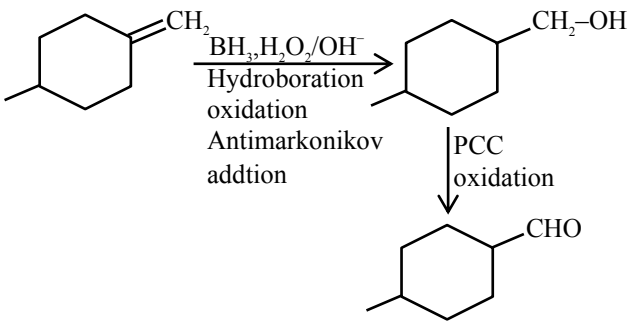
**Sol.** $BH_3$, $H_2O_2/^-OH$ followed by PCC oxidation.



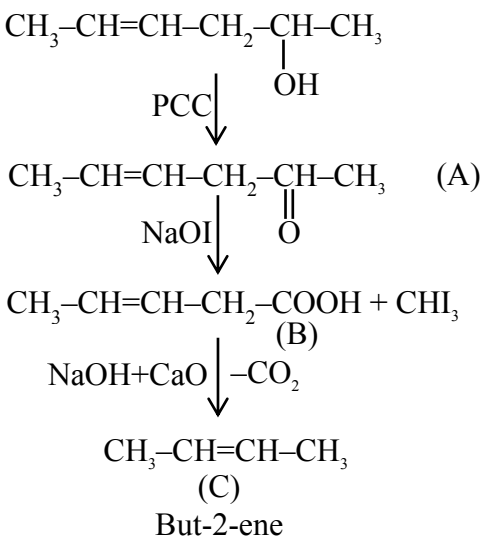

**16.** Hex-4-ene-2-ol on treatment with PCC gives 'A'. 'A' on reaction with sodium hypoiodite gives 'B', which on further heating with soda lime gives 'C'. The compound 'C' is

(A) 2- pentene (B) proponaldehyde

(C) 2-butene (D) 4-methylpent-2-ene

**Ans. (C)**

**Sol.**




**17.** The conversion of propan-1-ol to n-butylamine involves the sequential addition of reagents. The correct sequential order of reagents is.

(A)(i) $SOCl_2$ (ii) KCN (iii) $H_2$/Ni,Na(Hg)/$C_2H_5OH$

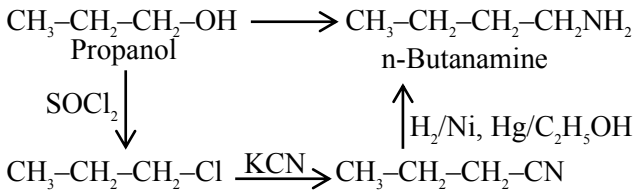
(B) (i) HCl (ii) $H_2$/Ni, Na(Hg)/$C_2H_5OH$

(C) (i) $SOCl_2$ (ii) KCN (iii) $CH_3NH_2$

(D) (i) HCl (ii) $CH_3NH_2$

**Ans. (A)**

**Sol.**



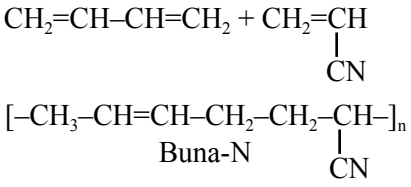

**18.** Which of the following is **not** an example of a condensation polymer?

(A) Nylon 6,6 (B) Decron

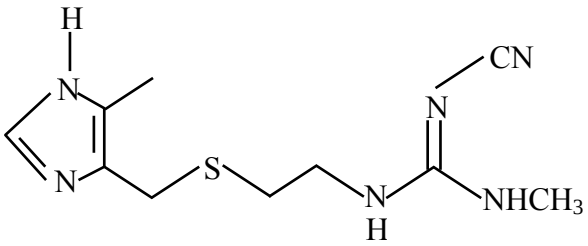
(C) Buna-N (D) Silicone

**Ans. (C)**

**Sol.** Buna-N is an addition copolymer of 1,3-butadiene and acrylonitrile.




**19.** The structure shown below is of which well-known drug molecule?




(A) Ranitidine (B) Seldane

(C) Cimetidine (D) Codeine

**Ans. (C)**

**20.** In the flame test of a mixture of salts, a green flame with blue centre was observed. Which one of the following cations may be present?

