

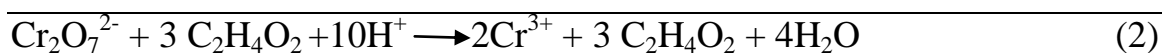
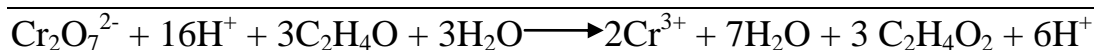
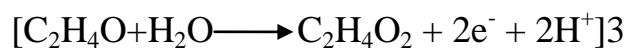
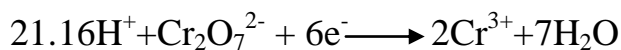
## Marking Scheme

Chemistry Sample Paper (2024-25)

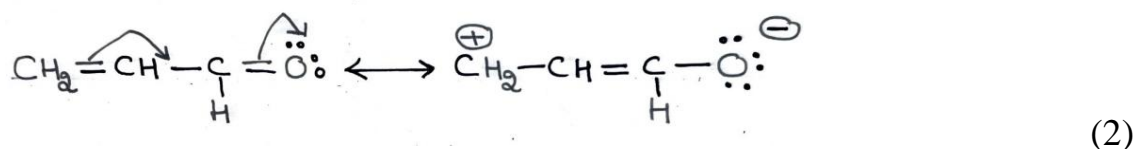
CHE-856

Class: 11<sup>th</sup>

1. (b) 6 unpaired e<sup>-</sup> (1)
2. (b) He, Na and Ar (1)
3. (c) F<Cl>Br>I (1)
4. (d) O<sub>2</sub><sup>2-</sup> (1)
5. (b) 18 gm/mol (1)
6. (c) q=0 (1)
7. (a) +2 (1)
8. (c) <math>\Delta U^\circ</math> (1)
9. (c) (1)
10. (a) 0 (1)
11. (a) planar (1)
12. (a) electron deficient species (1)
13. (b) 6.022x10<sup>21</sup> molecules (1)
14. (a) 1 (1)
15. (a) 2 (1)
16. (d) Assertion(A) is false but Reason(R) is true (1)
17. (a) Assertion(A) and Reason(R) are correct and (R) is correct explanation of Assertion(A) (1)
18. (a) Assertion(A) and Reason(R) are correct and (R) is correct explanation of Assertion(A) (1)
19. (a) n = 5 (1)  
(b) 16e
20. (a) as the volume increases, pressure decreases so equilibrium move in forward direction where number of moles increases. (1)  
(b)  $K_C (\text{Reverse}) = \frac{1}{8.3 \times 10^{-3}} = 120.48$



22.



23. Buffer solution is the solution which resist change in the pH value of solution when small amount of acid or base is added to it.

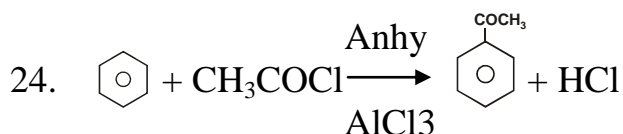
Buffer solutions are of two types

(a) Acidic buffer:- It contains equimolar quantities of weak acid and its salt with strong base.

Example acetic acid and sodium acetate

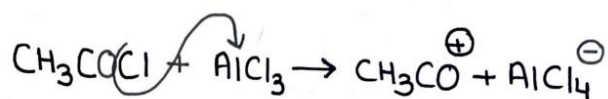
(b) Basic Buffer:- It contains equimolar quantities of weak base and its salt with strong acid

Example ammonium hydroxide and ammonium chloride (2)

