MODEL QUESTION PAPER
CHEMISTRY

Class: XI **Maximum Marks: 70**
(Time allowed: 2.30 Hours)

Instructions: Check the question paper for fairness of printing. If there is any lack of fairness, inform the hall supervisor immediately.
Note: draw diagrams and write equations wherever necessary.

PART-I

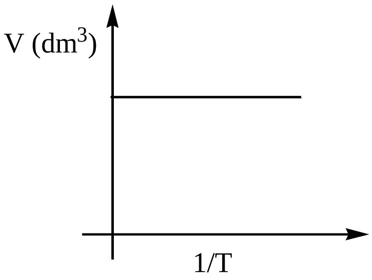
Answer All the Questions, **[15 X1 =15]**
Choose and write the correct answer:

1. Which of the following is used as a standard for atomic mass?
   a. ${}_6C^{12}$ b. ${}_6C^{14}$
   c. ${}_6C^{13}$ d. ${}_7C^{14}$
2. Consider the following set of quantum numbers

	n	l	m	s
(i)	2	1	-1	3/2
(ii)	1	1	1	+1/2
(iii)	1	0	+1	-1/2
(iv)	1	0	0	-1/2

   Which of the following set of quantum number is not possible?
   a. (i) and (ii) b. (ii) and (iv)
   c. (i) , (ii) and (iii) d. (iv) only
3. The electronic configuration of elements A and B are $1s^2,2s^2,2p^6,3s^1$ and $1s^2,2s^2,2p^5$ respectively. The formula of ionic compound that can be formed between these elements is
   a. AB b. A_2B
   c. AB_2 d. none of these
4. Which of the following statements is correct with regard to ortho and Para dihydrogen?
   a. They are stereo isomers.
   b. Ortho isomer has zero nuclear spin whereas the Para isomer has one nuclear spin.
   c. The Para isomer is favored at low temperature.
   d. All of these
5. The compound (X) on heating gives a colorless gas and a residue that is dissolved in water to obtain (B). When excess of CO_2 is bubbled through aqueous solution of B , compound C is formed. Solid (C) on heating gives back (X), the compound (B) is
   a. $CaCO_3$ b. $Ca(OH)_2$
   c. Na_2CO_3 d. $NaHCO_3$

6. Which of the following is the correct representation of Charles's law?

a.


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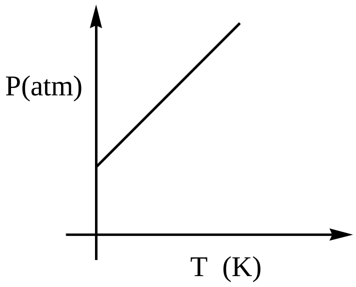

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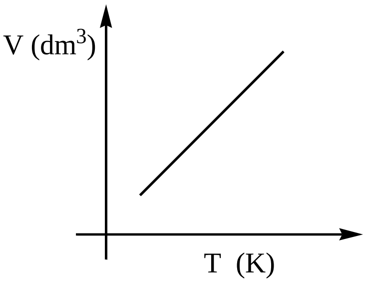

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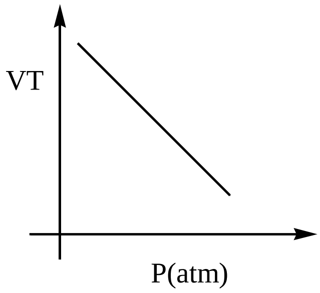


7. For one mole of an ideal gas, $\left(\frac{\partial H}{\partial T}\right)_P - \left(\frac{\partial U}{\partial T}\right)_V$ is equal to
   a. 2.303 R
   b. $8.314\ dm^3 atm mol^{-1}$
   c. $0.0821\ litatmmol^{-1}K^{-1}$
   d. 2.303 log R
8. For a reaction $AX_5 \rightleftharpoons AX_3 + X_2$,1% of AX_5 is dissociated at a total pressure of 1 atm , the equilibrium constant K_P is approximately equal to
   a. 10^{-3}
   b. 10^{-4}
   c. $0.1\ X\ 10^{-4}$
   d. 1
9. For an ideal solution
   a. $\Delta V_{mix} = 0$
   b. $\Delta V_{mix} \neq 0$
   c. $\Delta V_{mix} > 0$
   d. $\Delta V_{mix} < 0$
10. Assertion: oxygen molecule is paramagnetic.
    Reason: it has two unpaired electrons in its anti-bonding molecular orbitals.
    a. Both assertion and reason are true, and reason is the correct explanation of assertion
    b. Both assertion and reason are true, and reason is not the correct explanation of assertion
    c. Assertion is true but reason is false
    d. Both assertion and reason are false
11. The general formula for alkane is
    a. C_nH_{2n}
    b. C_nH_{2n-2}
    c. C_nH_{2n+1}
    d. C_nH_{2n+2}
12. Which of the following group has highest +I effect?
    a. $CH_3 -$
    b. $CH_3 - CH_2 -$
    c. $(CH_3)_2CH -$
    d. $(CH_3)_3C -$
13. $(CH_3)_2C = C(CH_3)_2 \xrightarrow[(ii)Zn\ /H_2O]{(i)O_3} X$. $X is$
    a. Acetic acid
    b. propanone
    c. acetaldehyde
    d. Organo zinc compound

