

COMMON HALF YEARLY EXAMINATION - 2025  
Standard XI

CHEMISTRY

PART - I

I. Choose the correct answer:

- 1) b) Spin quantum number
- 2) b) Oxygen
- 3) a)  $s > p > d > f$
- 4) b) Amphoteric oxide
- 5) c) Milk of lime
- 6) a) Boyle's law
- 7) a)  $\Delta H < 0$  and  $\Delta S > 0$
- 8) a) Increase in pressure
- 9) b)  $\pi V = nRT$
- 10) b) Dimethyl ether
- 11) c) Assertion is true but reason is false
- 12) c) Both (a) and (b)
- 13) b)  $-NO_2$
- 14) c) Freon - 112
- 15) c) 5.6

PART - II

II. Answer any 6 questions. (Q.No. 24 is compulsory).

- 16) Mole is the amount of substance of a system which contains as many elementary particles as there are atom in 12g of Carbon - 12 isotope.  
1 mole =  $6.022 \times 10^{23}$  entities
- 17) It is impossible to accurately determine both the position and momentum of microscopic particle simultaneously  
 $\Delta x \cdot \Delta p \geq h/4\pi$   
 $\Delta x$  - uncertainties in determining the position.  
 $\Delta p$  - uncertainties in determining the position.

18)

- \* Sodium hydroxides are strong bases.
- \* It dissolve in water with evolution of heat on account of intense hydration.

19)

The deviation of real gases from ideal behaviour is measured in terms of a ratio of  $Pv$  to  $nRT$ . This is termed as compressibility factor.

20

The entropy of pure crystalline substance at absolute zero is zero.

21

Isotonic solutions - Two solution having same osmotic pressure at a given temperature.

22)

- Acetaldehyde:  $\text{CHO}$
- Methylamine:  $\text{NH}_2$

An atom or group of atoms which is responsible for the characteristics properties of organic compound is called a functional group.

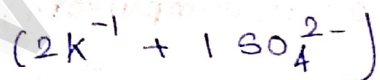
23)

- \* Nucleophiles:
    - \* Negatively charged ions
    - \* They are electron rich
    - \* Donates a pair of electron
    - \* Lewis bases.
- Eg:  $\text{NH}_3$  and  $(\text{RNH}_2)$ .

- \* Electrophiles:
    - \* Positive charged ions
    - \* They are electron deficient
    - \* Accept a pair of electron
    - \* Lewis acids
- Eg:  $\text{BF}_3$  and  $\text{AlCl}_3$ .

24)

$\text{K}_2\text{SO}_4$  contains 3 ion



1 mole  $\text{K}_2\text{SO}_4$  molecule contains } =  $3 \times 6.023 \times 10^{23}$  ions

$10^{-4}$  mole  $\text{K}_2\text{SO}_4$  molecule contains } =  $3 \times 6.023 \times 10^{23} \times 10^{-4}$

$$= 18.069 \times 10^{19} \text{ ions}$$

$$= 1.807 \times 10^{20} \text{ ions}$$

III Answer any 6 questions, (Q.No.33 is compulsory)

25) i) Urea [ $\text{CO}(\text{NH}_2)_2$ ]

$$\text{Molar mass} = 12 + 16 + (2 \times 14) + (4 \times 1) = 60 \text{ g mol}^{-1}$$

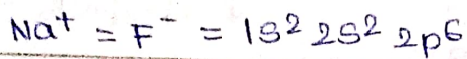
ii) Acetone [ $\text{CH}_3\text{COCH}_3$ ]

$$\text{Molar mass } (\text{C}_3\text{H}_6\text{O}) = (3 \times 12) + (6 \times 1) + 16 = 58 \text{ g mol}^{-1}$$

iii) Boric Acid [ $\text{H}_3\text{BO}_3$ ]

$$\text{Molar mass} = (3 \times 1) + 11 + (3 \times 16) = 62 \text{ g mol}^{-1}$$

26 Ions having same electronic configuration is called isoelectronic ions.

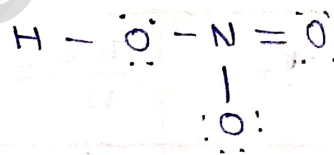


27) \* Deuterium is used as a tracer element.