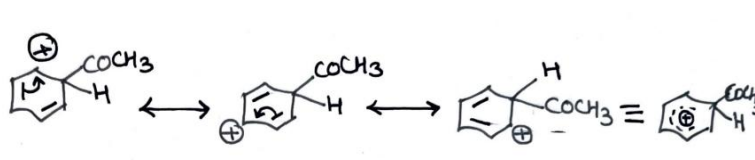
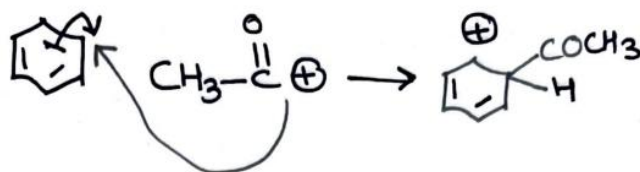


### Mechanism

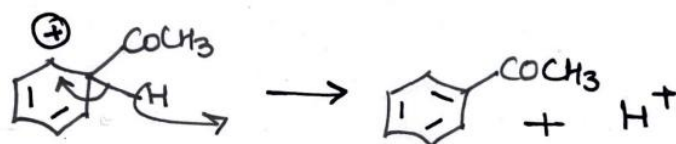
(i) Generation of Electrophile



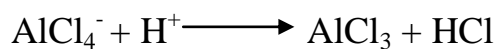
(ii) Attack of electrophile to form intermediate carbocation.



(iii) Loss of proton from carbocation

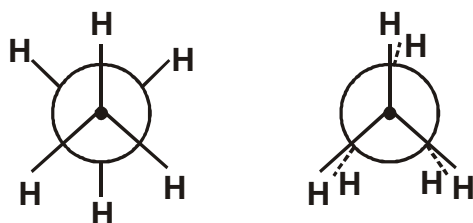


(2)



OR

Newman's Representation



(1)

Staggered

Eclipsed

Staggered Conformation is more stable due to less repulsions.

(1)

25.(a)  $S < P < O < N$

(1)

(b)  $P < S < N < O$

(1)

OR

(a)  $3s^2 3p^4$

Group  $\longrightarrow$  16<sup>th</sup> group

Block  $\longrightarrow$  p-block

Period  $\longrightarrow$  3<sup>rd</sup> period

(1)

(b)  $4s^2 3d^2$

Group  $\longrightarrow$  4<sup>th</sup> group

Block  $\longrightarrow$  d-block

Period  $\longrightarrow$  4<sup>th</sup> period

(1)

### SECTION-C

26.(a) 1 mole  $\text{C}_2\text{H}_6$  contains 2 moles of carbon, 3 mole  $\text{C}_2\text{H}_6$  contains  $3 \times 2 = 6$  moles carbon.

(1)

(b) 1 mole  $\text{C}_2\text{H}_6$  contains 6 mole hydrogen, 3 mole  $\text{C}_2\text{H}_6$  contains  $6 \times 3 = 18$  mole hydrogen.

(1)

(c) 1 mole  $C_2H_6 = 6.022 \times 10^{23}$  molecules

3 mole  $C_2H_6 = 3 \times 6.022 \times 10^{23}$  molecules

$$= 18.066 \times 10^{23} \text{ molecules} \quad (1)$$

27. (a) C non metal (1)

(a) A alkali metal (1)

(b) B alkaline earth metal (1)

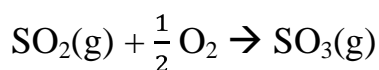
28.  $\Delta G = \Delta H - T \Delta S$  (1)

$$= 40.63 \times 1000 - 300 \times 108.8$$

$$= 7990 \text{ J/mol} \quad (1)$$

$\Delta G = +ve \therefore$  reaction is not feasible (1)