14. Ethanol reacts with methyl magnesium bromide to form
    a. Ethane b. methanol
    c. propanone d. methane
15. Haemoglobin of the blood form carboxy haemoglobin with
    a. Carbon dioxide b. carbon tetra chloride
    c. carbon monoxide d. carbamic acid

PART-II

Answer any six questions

(Q.No 18 is compulsory; answer any five from the remaining) [6 X 2 = 12]

16. Predict the oxidation state of carbon in each of the following compounds.
    (i) CH_4 (ii) CCl_4
17. A macroscopic particle of mass one Kg is moving at a velocity $10\ cm\ s^{-1}$. calculate its de Broglie wavelength.
18. Write the balanced equation for each of the following chemical reactions.
    (i) Heating calcium carbonate
    (ii) Reaction of metallic Lithium with Nitrogen gas
19. Distinguish between diffusion and effusion.
20. Calculate the mass of non-volatile solute (molar mass 80 $gmol^{-1}$) which should be dissolved in 92 g of toluene is reduced to its Vapour pressure to 90%.
21. Predict the shape of $ClF_3 and NH_3$ using VSEPR theory.
22. Give one example for $\beta - eleimination$reaction.
23. Draw Cis – Trans isomers for 2,3- dichloro -2-butene.
24. Give any two harmful effects of acid rain.

PART-III

Answer any six questions

(Q.no 27 is compulsory, and answer any five from remaining) . [6 X 3 = 18]

25. Define ionization energy. The first ionization energy of Nitrogen is greater than that of Oxygen- give appropriate reason.
26. Write the equation involved in the preparation of hydrogen peroxide from 2-ethylanthraquinol.
27. Give any three similarities between beryllium and aluminum.
28. Calculate ΔH_f^0 for the reaction
    $CO_2(g) + H_2(g) \rightarrow CO(g) + H_2O(g)$, given that ΔH_f^0 for $CO_2(g), CO(g) and H_2O(g) are - 393.5\ , -111.31\ and - 242\ kJmol^{-1}$ respectively.
29. Define Molarity. If 5.6 g of KOH is present in 250 ml of the solution, calculate the molarity of the solution.
30. Define equilibrium constant. Give any one application of equilibrium constant.
31. 0.30g of a substance gives 0.88 g of carbon dioxide and 0.54 g of water. Calculate the percentage of carbon and hydrogen.

32. Give any two methods for the preparation of halo alkanes from alcohols.

33. Write a note on

(i) Birch reduction

(ii) Friedel craft's acylation

PART-IV

Answer all the Questions **[5 X 5 = 25]**

34. a. (i) an organic compound present in vinegar has 40% carbon, 6.6% of Hydrogen and 53.4 % of Oxygen. Find the empirical formula of the compound.(3)

(ii) List the uses of plaster of Paris.(2)

(Or)

b. (i) describe the Aufbau principle. (3)

(ii) Write the electronic configuration of Fe^{2+} ion. (1)

(iii) How many radial nodes exist in 2s and 4f orbitals (1)

35. a. (i) Explain the Pauling's method of determination of ionic radius.(3)

(ii) Write a note on deuterium exchange reactions.(2)

(or)

b. (i) explain Fajan's rules.(4)

(ii) Draw the Lewis dot structures for sulphurtrioxide(1).