\* Deuterium is used to study the movement of groundwater by isotopic effect.

28 If a system at equilibrium is subjected to a disturbance; then the system will move in the direction to nullify the effect of the disturbance.

29) i) Nitric acid ( $\text{HNO}_3$ )



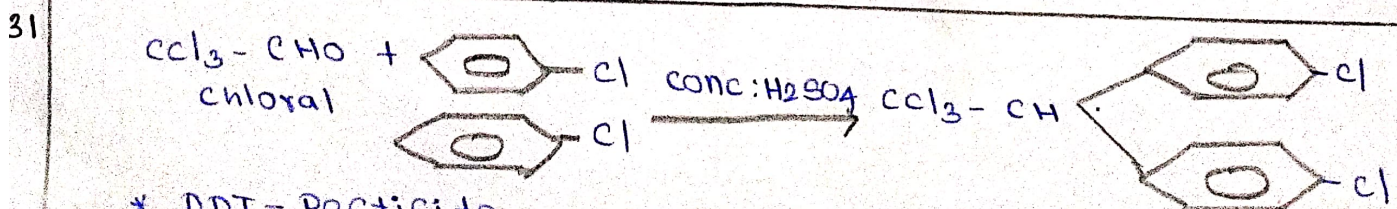
ii) Ammonia ( $\text{NH}_3$ )

$$\begin{array}{c} \text{H} \\ | \\ \text{H} - \text{N} - \text{H} \\ \vdots \end{array}$$

30 \* Entropy is a measure of the molecular disorder of a system

$$* S = q_{rev} / T$$

\* unit - J/K



\* DDT - Pesticide

32

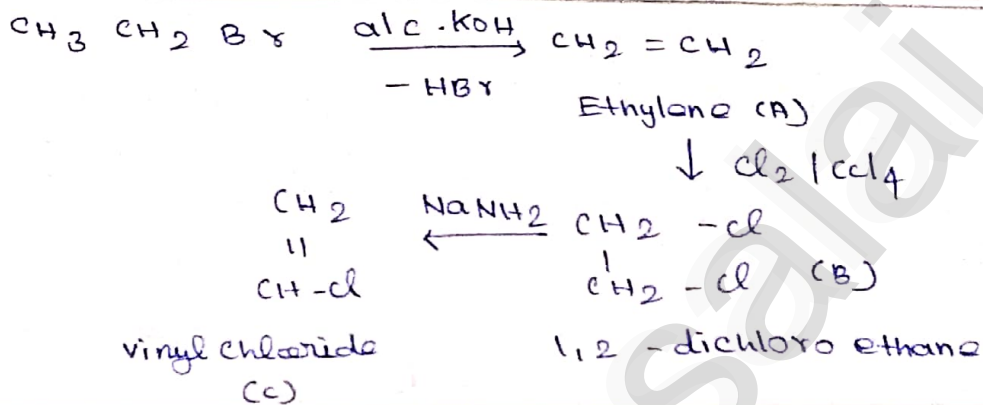
\* Biochemical oxygen Demand (BOD)

The total amount of oxygen in milligrams consumed by microorganisms in decomposing the waste in one litre of water at 20°C for a period of 5 days.

\* Chemical oxygen demand (COD)

The amount of oxygen required by the organic matter in a sample of water for its oxidation by a strong oxidizing agent like  $K_2Cr_2O_7$  in acid medium for a period of 2 hrs.

33



IV Answer all the questions.

PART - IV

Element	percentage	Atomic mass	Relative number of atoms	Simple ratio	whole no.
C	76.6	12	$\frac{76.6}{12} = 6.38$	$\frac{6.38}{1.06} = 6$	6
H	6.38	1	$\frac{6.38}{1} = 6.38$	$\frac{6.38}{1.06} = 6$	6
O	17.02	16	$\frac{17.02}{16} = 1.06$	$\frac{1.06}{1.06} = 1$	1

Empirical formula =  $C_6H_6O$

34)  
9)

ii)

- \* Azimuthal Quantum number ( $l$ )
- \* It represent a subshell
- \* It has the value from 0 to  $(n-1)$

