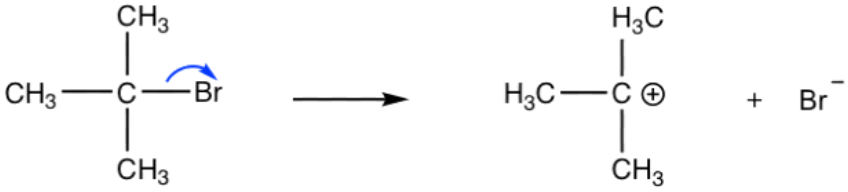
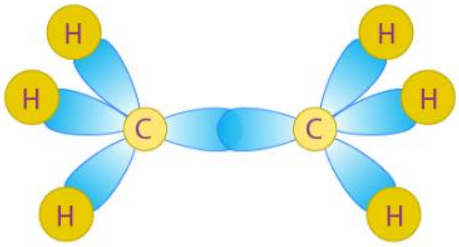
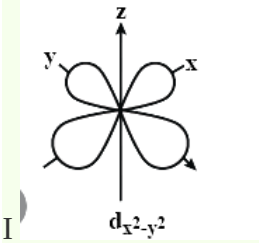
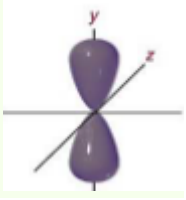
ANSWER KEY – CLASS 11 – CHEMISTRY – AT - 2 – SET 1 – 2023 – 24

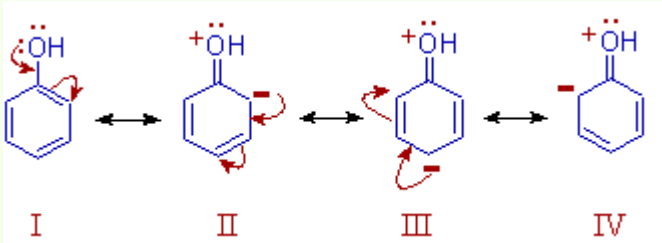
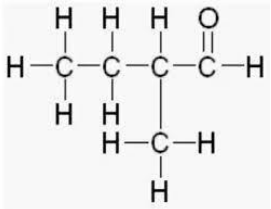
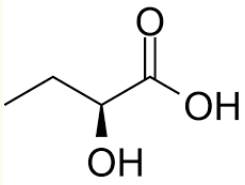
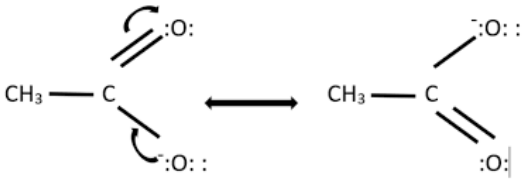
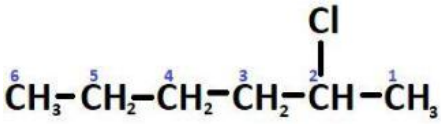
1.	b) CH4	1
2.	(a) n	1
3.	(a) $\nu = \Delta E/h$	1
4.	b) $Al_2O_3 < MgO < Na_2O$	1
5.	(c) Cl	1
6.	d) LiI	1
7.	(b) sp^3d^2	1
8.	(c) +5	1
9.	(d) $BaCl_2 + H_2SO_4 \rightarrow BaSO4 + 2HCl$	1
10.	(a) $(CH_3)_3C^+$	1
11	(a) 3-methyl-2-butanone	1
12	(d) 2,2-Dimethylpropane	1
13.	(d) Assertion is false but Reason is true.	1
14	a) Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.	1
15.	(d) Assertion is false but Reason is true	1
16.	d) Assertion is false but Reason is true	1
17.	(a) 0.2 moles of Cl_2 = 14.2 g of Cl_2 (b) 0.4 moles of HCl =14.60g of HCl OR (a) Mole fraction is the ratio of the number of moles of a component to the total number of moles (b) The reactant that is entirely used up in a reaction is called limiting reagent or the one which limits the formation of products	

18	a. 16 b. 2	
19.	The dipole moment of ammonia is higher than the dipole moment of NF_3 The direction of the lone pair dipole moment and the bond pair dipole moment is same in NH_3 whereas in case of NF_3 it is opposite. Thus, in ammonia molecule, individual dipole moment vectors add whereas in NF_3 they cancel each other	1
20	As E^{Θ} cell is +ve the cell reaction is feasible. **OR** (a) (i) +6 (ii) +6 (b) Cu (II)O	
21.	(a) position isomerism  (b) (c) heterolytic (d) Carbocation	
22.	(a) Any two difference between molarity and molality (b) 6 mol of $KClO_3$ = 735 g of $KClO_3$	½ x2=1 1+1
23	(i) a. n = 2, l = 1 b. n= 3, l = 2 c. n= 5, l = 3 (ii) Orbital is the space where there is maximum probability to find electrons (iii) λ =h/mv = 6.626x10-34/200x10-3 x3= 1.104x10-33 m	½ x3=1.5 ½ ½ ½
24.	(i) O^{2-} › F^{-} › Na^{+} › Mg^{2+} (ii) Na < Mg < Al < Si II. Element A. After removing the second electron the group 2 metal acquires stable configuration. Therefore, the third ionisation enthalpy would be high	1 1 ½ + ½