36. a. (i) find the missing parameters.(3)

$P = 1\ atm$	$P = 1\ atm$	$P = 1\ atm$
$V_1 = 0.3\ dm^3$	$V_2 = ?$	$V_3 = 0.15\ dm^3$
$T_1 = 200K$	$T_2 = 300K$	$T_3 = ?\ K$

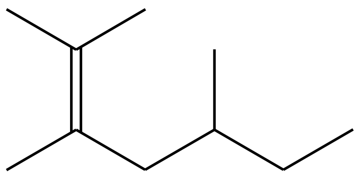
(ii) State Le-Chatlier's principle.(2)

(or)

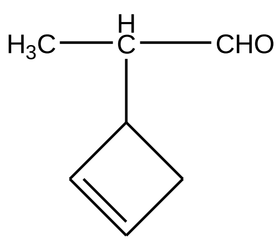
b. (i) in the equilibrium $2A(g) \leftrightharpoons 2B(g) + C_2(g)$,the equilibrium concentrations of A , B and C_2 at 400K are $1X10^{-4}M$, $2.0\ X10^{-3}\ M$, $1.5\ X10^{-4}M$ respectively. Calculate the equilibrium constant Kc at 400 K.(2)

(ii) what are state and path functions? (3)

37. a. (i) Give the IUPAC names of the following compounds. (3)

1. 

2. $H_3C—CH_2—COOH$

3. 

(ii) Give the structures for the following compound (2)

1). 3-chlorobutanol 2). Acetaldehyde

(Or)

b. (i) state Markownikov's rule (1 ½)

(ii) Describe the mechanism of addition of HBr to propene. (3 ½)

38. a. (i)write a short note on the following (3)

(1) Dow's process (2) Darzan's process

(ii)what is green chemistry?(2)

(or)

b. Write a short note on the following

1. Hyper conjugation (2)
2. Osmotic pressure (1 ½)
3. Molar mass (1 ½)

KEY ANSWERS

PART-I

1. a. $_6C^{12}$
2. c. (i) , (ii) and (iii)
3. a. AB
4. c. The Para isomer is favored at low temperature.
5. b. $Ca(OH)_2$
6. c.
7. c. $0.0821\ litatmmol^{-1}K^{-1}$
8. b. 10^{-4}
9. a. $\Delta V_{mix} = 0$
10. a. Both assertion and reason are true, and reason is the correct explanation of assertion.
11. d. C_nH_{2n+2}
12. d. $(CH_3)_3C-$
13. b. propanone
14. d. methane
15. c. carbon monoxide

PART-II

16. (i) oxidation state of carbon in methane (CH_4)

$$oxidation\ state\ of\ carbon + 4(\ oxidation\ state\ of\ H) = 0$$
$$x\ +\ 4(+1) = 0$$
$$x\ +\ 4 = 0$$
$$x = -\,4$$

(ii) oxidation state of carbon in carbon tetra chloride (CCl_4)

$$oxidation\ state\ of\ carbon + 4(\ oxidation\ state\ of\ Cl) = 0$$
$$x\ +\ 4(-1) = 0$$
$$x-\ 4 = 0$$
$$x = +\,4$$

17. A macroscopic particle of mass one Kg is moving at a velocity $10\ CmS^{-1}$. calculate its de Broglie wavelength.

Given : $m = 1\ Kg$ $\quad v = 10\ cm\ s^{-1}$ $\quad \lambda = ?$

$$\lambda = \frac{h}{mv}$$
$$\lambda = \frac{6.626\ X\ 10^{-34\ Js}}{1\ Kg\ \ X\ \ 10\ X\ 10^{-2}\ m\ s^{-1}}$$
$$\lambda = 6.626\ X\ 10^{-33}\ m$$

18.

(i) $CaCO_3 \xrightarrow{1070-1270\,K} CaO + CO_2$

(ii) $6Li + N_2 \longrightarrow 2Li_3N$

19.

The movement of the gas molecules through another gas is called diffusion. Effusion is a process in which a gas escapes from a container through a very small hole.