$l$ -value	0	1	2	3
orbitals	s	p	d	f

- \* The maximum number of electrons in a given subshell is  $2(2l+1)$ .
- \* It is determined by the shape of orbitals

b)

In the Pauling method the ionic radius was calculated by using the Inter Ionic Distance

$$d = r_{C^+} + r_{A^-} \quad \dots \quad (1)$$

$r_{C^+}$  - radius of cation,  $r_{A^-}$  - radius of anion

$d$  = distance between  $C^+$  and  $A^-$  ions

In noble gases,

Ionic radius  $\propto$  Effective nuclear charge

$$r_{C^+} \propto \frac{1}{(Z_{eff})_{C^+}} \quad \dots \quad (2)$$

and

$$r_{A^-} \propto \frac{1}{(Z_{eff})_{A^-}} \quad \dots \quad (3)$$

$$\text{If } Z_{eff} = Z - S$$

From equations (2), (3)

$$\frac{r_{C^+}}{r_{A^-}} = \frac{(Z_{eff})_{A^-}}{(Z_{eff})_{C^+}} \quad \dots \quad (4)$$

On solving equation (1) and (4) the values of  $r_{C^+}$  and  $r_{A^-}$  can be obtained

- 35  
a) i) \* Electron deficient hydride -  $B_2H_6$   
\* Electron rich hydride - Water,  $NH_3$   
\* Electron precise Hydride - methane.

- ii) \*  $Mn^{2+} = 1s^2 2s^2 2p^6 3s^2 3p^6 \cdot 3d^5 4s^0$   
\*  $Cr^{3+} = 1s^2 2s^2 2p^6 3s^2 3p^6 3d^3 4s^0$

- b) \* Gibbs free energy  $G = H - TS$   
\*  $G$  - state function.  
\*  $G$  - Extensive property.  
\*  $G$  has a single value for the thermodynamic state of the system.

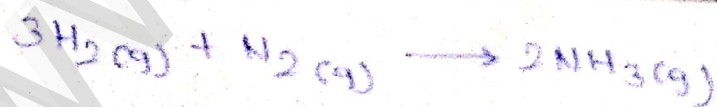
Process	Spontaneous	Non-Spontaneous	Equilibrium
$\Delta G$	-ve	+ve	0

- 36  
a) i) At constant temperature, the partial vapour pressure of each component in the solution is directly proportional to the mole fraction.  
 $P_A \propto X_A$

- ii) vander waals equation for a real gas  
$$\left(p + \frac{an^2}{V^2}\right) \cdot (V - nb) = nRT$$
  
(a, b - vander waals constant)

Volume correction

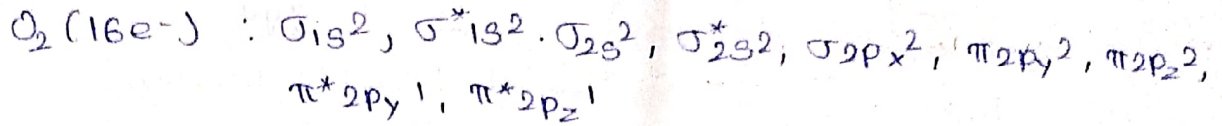
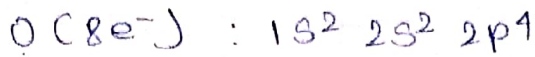
$$V_{ideal} = V - nb$$



