

CBSE
CLASS – XI
CHEMISTRY
SAMPLE PAPER 4

Time: 3 Hours

Marks: 70

General Instructions

- All questions are compulsory.
 - Section A: Q.no. 1 to 5 are very short answer questions and carry 1 mark each.
 - Section B: Q.no. 6 to 12 are short answer questions and carry 2 marks each.
 - Section C: Q.no. 13 to 24 are also short answer questions and carry 3 marks each.
 - Section D: Q.no. 25 to 27 are long answer questions and carry 5 marks each.
 - There is no overall choice. However an internal choice has been provided in two questions of one mark, two questions of two marks, four questions of three marks and all the three questions of five marks weightage. You have to attempt only one of the choices in such questions.
 - Use of log tables if necessary, use of calculators is not allowed.
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Section A

1. Why is an organic compound fused with sodium for testing halogens, nitrogen, sulphur and phosphorous? [1]

OR

What kind of isomers are the compounds: $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$ and $\text{CH}_3\text{OCH}_2\text{CH}_2\text{CH}_3$?

2. What shapes are associated with sp^3d and sp^3d^2 hybrid orbitals? [1]

OR

Arrange the following bonds in the order of increasing ionic character:

C-H, F-H, Br-H, Na-I, K-F, Li-Cl

3. Although benzene is highly unsaturated it does not undergo addition reactions. [1]

4. What is siltation? [1]

5. Why alkali and alkaline earth metals cannot be obtained by chemical reduction method? [1]



Section B

6. Which of the following has largest size? Mg, Mg²⁺, Al³⁺, Al [2]
7. Consider the following species: [2]
N³⁻, O²⁻, F⁻, Na⁺, Mg²⁺, Al³⁺
(a) What is common in them?
(b) Arrange them in order of increasing ionic radii?
8. The wavelength of first spectral line in Balmer series is 6561 Å. Calculate the wavelength of second spectral line in Balmer series. [2]
9. On a ship sailing in Pacific Ocean where temperature is 23.4°C, a balloon is filled with 2 L air. What will be the volume of the balloon when the ship reaches Indian Ocean, where temperature is 26.1°C?
10. Balance the following equation in an alkaline medium by half reaction method. [2]
$$\text{Cr(OH)}_3 + \text{IO}_3^- \rightarrow \text{I}^- + \text{CrO}_4^{2-}$$

OR

11. Give reasons: [2]
(a) Anhydrous AlCl₃ is covalent but hydrated AlCl₃ is electrovalent. Explain
(b) Boric acid behaves as Lewis acid? Explain
12. Which of the two is more concentrated and why? 1 M or 1 m aqueous solution of a solute. [2]

OR

How many moles and how many grams of NaCl are present in 250 cm³ of 0.500 M NaCl solution?

Section C

13. If the photon of the wavelength 150 pm strikes an atom and one of its inner bound electrons is ejected out with a velocity of 1.5×10^7 m/s, calculate the energy with which it is bound to the nucleus. [3]

OR

- (a) What are degenerate orbitals? Give examples.



(b) Show that the circumference of the Bohr's orbit for H atom is an integral multiple of wavelength associated with the electron revolving around the orbit.

14. Which out of NH_3 and NF_3 has higher dipole moment and why? [3]

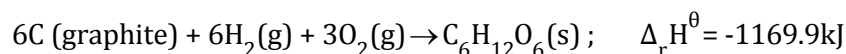
OR

(a) For the complex $[\text{Fe}(\text{H}_2\text{O})_6]^{+3}$, write the hybridisation, magnetic character and spin of the complex. (At, number : Fe = 26)

(b) Draw one of the geometrical isomers of the complex $[\text{Pt}(\text{en})_2\text{Cl}_2]^{+2}$ which is optically inactive.

15. 0.2325g of an organic compound was analysed for nitrogen by Duma's method. 31.7mL of moist nitrogen was collected at 25°C and 755.8mm Hg pressure. Calculate the percentage of N in the sample. (Aq. Tension of water at 25°C is 23.8mm). [3]

16. Calculate the enthalpy of combustion of glucose from the following data [3]



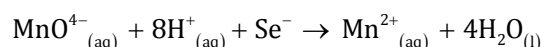
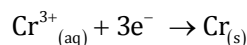
17. Calculate the molar solubility of $\text{Ni}(\text{OH})_2$ in 0.10 M NaOH. The solubility product of $\text{Ni}(\text{OH})_2$ is 2.0×10^{-15} . [3]

OR

The pH of 0.1 M solution of cynic acid (HCNO) is 2.34. Calculate the ionization constant of the acid and its degree of ionization in the solution.