20.

$$\frac{\Delta P}{P^0} = X_2$$

$$\frac{100-90}{100} = \frac{n_2}{n_1+n_2}$$

$$\frac{1}{10} = \frac{n_2}{n_1+n_2}$$

$$\frac{n_1+n_2}{n_2} = 10$$

$$\frac{n_1}{n_2} + 1 = 10 \qquad [\, n_1 = \frac{92}{92} = 1]$$

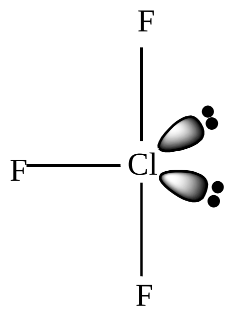
$$\frac{1}{n_2} = 9$$

$$n_2 = \frac{1}{9}$$

$$\frac{W_2}{M_2} = \frac{1}{9}$$

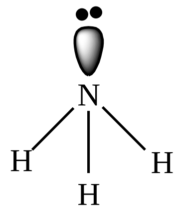
$$W_2 = \frac{M_2}{9} = \frac{80}{9} = 8.89\ g$$

21. ClF_3 consists of 3 bond pairs of electrons and 2 lone pairs of electrons, hence its structure must be represented as



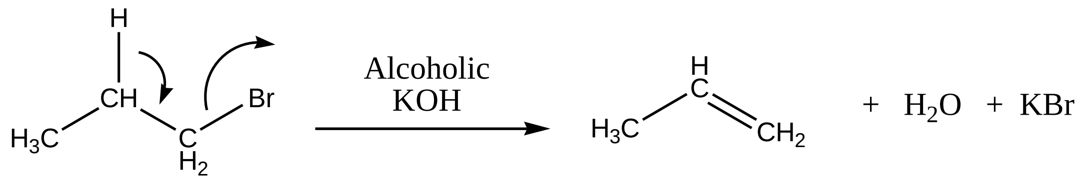
T- shaped

NH_3 consists of 3 bond pairs of electrons and 1 lone pair of electrons, hence its structure must be represented as



Pyramidal

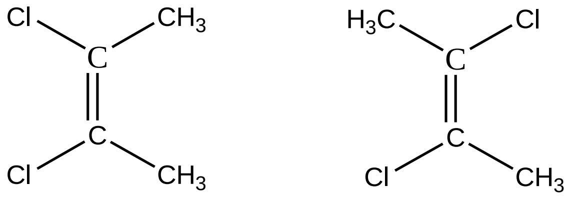
22. The reaction in which two substituent are eliminated from the molecule with the formation of a new C-C double bond is called elimination reaction.



n-Propyl bromide

Propene

23.



Cis 2,3 dichloro-2-butene   Trans 2,3 dichloro-2-butene

24. Harmful effects of acid rain are

(i) Acid rain causes extensive damage to buildings and structural materials of marbles. This attack on marble is termed as **Stone leprosy**.

$CaCO_3 + H_2SO_4 \rightarrow CaSO_4 + H_2O + CO_2\uparrow$

(ii) Acid rain affects plants and animal life in aquatic ecosystem.

25. Ionisation energy is defined as “ The minimum amount of energy required to remove the most loosely bound electron from the valence shell of the isolated neutralgaseous atom in its ground state”.

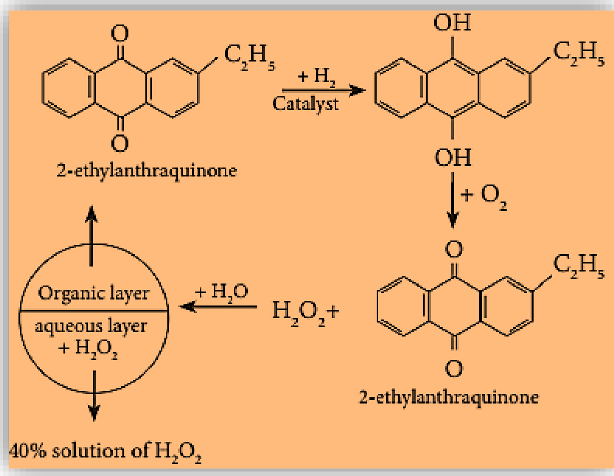
Nitrogen ($1s^2$, $2s^2$, $2p^3$) (1402 kJ mol^{-1}) has higher ionisation energy than Oxygen ($1s^2$, $2s^2$, $2p^3$) (1314 kJ mol^{-1}).

Since the half-filled electronic configuration is more stable, it requires higher energy to remove an electron from 2p orbital of nitrogen.

Whereas the removal one 2p electron from oxygen atom leads to a stable half-filled configuration. This makes comparatively easier to remove 2p electron from oxygen.

26.

H_2O_2 can be prepared by autoxidation of 2-alkyl anthraquinol.



27. Similarities between beryllium and aluminum.

(i) Both beryllium and aluminium hydroxides are amphoteric in nature.

(ii) Carbides of beryllium (Be2C) like aluminium carbide (Al4C3) give methane on hydrolysis.