$$K_C = \frac{[NH_3]^2}{[H_2]^3 [N_2]}$$

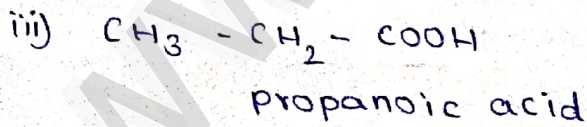
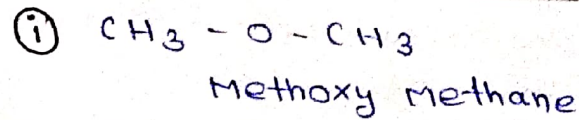
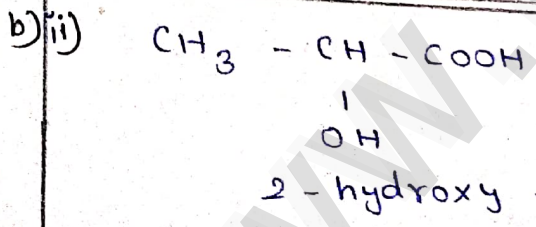
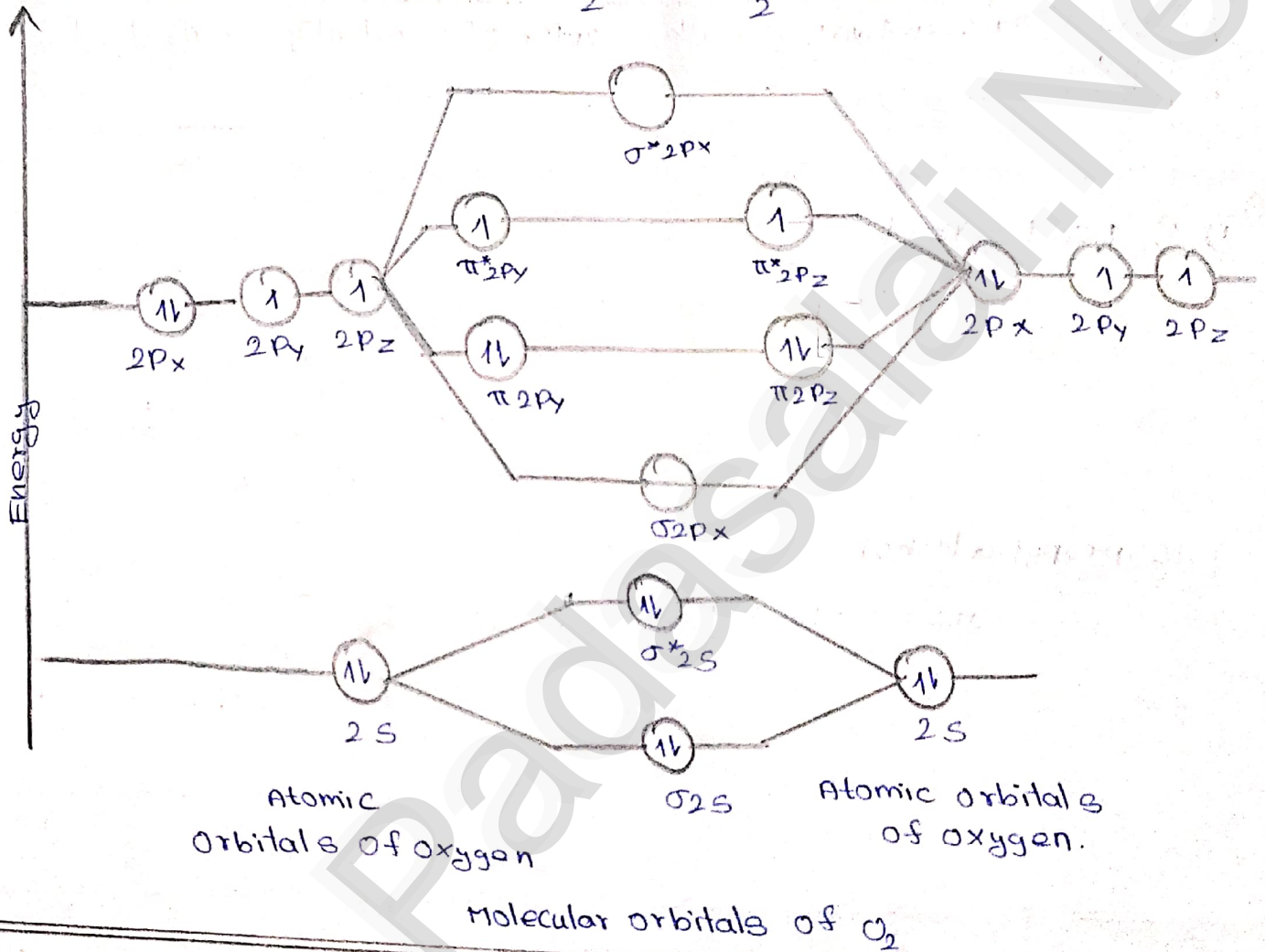
$$K_P = \frac{(P_{NH_3})^2}{(P_{H_2})^3 (P_{N_2})}$$