18.

(a) Consider the voltaic cell constructed with the following substances: [3]



$$E^\circ = -0.74\text{V}$$

$$E^\circ = +1.51\text{V}$$

(i) Which substances are oxidised and reduced in this cell?

(ii) Which are the negative and positive electrodes?



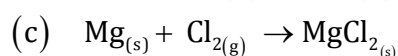
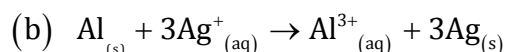
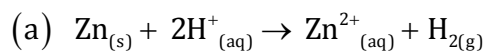
(b) Write the oxidation number of the following atoms:

(i) KMnO_4

(ii) $\text{K}_2\text{Cr}_2\text{O}_7$

OR

Write the half reactions for each of the following redox reactions:



19. Arrange the following: [3]

(a) CaH_2 , BeH_2 and TiH_2 in order of increasing electrical conductance.

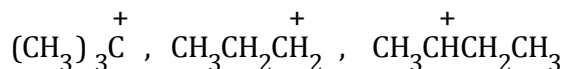
(b) LiH , NaH and CsH in order of increasing ionic character.

(c) H-H , D-D and F-F in order of increasing bond dissociation enthalpy.

20. [3]

(a) Why cannot sulphuric acid be used to acidify sodium extract for testing S using lead acetate solution?

(b) Which of the carbocations is most stable and why?



(c) Why does a liquid vaporize below its boiling point in steam distillation process?

21. What type of isomerism is exhibited by following pair of compounds? [3]

(i) Ethanol and Methoxy methane

(ii) o-cresol and m-cresol

(iii) Pentan-3-one and pentan-2-one

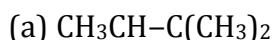
22. Explain [3]

(a) Fish do not grow as well in warm water as in cold water. Why?

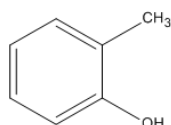
(b) Why does rain water normally have a pH about 5.6?

(c) Name two major greenhouse gases.

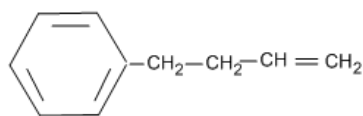
23. Write the IUPAC names of the following compounds: [3]



(b)



(c)



24. When a metal X is treated with sodium hydroxide, a white precipitate A is obtained, which is soluble in an excess of NaOH to give soluble complex B. Compound A is soluble in diluted HCl to form compound C. The compound A when heated strongly gives D, which is used to extract metal. Identify X, A, B, C and D. Write suitable equations to support their identities. [3]

Section D

25. [5]
- (a) What is spontaneous change? What is the condition for spontaneity in terms of free energy change?
- (b) At 60°C, dinitrogen tetroxide is fifty percent dissociated. Calculate the standard free energy change at this temperature and at one atmosphere.

OR

- (a)
- (i) Why standard enthalpy of an elementary substance is not zero whereas standard enthalpy of formation is taken as zero?
- (ii) Under what conditions will the reaction occur, if,
Both ΔH and ΔS are positive
Both ΔH and ΔS are negative
- (b) Calculate the enthalpy change for the reaction :
- $$\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{HCl}(\text{g})$$
- Given that bond energies of H-H, Cl-Cl and H-Cl bonds are 433, 244 and 431 kJ/mol respectively.
26. Give reasons for the following [5]
- (a) Unlike Na_2CO_3 , K_2CO_3 cannot be prepared by Solvay process. Why?
- (b) Why are alkali metals not found in nature?
- (c) Sodium is less reactive than potassium why?
- (d) Alkali metals are good reducing agents. Why?
- (e) Alkali metals are paramagnetic but their salts are diamagnetic. Why?



Complete the following reactions:

- (a) Why does the solubility of alkaline earth metal carbonates and sulphates in water decrease down the group?
- (b) Arrange the following alkali metal ions in decreasing order of their mobility: Li^+ , Na^+ , K^+ , Rb^+ , Cs^+ . Explain
- (c) NaOH is a stronger base than LiOH . Explain
- (d) Why are alkali metals kept in paraffin or kerosene?
- (e) Why does lithium show properties uncommon to the rest of the alkali metals?