(iii) Both beryllium and aluminium are rendered passive by nitric acid.

28. Solution:

Given

$\Delta H_f^0\ CO_2 = -393.5\ kJ\ mol^{-1}$

$\Delta H_f^0\ CO = -111.31\ kJ\ mol^{-1}$

$\Delta H_f^0\ (H_2O) = -242\ kJ\ mol^{-1}$

$CO_2(g) + H_2(g) \rightarrow CO(g) + H_2O(g)$

$\Delta H_r^0 = ?$

$\Delta H_r^0 = \Sigma\ (\Delta H_f^0)_{products} - \Sigma\ (\Delta H_f^0)_{reactants}$

$\Delta H_r^0 = [\Delta H_f^0\ (CO) + \Delta H_f^0\ (H_2O)] - [\Delta H_f^0\ (CO_2) + \Delta H_f^0\ (H_2)]$

$\Delta H_r^0 = [-111.31 + (-242)] - [-393.5 + (0)]$

$\Delta H_r^0 = [-353.31] + 393.5$

$\Delta H_r^0 = 40.19$

$\Delta H_r^0 = +40.19\ kJ\ mol^{-1}$

29. "The number of moles of solute dissolved in one litre of the solvent" is called as Molarity of the solution.

$$\text{Molarity(M)} = \frac{\text{number of moles of solute}}{\text{volume of the solvent in Litres}}$$

If 5.6 g of KOH is present in 250 ml of the solution

Number of moles of KOH = $\frac{5.6\ g}{56\ g\ mol^{-1}} = 0.1\ moles$

$$\text{Molarity(M)} = \frac{\text{0.1 moles}}{\text{0.4 Lit}} = 0.25\ mol\ Lit^{-1}\ (or)\ 0.25\ M$$

30. At a given temperature, the ratio of the product of active masses of reaction products raised to the respective stoichiometric coefficients in the balanced chemical equation to that of the reactants is a constant, known as equilibrium constant. For any general equilibrium reaction $xA + yB \rightleftharpoons lC + mD$

$$equilibrium\ constant\ K_C = \frac{[C]^l[D]^m}{[A]^x[B]^y} \quad (in\ terms\ of\ active\ masses)$$

Uses of equilibrium constant:

1. It predicts the direction in which the net reaction will take place.
2. It predicts the extent of the reaction.
3. It is used to calculate the equilibrium concentrations of the reactants and products.

31. Solution:

Weight of organic compound = 0.30 g

Weight of water = 0.54 g

Weight of CO2 = 0.88g

Percentage of Hydrogen:

18 g of water contain 2 g of hydrogen

0.54 g of water contains $\frac{2}{18}\ X\ 0.54\ g\ of\ hydrogen$

$$\%\ of\ Hydrogen = \frac{2}{18}\ X \frac{0.54}{0.3}\ X\ 100\ = 20\%$$

Percentage of carbon:

44 g of CO_2 contain 12 g of carbon

0.88 g of CO_2 contains $\frac{12}{44}\ X\ 0.88\ g\ of\ carbon$

$$\%\ of\ carbon = \frac{12}{44}\ X \frac{0.88}{0.3}\ X\ 100\ = 80\%$$

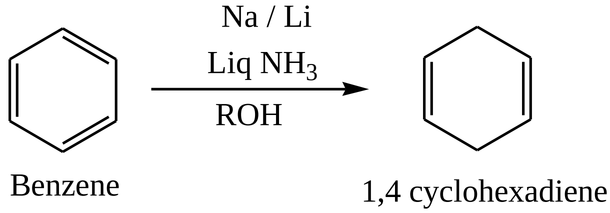
32. Preparation of halo alkanes from alcohols.

1. $CH_3CH_2 - OH + HCl \xrightarrow{anhyd\ ZnCl_2} CH_3CH_2 - Cl\ + H_2O$
2. $CH_3CH_2 - OH + PCl_5 \longrightarrow\ CH_3CH_2 - Cl\ + POCl_3\ +\ HCl$

33.

