question 43. The given structure (I) and (II) represent configuration of the simplest sugar glyceraldehyde. Which of the following statements is not correct for the structures?  (a) I represents D-form while II represents L-form of glyceraldehyde (b) The sugars having same configuration as D- glyceraldehyde are designated as D-sugars (c) Natural glucose and fructose are D-forms (d) 'D' is dextrorotatory while 'L' is levorotatory enantiomer Answer: (d) 'D' is dextrorotatory while 'L' is levorotatory enantiomer is wrong. (Actually 'd' is dextrorotatory, 'l' is levorotatory)	(d)
44.	Question 44. Amino acids generally exist in the form of Zwitter ions, which means they contain, (a) Basic – NH2 group and acidic – COOH group (b) The basic – NH3+ group and acidic – COO– group (c) Basic -NH2 and acidic – H+ group (d) Basic – COO– group and acidic – NH3+ group Answer: (d) Basic – COO– group and acidic – NH3+ group	(d)
45.	Question 45. Globular proteins are present in (a) blood (b) egg (c) milk (d) all of the above Answer: (d) all of the above	(d)

46.	Question 46. Which one of the amino acids can be synthesized in the body? (a) Alanine (b) Lysine (c) Valine (d) Histidine Answer: (a) Alanine	(a)
47.	Question 47. Which of the following is not true about amino acids? (a) Amino acids are constituents of all proteins (b) Alanine is having one amino and one carboxylic group (c) Most naturally occurring amino acids have D-configuration (d) Glycine is the only naturally occurring amino acid which is optically inactive. Answer: (c) Most naturally occurring amino acids have D-configuration is not true (They have L -configuration)	(c)
48.	Question 48. A compound which contains both …… and …… is called amino acid. The amino acids are joined by ……..… bonds to make polypeptide chain, (a) amino, carboxylic group, ester (b) amino, carboxylic group, peptide (c) nitrogen, carbon, glycosidic (d) hydroxy, carboxylic group, peptide Answer: (b) amino, carboxylic group, peptide	(b)
49.	Question 49. Denaturation of protein leads to loss of its biological activity by, (a) formation of amino acids (b) disruption of primary structure (c) disruption of both primary and secondary structure (d) disruption of both secondary and tertiary structures only Answer: (d) disruption of both secondary and tertiary structures only	(d)
50.	Question 50. Proteins are condensation polymers of, (a) α-amino acids (b) β-amino acids (c) α-hydroxy acids (d) β-hydroxy acids Answer: (a) α-amino acids	(a)

51.	Question 51. Find the correct statement about the structural difference between ribose of DNA and RNA (a) DNA and RNA show difference at C-1 carbon of sugar moiety (b) DNA and RNA show difference at C-2 carbon of sugar moiety (c) DNA and RNA show difference at C-3 carbon of sugar moiety (d) DNA and RNA show difference at C-4 carbon of sugar moiety Answer: (b) DNA and RNA show difference at C-2 carbon of sugar moiety, (In DNA, C-2 of ribose has no oxygen atom but it has H and H, however in RNA, there is -OH and H at C-2)	(b)
52.	Question 52. In fibrous proteins, polypeptide chains are held together by, (a) van der waals forces (b) electrostatic forces of attraction (c) hydrogen bonds (d) covalent bonds Answer: (c) hydrogen bonds	(c)
53.	Question 53. What types of interactions are responsible for making the α-helix structure stable? (a) Peptide bonds between -NH2 and -CO groups of adjacent carbon chain (b) Hydrogen bonds between -NH of amino acid in one turn with -CO of amino acid to adjacent turn (c) -OH group of one amino acid with -CO group of other amino acid on the turn (d) Hydrogen bonds between adjacent amino acids Answer: (b) Hydrogen bonds between -NH of amino acid in one turn with -CO of amino acid to adjacent turn	(b)
54.	Question 54. Secondary structure of protein refers to, (a) sequence of amino acids in polypeptide chain (b) bonds between alternate polypeptide chains (c) folding patterns of polypeptide chain (d) bonding between NH3+ and COO– of two peptides Answer: (c) folding patterns of polypeptide chain	(c)
55.	Question 55. Which compound can exist in a dipolar (zwitter ion) structure? (a) C6H5-CH2-CH (N = CH2)- COOH (b) (CH3)2CH-CH (NH2) -COOH (c) C6H5-CONHCH2-COOH (d) HOOC-CH2-CH2-CO-COOH Answer: (b) (CH3)2CH-CH (NH2)- COOH, (as it has both –NH2 and –COOH groups)	(b)