OR



$$\Delta H = \sum \Delta_f H^\circ \text{ products} - \sum \Delta_f H^\circ \text{ reactants} \quad (1)$$

$$= \Delta_f H^\circ SO_3 - \Delta_f H^\circ SO_2$$

$$= -395.6 - (-296.6) \quad (1)$$

$$= -395.6 + 296.6$$

$$= -99 \text{ KJ} \quad (1)$$

29.(a)  $AgCl \equiv Cl$

$$108 + 35.5 \quad 35.5$$

$$143.5 \quad 35.5$$

$$\% \text{ of Cl} = \frac{35.5}{143.5} \times \frac{\text{Amt. of AgCl formed}}{\text{Wt. of Organic Compound}} \times 100$$

$$\% \text{ of Cl} = \frac{35.5}{143.5} \times \frac{0.5740}{0.3780} \times 100 \quad (2)$$

$$= 37.57\%$$

(b) Paper chromatography is a type of partition chromatography which is based upon the differences in the tendencies of substance to distribute between two phases. (1)

OR

(c) The process of displacement of  $\sigma$  electrons along the saturated carbon chain due to the presence of a polar covalent bond at one end of the chain is called inductive effect (I effect). It is of two types.

(i) + I effect  $\rightarrow$  substituent has less  $e^-$  attracting power than H.

(ii) - I effect  $\rightarrow$  substituent has more  $e^-$  attracting power than H.

+ I effect example -  $\text{CH}_3$ , -  $\text{C}_2\text{H}_5$

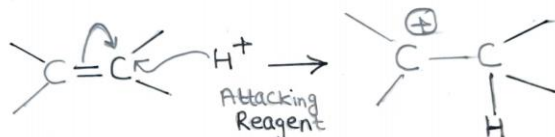
- I effect example -  $\text{NO}_2$ , -  $\text{CN}$ , -  $\text{X}$  (1½)

Electromeric effect is the complete transfer of shared pair of  $\pi e^-$  to one of the atom joined by multiple bond. It is of two types

(i) + E effect

(ii) - E effect

(i) + E effect is when  $\pi e^-$ s are transferred to atom to which attacking reagent get attached example

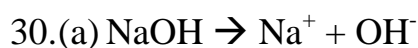


(ii) - E effect is when  $\pi$  bond  $e^-$  all transferred to atom other than the one to which reagent get attached.

Example



(1½)



0.01 M      0.01M

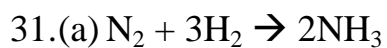
$$K_w = [\text{H}^+] [\text{OH}^-] = 10^{-14}$$

$$[\text{H}^+] = \frac{10^{-14}}{0,01} \times 100 = 10^{-12} \quad (1)$$

$$\text{pH} = -\log [\text{H}^+]$$

$$= -\log 10^{-12}$$

$$= 12 \quad (1)$$



$$\Delta n_g = 2 - 4 = -2$$

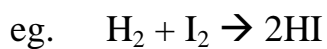
$$\Delta H = \Delta U + \Delta n_g RT$$

$$= -87.425 \times 1000 + (-2) \times 8.314 \times 298 \quad (2)$$

$$= -87425 - 4955.14$$

$$= -77514.7\text{J}$$

OR



$$\Delta n_g = 2 - 2 = 0$$

$$\therefore \Delta H = \Delta U + 0RT$$

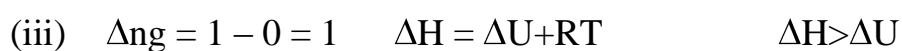
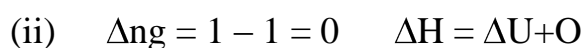
$$\therefore \Delta H = \Delta U$$

$$\Delta H = \Delta U + P\Delta V$$

when  $\Delta V = 0$  then  $\Delta H = \Delta U \quad (2)$

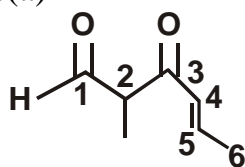
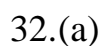
OR

any other relevant example.