27.

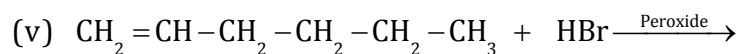
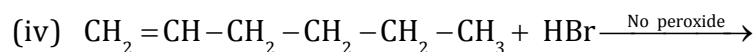
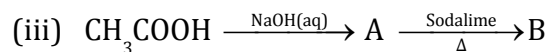
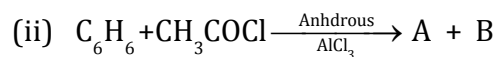
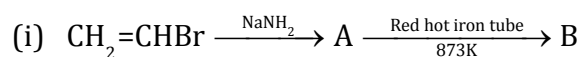
(a) Convert:

- (i) Propene to propane-1,2-diol
- (ii) Isopropylbromide to n-propylbromide

(b) An alkene on ozonolysis gives butan-2-one and 2-methylpropanal. Give the structure and IUPAC name of Alkene. What products will be obtained when it is treated with hot, concentrated KMnO_4 ?

OR

(c) Complete the equations:



CBSE
Class XI Chemistry
Sample Paper – 4 Solution

Section A

1. Organic compound is fused with sodium metal to convert N, S, P and halogens present in organic compound to their corresponding sodium salts.

OR

$\text{CH}_3\text{CH}_2\text{OCH}_2\text{CH}_3$ and $\text{CH}_3\text{OCH}_2\text{CH}_2\text{CH}_3$ are metamers.

2. sp^3d hybrid orbitals - Trigonal bipyramidal
 sp^3d^2 hybrid orbitals - Octahedral

OR

Increasing bonds order of ionic character:

$\text{Br-H} < \text{C-H} < \text{F-H} < \text{Na-I} < \text{Li-Cl} < \text{K-F}$

3. It is due to the delocalization of π electrons in benzene it is highly stable.
4. Mixing of soil or rock particles in water is called siltation.
5. Because alkali and alkaline earth metals are themselves stronger reducing agents than the majority of other reducing agents.
6. Atomic radii decrease across a period. Cations is smaller than their parent atoms. Among isoelectronic species, the one with the larger positive nuclear charge will have a smaller radius. Hence the largest species is Mg; the smallest one is Al^{3+} .
- 7.
- (a) All of them are isoelectronic in nature and have 10 electrons each.
- (b) In isoelectronic species, greater the nuclear charge, lesser will be the atomic or ionic radius.
- $\text{Al}^{3+} < \text{Mg}^{2+} < \text{Na}^+ < \text{F}^- < \text{O}^{2-} < \text{N}^{3-}$

8.

According to Rydberg equation,

$$\bar{\nu} = 109,677 \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right) \text{ cm}^{-1}$$



$R = 109,677$ which is the Rydberg's constant

$$\frac{1}{\lambda} = \frac{1}{\text{Wavelength}}$$

For first line in Balmer series, $n_1 = 2, n_2 = 3$

Given wavelength of 1st spectral line = 6561 \AA

$$\text{Therefore, } \frac{1}{6561} = R \left(\frac{1}{2^2} - \frac{1}{3^2} \right) = R \left(\frac{5}{36} \right) \quad (\text{i})$$

For second line in Balmer series, $n_1 = 2, n_2 = 4$

$$\text{Therefore, } \frac{1}{\text{Wavelength}} = R \left(\frac{1}{2^2} - \frac{1}{4^2} \right) = R \left(\frac{3}{16} \right) \quad (\text{ii})$$

Dividing eq. (i) by (ii), we get:

$$\frac{\text{Wavelength}}{6561} = \frac{5 \times 16}{36 \times 3}$$

$$\therefore \text{Wavelength} = 4860 \text{ \AA}$$

9.

$$V_1 = 2 \text{ L}$$

$$\begin{aligned} T_1 &= (23.4 + 273) \text{ K} \\ &= 296.4 \text{ K} \end{aligned}$$

$$\begin{aligned} T_2 &= (26.1 + 273) \text{ K} \\ &= 299.1 \text{ K} \end{aligned}$$