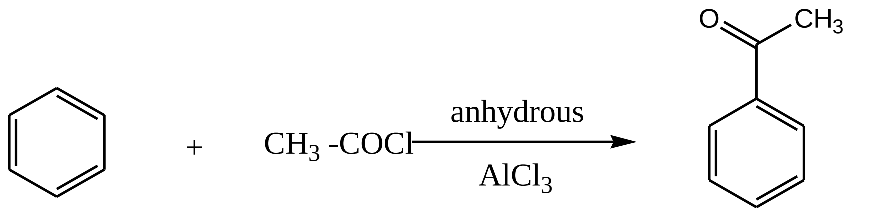
(i) Birch reduction:

Benzene can be reduced to 1, 4-cyclohexadiene by treatment with Na or Li in a mixture of liquid ammonia and alcohol.



(ii) Friedel craft acylation:

When benzene is treated with acetyl chloride in the presence of $AlCl_3$, acyl benzene is formed.



34. a.

(i) **Solution:**

Element	%	Atomic mass	Relative no. of moles	Simplest ratio	Simplest ratio (in whole nos)
C	40	12	$\frac{40}{12} = 3.3$	$\frac{3.3}{3.3} = 1$	1
H	6.6	1	$\frac{6.6}{1} = 6.6$	$\frac{6.6}{3.3} = 2$	2
O	53.4	16	$\frac{53.4}{16} = 3.3$	$\frac{3.3}{3.3} = 1$	1

The empirical formula is CH_2O

(ii) Uses of plaster of Paris:

- ♥ Plaster of Paris is used in building industry as well as plasters.
- ♥ It is used for immobilizing the affected part of organ where there is a bone fracture or sprain.
- ♥ It is used in dentistry, in ornamental work.
- ♥ It is used for making casts of statues and busts.

b. (i) Aufbau principle.

In the ground state of the atoms, the orbitals are filled in the order of their increasing energies. That is the electrons first occupy the lowest energy orbital available to them. Once the lower energy orbitals are completely filled, then the electrons enter the next higher energy orbitals.

(ii)Electronic configuration of Fe^{2+} : $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^0\ 3d^6$

(iii)Radial node$(\boldsymbol{n} - \boldsymbol{l} - \mathbf{1})$

Radial node for 2s orbital is = (2-0-1) = 1

Radial node for 4f orbital is = (4-3-1)=0

35. a

(i) Ionic radius of uni-univalent crystal can be calculated using Pauling's method from the inter ionic distance between the nuclei of the cation and anion. Pauling assumed that ions present in a crystal lattice are perfect spheres, and they are in contact with each other therefore,

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

Where d - is the interionic distance between nucleus of cation and anion

r_{C^+} - the radius of the cation

r_{A^-} - the radius of anion.

Pauling also assumed that the radius of the ion having noble gas electronic configuration (Na^+ and Cl^- having $1s^2\ 2s^2$, $2p^6$ configuration) is inversely proportional to the effective nuclear charge felt at the periphery of the ion.

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

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

Where Z_{eff} is the effective nuclear charge and Z_{eff} = Z-S

From (2) and (3)

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

By solving equations (1) and (4) we will be able to calculate $r_{C^+}$and r_{A^-}.

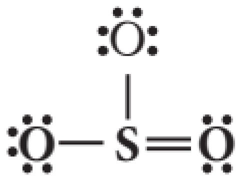
(ii) Deuterium can replace reversibly hydrogen in compounds either partially or completely depending upon the reaction conditions. These reactions occur in the presence of deuterium or heavy water.

$$CH_4 + 2D_2 \longrightarrow CD_4 + 2H_2$$
$$2NH_3 + 3D_2 \longrightarrow 2ND_3 + 3H_2$$

b. (i)

1. **Charge on the ions:**
   - ♣ Higher the positive charge on the cation, greater will be the polarising ability.
   - ♣ Higher the negative charge on the anion, greater is its Polarisibility.
   - ♣ Hence, the increase in charge on cation or in anion increases the covalent character.
   - ♣ Let us consider three ionic compounds $AlCl_3$, $MgCl_2$ and NaCl. Since the charge of the cation increase in the order $Na^+ < Mg^{2+} < Al^{3+}$, the covalent character also follows the same order $NaCl < MgCl_2 < AlCl_3$.
2. **Size of the ions**
   - ♣ The smaller cation and larger anion show greater covalent character due to the greater extent of polarization.
   - ♣ LiCl is more covalent than NaCl. The size of Li^+ is smaller than Na^+ and hence the polarizing power of Li^+ is more.
   - ♣ LiI is more covalent than LiCl, as the size of $I^-$is larger than the Cl^-. Hence I^- will be more polarised than Cl^- by Li^+.
3. **Electronic configuration**
   - ♣ Cations having ns^2 np^6 nd^{10} configuration show greater polarising power than the cations with ns^2 np^6 configuration. Hence, they show greater covalent character.
   - ♣ CuCl is more covalent than NaCl.