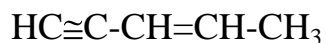
$$\Delta H < \Delta U \text{ in (i)} \quad (1)$$

$$\Delta H > \Delta U \text{ in (iii)} \quad (1)$$



3-keto-2-methylhex - 4 - en - 1 - al (1)

(b) pent - 3 - en - 1 - yne



(1)

(c) (i) 
$$\begin{array}{c} \text{O} \\ || \\ \text{H}-\text{C}-\text{OH} \end{array}$$
 Methanoic acid

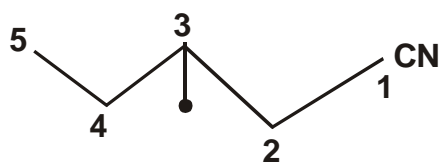
(ii) 
$$\begin{array}{c} \text{O} \\ || \\ \text{CH}_3-\text{C}-\text{OH} \end{array}$$
 Ethanoic acid

(iii) 
$$\begin{array}{c} \text{O} \\ || \\ \text{CH}_3-\text{CH}_2-\text{C}-\text{OH} \end{array}$$
 Propanoic acid

(iv) 
$$\begin{array}{c} \text{O} \\ || \\ \text{CH}_3-\text{CH}_2-\text{CH}_2-\text{C}-\text{OH} \end{array}$$
 Butanoic acid (2)

OR

(i)



3-methyl pentane nitrile (1)

(ii) 
$$\begin{array}{cccc} 1 & 2 & 3 & 4 \\ \text{CH}_3 & -\text{CH} & -\text{CH} & -\text{CH}_3 \\ & | & | & \\ & \text{OH} & \text{Br} & \end{array}$$

3-Bromobutan-2-ol (1)

### SECTION-E

33.(a)  $\Delta V = 45 \times \frac{2}{100} = 0.9$  (1)

$$m = \frac{40}{1000}$$

$$\Delta x = \frac{h}{4\pi m \Delta v} \quad (1)$$

$$= \frac{6.626 \times 10^{-34}}{4 \times 3.14 \times 40 \times 10^{-3} \times 0.9}$$

$$= 1.46 \times 10^{-33} \text{ m} \quad (1)$$

- |     |   |   |
|-----|---|---|
| (b) | Orbit   | Orbital   |
| (a) | It is well defined circular path around which $e^-$ revolve | It is region in space around nucleus where the probability to find $e^-$ is maximum |
| (b) | Represent planar motion                                     | three dimensional motion of electron  |

OR / any other relevant difference. (2)

OR

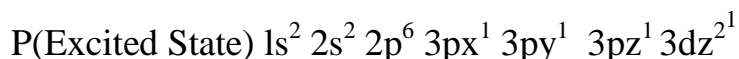
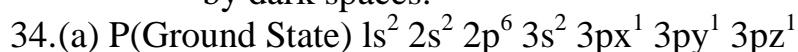
$$(a) \frac{\lambda_A}{\lambda_B} = \frac{h}{P_A} \frac{P_B}{h} = \frac{P_B}{P_A} \quad (1)$$

$$P_B = \frac{P_A}{2}$$

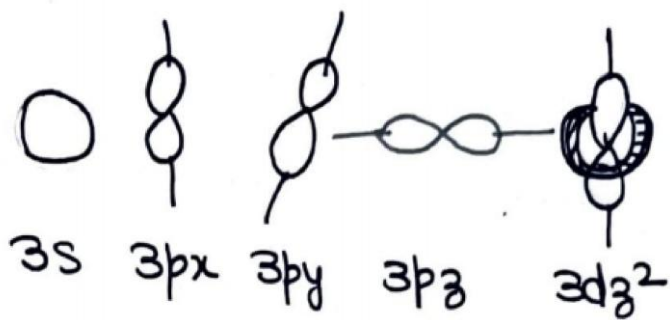
$$\frac{\lambda_A}{\lambda_B} = \frac{P_A}{2 \cdot P_A} = \frac{1}{2} \quad (1)$$

$$\frac{5 \times 10^{-8}}{\lambda_B} = \frac{1}{2} \therefore \lambda_B = 10 \times 10^{-8} \text{ m} = 10^{-7} \text{ m} \quad (1)$$