31  
2



Two unpaired electrons - paramagnetic

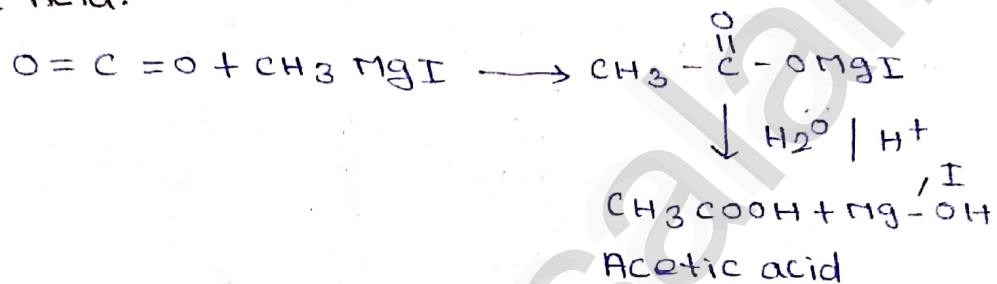
$$\text{Bond Order} = \frac{N_b - N_a}{2} = \frac{10 - 6}{2} = 2$$



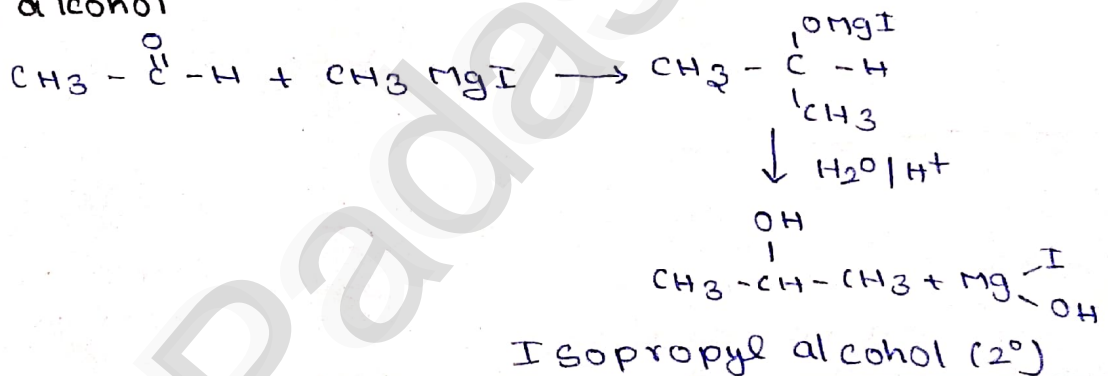
ii)

	$S_N1$	$S_N2$
1	unimolecular reaction	Bimolecular reaction
2	Two steps process	Single step process
3	First order kinetic reaction	Second order kinetic reaction
4	Rate of reaction $\propto$ [substrate]	Rate of reaction $\propto$ [substrate][nucleophile]
5	Carbocation mediated reaction order of reactivity of alkyl halide $3^\circ > 2^\circ > 1^\circ$	Transition Phase mediated reaction order of reactivity of alkyl halide $1^\circ > 2^\circ > 3^\circ$

38) i) 1) Acetic Acid.



2) Isopropyl alcohol



i)

Huckel proposed that aromaticity is a function of electronic structure. A compound may be aromatic, if it obeys the following rules.

- i) The molecule must be co-planar
- ii) complete delocalization of  $\pi$  electron in the ring
- iii) presence of  $(4n+2)$   $\pi$  electrons in the ring where  $n$  is an integer ( $n=0, 1, 2, \dots$ ) This is known as Huckel's rule.

\*)

- \* Growing more trees.
- \* waste management and proper disposal of wastes.
- \* Recycling waste materials and reusing them.
- \* Methanol is used as a fuel in automobiles.
- \* using fuels with low Sulphur content

The end. . . . .