(ii) lewis dot structure for SO_3



36. a. (i)

Solution: According to Charles law,

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$

$$\frac{0.3\ dm^3}{200\ K} = \frac{V_2}{300K}$$

$$V_2 = \frac{0.3\ dm^3\ X\ 300K}{200\ K}$$

$$V_2 = 0.45\ dm^3$$

$$\frac{V_1}{T_1} = \frac{V_3}{T_3}$$

$$\frac{0.3\ dm^3}{200\ K} = \frac{0.15\ dm^3}{T_3}$$

$$T_3 = \frac{0.15\ dm^3\ X\ 200K}{0.3\ dm^3}$$

$$T_3 = 100K$$

(ii) Le- chatlier's principle:

"If a system at equilibrium is disturbed, then the system shifts itself in a direction that nullifies the effect of that disturbance."

b. (i)

$$2A(g) \leftrightharpoons 2B(g) + C_2(g),$$

equilibrium concentrations

$[A] = 1X10^{-4}M$,

$[B] = 2.0\ X10^{-3}\ M,$

$[C_2] = 1.5\ X10^{-4}M.$

$$K_c = \frac{[B]^2[C_2]}{[A]^2}$$

$$K_c = \frac{[2.0X\ 10^{-3}]^2[1.5\ X\ 10^{-4}]}{[1\ X\ 10^{-4}]^2}$$

$$K_c = 6X\ 10^{-2}$$

(ii) state and path functions:

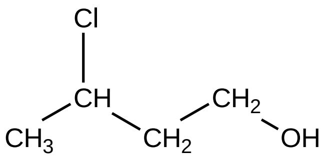
- **State function:**
  A state function is a thermodynamic property of a system, which has a specific value for a given state and does not depend on the path by which the particular state is reached.**Example :** Pressure (P), Volume (V), Temperature(T) etc.
- **Path functions:**
  A path function is a thermodynamic property of the system whose value depends on the path by which the system changes from its initial to final states.**Example:** Work (*w*), Heat (*q*).

37. a.

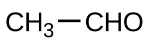
(i) IUPAC names

1. 2,3,5-trimethyl-hept-2-ene
2. propanoic acid
3. 2-(cyclobut-2-enyl)propanal

(ii) structures:

1) 

3-chlorobutanol

2) 

Acetaldehyde

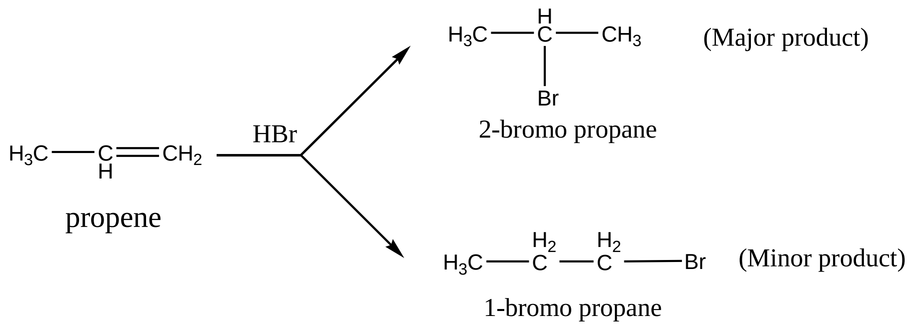
b.

(i) Markownikov's rule :

"When an unsymmetrical alkene reacts with hydrogen halide, the hydrogen adds to the carbon that has more number of hydrogen and halogen add to the carbon having fewer hydrogen".

(ii) Mechanism of addition of HBr to propene:

Addition of HBr to propene follows markownikoff rule. This can be explained as follows.