- |      |   |   |
|------|---|---|
| (b)  | Emission Spectrum   | Absorption Spectrum   |
| (i)  | It is obtained when radiation emitted by the excited substance are analysed with spectroscope | It is obtained when white light is passed through solution and transmitted light is analysed through spectroscope |
| (ii) | Emission spectrum consist of bright coloured lines separated by dark spaces.                  | Consist of dark lines in otherwise continuous spectrum  |
- (2)





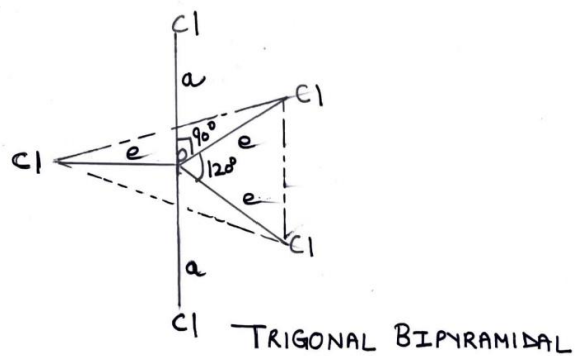
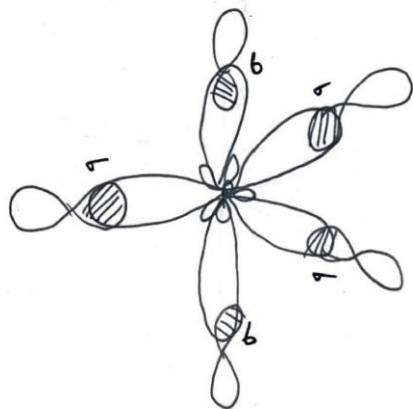


(1)

5 orbitals hybridise and form 5 new orbitals of same energy and same shape.



5 sp<sup>3</sup>d hybrid orbitals adopt trigonal bipyramidal arrangement which overlap with 3p<sub>z</sub> orbital to form 5 σ bonds



(1)

Axial bonds are longer than equatorial bonds due to greater repulsions from other bonds in axial position. (1)

- (b)  $\text{BeH}_2$  is linear molecule. Therefore the resultant dipole moment of two Be-H bonds get cancelled giving zero dipole moment.



OR

$$\begin{aligned} \text{(a) } \text{O}_2 &= \sigma 1s^2 \sigma^* 1s^2 \sigma 2s^2 \sigma^* 2s^2 \sigma 2pz^2 \pi 2px^2 = \pi 2py^2 \pi^* 2px^1 = \pi^* 2py^1 \\ \text{O}_2^+ &= \sigma 1s^2 \sigma^* 1s^2 \sigma 2s^2 \sigma^* 2s^2 \sigma 2pz^2 \pi 2px^2 = \pi 2py^2 \pi^* 2px^1 = \pi^* 2py^0 \\ \text{O}_2^- &= \sigma 1s^2 \sigma^* 1s^2 \sigma 2s^2 \sigma^* 2s^2 \sigma 2pz^2 \pi 2px^2 = \pi 2py^2 \pi^* 2px^2 = \pi^* 2py^1 \end{aligned} \quad (1)$$

$$\text{Bond order } \text{O}_2 = \frac{8-4}{2} = \frac{4}{2} = 2$$

$$\text{O}_2^+ = \frac{8-3}{2} = \frac{5}{2} = 2.5$$

$$\text{O}_2^- = \frac{8-5}{2} = \frac{3}{2} = 1.5 \quad (1)$$

Higher is the bond order, more is the stability.

$$\text{O}_2^+ > \text{O}_2 > \text{O}_2^- \quad (1)$$

- (b)  $\text{CO}_2$  has zero dipole moment so  $\text{CO}_2$  is linear as two C=O bond moments get cancelled where as  $\text{H}_2\text{O}$  molecule has resultant dipole moment. Two O-H bonds are arranged in angular shape and the bond moment of two O-H bonds give resultant dipole moment. (2)

35.(a)