56.	Question 56. Which of the following is an acidic amino acid? (a) Glycine (b) Valine (c) Leucine (d) Glutamic acid Answer: (d) Glutamic acid	(d)
57.	Question 57. Most common types of secondary structures of proteins are, (a) α-helix and β-helix structures (b) α-helix and β-pleated sheet structures (c) right and left hand twisted structures (d) globular and fibrous structures Answer: (b) α-helix and β-pleated sheet structures	(b)
58.	Question 58. Find the incorrect example, (a) Keratin and myosin are fibrous proteins (b) Insulin and albumins are Globular proteins (c) Glycylalanine is a dipeptide (d) Enzymes and haemoglobin are derived proteins Answer: (d) Enzymes and haemoglobin are derived proteins, (it is not correct, as they are natural proteins)	(d)
59.	Question 59. Find the correct statement, (a) Haemoglobin, albumin are fibrous proteins (b) Keratin and myosin are globular proteins (c) Wool and Silk are fibrous proteins (d) None of the above is correct Answer: (c) Wool and Silk are fibrous proteins	(c)
60.	Question 60. Find the wrong statement about DNA finger printing, (a) DNA finger printing is used in forensic laboratories for identification of criminals (b) DNA finger printing is used to find the primary structure of protein (c) DNA finger printing is used to determine paternity of child (d) DNA finger printing is used to identify the dead bodies in accident Answer: (b) It is used to find the primary structure of protein (it is a wrong statement)	(b)

61.	**BIOMOLECUELS (2)** **Match the following:** **I** **II** (i)Amino acids (A) Protein (ii)Thymine (B) Nucleic acid (iii) Uracil (C)DNA (iv)Phosphodiester linkage (D) RNA (v)Insulin Which of the following are the best matched options? (a) i-A, v- D, iii- C, iv-B (b) i-D, ii-C, iii- A, iv-B (c) i-D, v- D, iii- A, iv-B (d) i-A, ii- C, iii- D, iv-B	Answer: (d) i-A, ii- C, iii- D, iv-B
62.	**Match the following:** **I** **II** (i) D,L Configuration (A) C-1 carbon (ii) Anomers (B) Glyceraldehyde (iii) Lactose (C)Glucose (iv) Aldohexose (D) Milk (v) Furanose Which of the following are the best matched options? (a) i-B, ii-A- iii-D, iv- C (b) i-C, ii-D, iii- A, iv-B (c) i-B, ii-C, iii- D, iv-A (d) i-A, ii- C, iii- D, iv-B	Answer: (a) i-B, ii-A- iii-D, iv- C

PREPARED BY:

1.MR SREEDHAR- PGT CHEMISTRY-N0-2 NAUSENABAGH(SOLUTIONS)
2.MR MADHUSUDHAN RAO -PGT CHEMISTRY, KV GOLCONDA -2(SOLUTIONS)
3.MR HARIKITHAN.P -PGT CHEMISTRY- KV BOLARAM(SOLID STATE)
4.MR SHOBHAN BABU- PGT CHEMISTRY-(SOLID STATE)
5.MR ANJANEYULU- PGT CHEMISTRY-(HALOALKANES AND HALOARENES)
6.MR DLN MURTHY -PGT CHEMISTRY-(P-BLOCK ELEMENTS)
7.MR VICTOR EMMANEUL- PGT CHEMISTRY-(BIOMOLECULES)
8.MRS LAXMI PAPPAI -PGT CHEMISTRY,KV NSB-1(P- BLOCK ELEMENTS)
9.MR NAVEEN-PGT VHEMISTRY-(HALOALKANES AND HALOARENES and ALCOHOLS,PHENOLS AND ETHERS)
10.MR VENKATESH –PGT-CHEMISTRY, KV STEEL PLANT(ALCOHOLS, PHENOLS,AND ETHERS)