Mechanism:

Step: 1 Formation of electrophile:

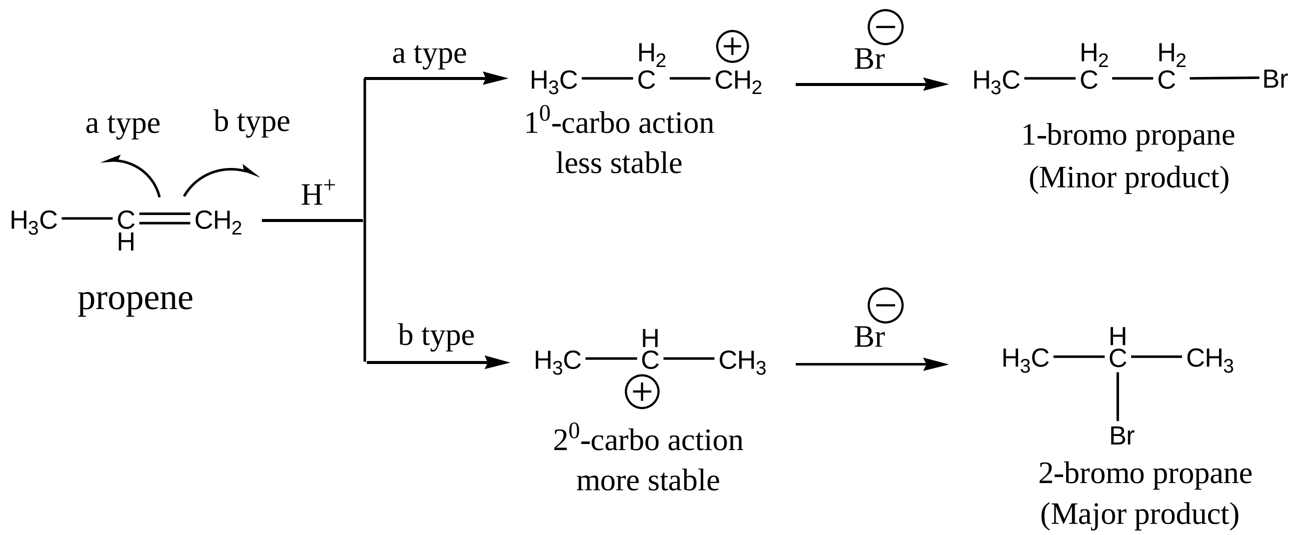
In H-Br, Br is more electronegative than H. therefore it breaks to give H^+ ion and Br^- ions. The H^+ ions are attracted towards the double bond to form carbocation.

Step:2

Secondary carbocation is more stable than primary carbocation and it predominates over the primary carbocation.

Step:3

The Br^-ion attack the 2° carbocation to from 2-Bromobutane, the major product.



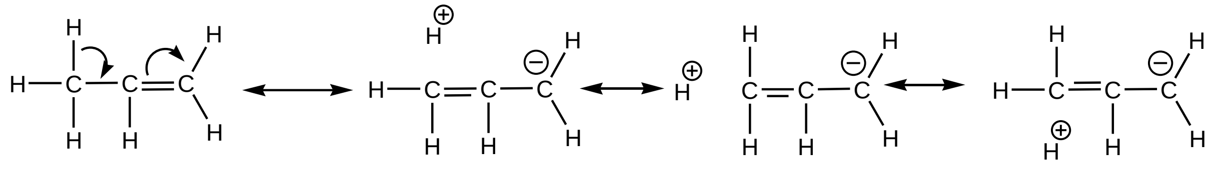
38.

1. Hyper conjugation :

The delocalization of electrons of **σ** bond is called as hyper conjugation. It is a permanent effect.It is due to the interaction of **σ**-bond electrons with the adjacent, empty non-bonding p-orbital or an antibonding **σ*** or **π*-**orbitals resulting in an extended molecular orbital. It requires an α-CH group (or) a lone pair on atom like N, O adjacent to a **π** bond (sp2 hybrid carbon).

Example 1:

In propene, the σ-electrons of C-H bond of methyl group can be delocalised into the π-orbital of doubly bonded carbon as represented below



I II III IV

In the above structure the sigma bond is involved in resonance and breaks in order to supply electrons for delocalization giving rise to 3 new canonical forms. In the contributing canonical structures: (II), (III) & (IV) of propene, there is no bond between an α-carbon and one of the hydrogen atoms. Hence the hyper conjugation is also known as "no bond resonance" or "Baker-Nathan effect".

2. Osmotic pressure:

Osmotic pressure can be defined as "the pressure that must be applied to the solution to stop the influx of the solvent (to stop osmosis) through the semi permeable membrane"

3. Molar mass :

Molar mass is defined as the mass of one mole of a substance. The molar mass of a compound is equal to the sum of the relative atomic masses of its constituents expressed in $(g\ mol^{-1})$.**Examples:**

Relative molar mass of glucose = 180 u

Molar mass of glucose = 1.80$g\ mol^{-1}$