(A) $Cu^{2+}$ (B) $Sr^{2+}$

(C) $Ba^{2+}$ (D) $Ca^{2+}$

**Ans. (A)**

**Sol.**

| Ion | Colour of the flame |
|---|---|
| (A) $Cu^{+2}$ | green flame with blue centre |
| (B) $Sr^{2+}$ | Crimson Red |
| (C) $Ba^{2+}$ | Apple green |

## SECTION-B

**1.** At 300 K, a sample of 3.0 g of gas A occupies the same volume as 0.2 g of hydrogen at 200 K at the same pressure. The molar mass of gas A is____ g $mol^{-1}$ (nearest integer) Assume that the behaviour of gases as ideal. (Given: The molar mass of hydrogen ($H_2$) gas is 2.0 g $mol^{-1}$)

**Ans. ( 45)**

**Sol.** Given : Ideal gas A and $H_2$ gas at same pressure and volume.

From ideal gas equation pv = nRT

$n_1T_1 = n_2T_2$

$$\frac{3}{\text{GMM of A}} \times 300 = \frac{0.2}{2} \times 200$$

GMM of A = 45 g/mole

**2.** A company dissolves 'X' amount of $CO_2$ at 298 K in 1 litre of water to prepare soda water

X =____ $\times 10^{-3}$g. (nearest integer)

(Given: partial pressure of $CO_2$ at 298 K= 0.835 bar.

Henry's law constant for $CO_2$ at 298 K = 1.67 kbar.

Atomic mass of H,C and O is 1, 12 and 6 g $mol^{-1}$, respectively)

**Ans. (1222 & 1223)**

**Sol.** From Henry law

$P = K_H X_{CO_2}$

$$0.835 = 1.67 \times 10^3 \times 1.67 \times 10^3 \times \frac{w_{CO_2}/44}{\frac{w_{CO_2}}{44} + \frac{1000}{18}}$$

$w_{CO_2} = 1.2228\text{g} = 1222.8 \times 10^{-3}\text{g}$

Or

$P = K_H X_{CO_2}$

$$0.835 = 1.67 \times 10^3 \times \frac{n_{CO_2}}{n_{CO_2} + n_{H_2O}}$$

$$0.835 = 1.67 \times 10^3 \times \frac{w_{CO_2}/44}{\frac{1000}{18}}$$

$w_{CO_2} = 1.2222\text{g} = 1222.2 \times 10^{-3}\text{g}$

**3.** $PCl_5$ dissociates as

$$PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$$

5 moles of $PCl_5$ are placed in a 200 litre vessel which contains 2 moles of $N_2$ and is maintained at 600 K. The equilibrium pressure is 2.46 atm. The equilibrium constant $K_p$ for the dissociation of $PCl_5$ is_____ $\times 10^{-3}$. (nearest integer)

(Given: R = 0.082 L atm $K^{-1}$ $mol^{-1}$ : Assume ideal gas behaviour)

**Ans. (1107 )**

**Sol.** Given : 2 mole of $N_2$ gas was present as inert gas.

Equilibrium pressure = 2.46 atm

$$PCl_5(g) \rightleftharpoons PCl_3(g) + C\ell_2(g)$$

| | | | |
|---|---|---|---|
| t = 0 | 5 | 0 | 0 |
| t = Eq$^m$ | 5 – x | x | x |

from ideal gas equation

PV = nRT

2.46 × 200 = (5 – x + x + x + 2) × 0.082 × 600

x = 3

$$K_P = \frac{n_{PCl_3} \times n_{Cl_2}}{n_{PCl_5}} \times \left[\frac{P_{total}}{n_{total}}\right]$$

$$\frac{3 \times 3}{2} \times \frac{2.46}{10} = 1.107 = 1107 \times 10^{-3}$$

**4.** The resistance of conductivity cell containing 0.01 M KCl solution at 298 K is 1750 Ω. If the conductively of 0.01 M KCl solution at 298 K is $0.152 \times 10^{-3}$ S $cm^{-1}$, then the cell constant of the conductivity cell is_____ $\times 10^{-3}$ $cm^{-1}$.