25.	(A) Bond order is half the difference between the number of electrons in the bonding orbital and the number of electrons in non-bonding orbitals or the number of bonds between two atoms (B) Bond order= [No. of electrons in bonding orbital] − [No. of electrons in anti−bonding orbital] /2 (i) 10−4/2 =3 (ii) 10−6/2 = 2 **OR** sp3 hybridization explanation 	(1) x3 (1) x3
26.	a) $2H^+ + Cr_2O_7^{2-} + 3SO_2 \rightarrow 2Cr^{3+} + H_2O + 3SO_4^{2-}$ b. Cu(II)O	
27.	(a) A Salt bridge is used to maintain electrical neutrality inside the circuit of a galvanic cell. It completes the circuit (b) A type of redox reaction involving simultaneous reduction and oxidation of atoms of the same element. (c) Cl atom	1x2=2 marks ½ ½
28	a.C4H10 b. $CH_3CH(CH_3)CH_2CH_3$ 2-Methylpen tane; $CH_3CH_2CH(CH_3)CH_3$ 3-Methylpenatone c. $CH_3CH_2CH_3$ Propane	
29.	a. For the given value of n, *l* can have only n-1 values b. spin quantum number c. I  II 	1 1 1 1

	OR 4s, n+l rule	1+1
30	(a) simple distillation (b) Distillation under reduced pressure (c) The component in the mixture should be steam volatile and immiscible in water OR (i) Differential extraction (ii) Distillation under reduced pressure	½ x 2= 1 1 2 1 1
31.	(a) Nitrogen has half-filled electronic configuration and hence its ionisation energy is greater than oxygen. (b) Electron gain enthalpy is defined as the amount of energy released when an electron is added to an isolated gaseous atom (c) Ununbium and Uub (d) Ionisation energy of boron being unexpectedly less than that for beryllium due to the removal of electrons from 2s is more difficult than removing an electron from 2p orbital of Boron. (e) $(n-2)\ f^{1-14}\ (n-1)\ d^{0-1} ns^2$. OR (a) 3rd period and 17th group. (b) (i) B. Electron gain enthalpy values of noble gases are positive because they have stable electronic configuration and thus have no tendency to take additional electrons (ii) C. Being an alkali metal, it is easier to remove the outermost electron (c) Beryllium has smaller atomic size and ionic size than the other members of the group, also it has high ionisation enthalpy. Moreover, it forms covalent compounds while other members form ionic compounds.	1x5=5 1 1 1 2

32.	(i) Hybridisation is defined as the concept of mixing two atomic orbitals to give rise to a new type of hybridised orbitals having entirely different energy, shapes, etc. (ii) (a) One s and three p orbitals of Carbon hybridise to form 4 sp3 hybrid orbitals. The four sp3 hybrid orbitals overlap with four 1s orbitals of Hydrogen atoms. The methane molecule is tetrahedral. The carbon and four hydrogens are attached at 109. 50 angles to each other. (b)One s, three p and two d orbitals hybridise to form 6 sp3d2 hybrid orbitals. Sulphur hexafluoride has 6 bond pairs around the central sulphur atom (6 bonds, no lone pairs). The resulting shape is an octahedron with 90° F-S-F bond angles. (iii) (a) trigonal planar (b) trigonal bipyramidal (c) linear (d) octahedral OR (A) (a) The Nitrogen atom has the electronic configuration of 1s2 2s2 2px1 2py1 2pz1.one s-orbital and three p-orbitals hybridize and overlap with s orbitals of a Hydrogen atom to form sp3 hybridisation. It has a molecular geometry of trigonal pyramidal Although the bond angle should be 109.5 degrees for trigonal pyramidal molecular geometry, it decreases to 107 degrees due to the lone pair on the nitrogen atom. (b) electron configuration of B in an excited state and will be represented as 1s2, 2s2, 2px1, 2py1. one 2s and two 2p orbitals of boron will take part in the process to form three half-filled sp2 hybrid orbitals. Each sp2 hybrid orbitals will contain unpaired electrons that will overlap with the unpaired electron in chlorine's 3p orbital. BCl3 molecular geometry is trigonal planar. The bond angle is 120°. (B) σ bond / π bond 1. Overlapping is along the axis / Overlapping is on side wise 2. Overlapping is maximum / Overlapping is minimum	1 1 1 ½ x4 = 2 1 ½ 1 ½ 2

33.	a. 	2
	b. 	1
	c. I 	1
	II 	1
	OR a. 	2
	b. 	1
	c. C-Br bond is more polar because Br is more electronegative than H	1
	d. Negative Electromeric Effect (–E effect) In this effect the π - electrons of the multiple bond are transferred to that atom to which the attacking reagent does not get attached.	1