**Ans. (266 )**

**Sol.** $K = \frac{1}{R} \times \text{cell constant}$

$0.152 \times 10^{-3} = \frac{1}{1750}$ cell constant

cell constant = $266 \times 10^{-3}$

**5.** When 200 mL of 0.2 M acetic acid is shaken with 0.6 g of wood charcoal, the final concentration of acetic after adsorption is 0.1 M. The mass of acetic acid adsorbed per garm of carbon is_____ g.

**Ans. (2 )**

**Sol.** weight of wood charcoal = 0.6 g

Mass of acetic acid adsorbed = $\frac{M_1V_1 - M_2V_2}{1000} \times 60$

$= \frac{0.2 \times 200 - 0.1 \times 200}{1000} \times 60$

= 1.2 g

Mass of acetic acid adsorbed per gram of

carbon = $\frac{1.2}{0.6} = 2$

**6.** (a) Baryte, (b) Galena, (c) Zinc blende and (d) Copper pyrites. How many of these minerals are sulphide based?

**Ans. (3)**

**Sol.**

(1) Baryte : $BaSO_4$

(2) Galena : PbS

(3) Zinc blende : ZnS

(4) Copper pyrite : $CuFeS_2$

] sulphide ($S^{2-}$) ores

**7.** Manganese (VI) has ability to disproportionate in acidic solution. The difference in oxidation states of two ions it forms in acidic solution is_____

**Ans. (3)**

**Sol.** $MnO_4^{2-}$ disproportionates in a neutral or acidic solution to give $MnO_4^-$ and $Mn^{+4}$

$3MnO_4^{2-} + 3H^+ \longrightarrow 2MnO_4^- + MnO_2 + 2H_2O$

O.S. of Mn in $MnO_4^-$ = +7

O.S. of Mn in $MnO_2$ = +4

difference = 3

**8.** 0.2 g of an organic compound was subjected to estimation of nitrogen by Dumas method in which volume of $N_2$ evolved (at STP) was found to be 22.400 mL. The percentage of nitrogen in the compound is____.[nearest integer]

(Given: Molar mass of $N_2$ is 28 $mol^{-1}$. Molar volume of $N_2$ at STP : 22.4 L)

**Ans. (14 )**

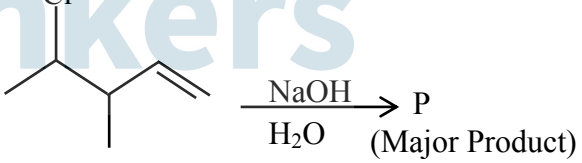
**Sol.** weight of organic compound = 0.2g

mass of $N_2$(g) evolved = $\frac{22.4 \times 10^{-3}}{22.4} \times 28$

= $28 \times 10^{-3}$g

% of N = $\frac{28 \times 10^{-3}}{0.2} \times 100 = 14$

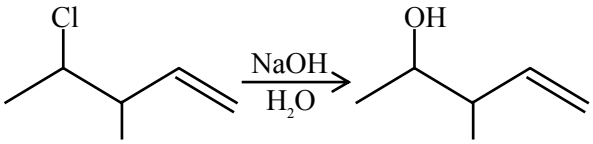
**9.**




Consider the above reaction. The number of $\pi$ electrons present in the product 'P' is____.

**Ans. (2)**

**Sol.** Number of $\pi$ electron = 2




**10.** In alanylglycylleucylalanylvaline, the number of peptide linkages is_____.

**Ans. (4)**

**Sol.** There are Five amino acids and four peptide linkages.