From Charles law

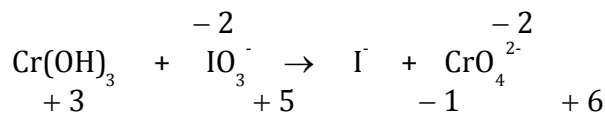
$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$

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

$$\begin{aligned} \Rightarrow V_2 &= \frac{2 \text{ L} \times 299.1 \text{ K}}{296.4 \text{ K}} \\ &= 2 \text{ L} \times 1.009 \\ &= 2.018 \text{ L} \end{aligned}$$

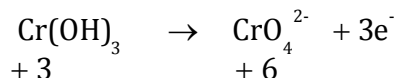
10.

a) First, we will write down the oxidation number of each atom

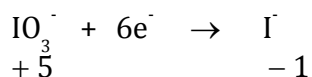


b) Write separately oxidation & reduction half reactions

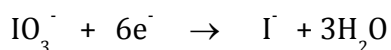
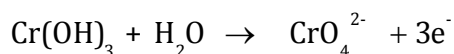
Oxidation half reaction:



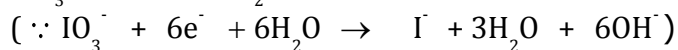
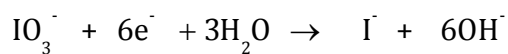
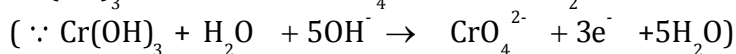
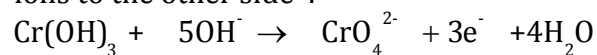
Reduction half reaction:



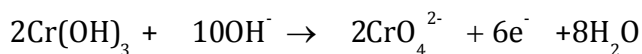
c) Balance O atoms by adding H_2O molecules to the side deficient in 'O' atoms and then balancing H atoms



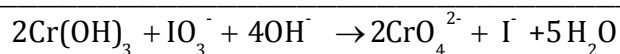
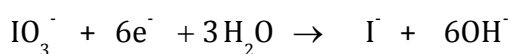
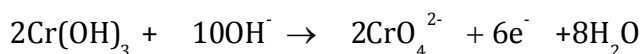
d) Balance H atoms. Since the medium is alkaline, therefore H_2O molecules are added to the side deficient in H atoms and equal no. of OH^- ions to the other side :



e) Equalise the electrons lost and gained by multiplying the oxidation half reaction with 2.



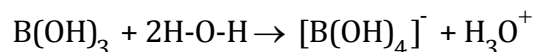
Adding the oxidation half reaction and reduction half reaction we get



11.

(a) Anhydrous AlCl_3 is covalent but hydrated AlCl_3 is electrovalent because when it is dissolved in water the high heat of hydration is sufficient to break the covalent bond of AlCl_3 into Al^{3+} and Cl^- ions.

(b) Boric acid behaves as Lewis acid by accepting a pair of electron from OH^- ion (in water).



12.1 molar solution contains 1mole of solute in 1 L of solution while

1 molal solution contains 1 mole of solute in 1000g of solvent.

Considering density of water as almost 1g/mL, then 1mole of solute is present in 1000mL of water in 1molal solution while 1mole of it is present in less than 1000mL of water in 1 molar solution

(1000mL solution in molar solution = Volume of solute + Volume of solvent).

Thus 1M solution is more concentrated than 1m solution.

OR

Given:

Molarity of solution = 0.5 M

Volume of solution = 250 cm^3

0.5 M NaCl solution contains 0.5 mole of NaCl in 1 litre of solution.

Number of moles of NaCl in 250 cm^3

$$= \frac{0.500}{4}$$

$$= 0.125 \text{ mol}$$

Molar mass of NaCl = 58.44 g

Mass of 0.125 mol of NaCl = 58.44 \times 0.125

$$= 7.305 \text{ g of NaCl}$$



Section C

13. Given:

$$\lambda = 150 \text{ pm}$$

$$= 150 \times 10^{-12} \text{ m}$$

$$v = 1.5 \times 10^7 \text{ m/s}$$

$$h = 6.626 \times 10^{-34} \text{ Js}$$

$$c = 3.8 \times 10^8 \text{ m/s}$$

Energy of the incident photon

$$= \frac{hc}{\lambda}$$

$$= \frac{6.626 \times 10^{-34} \times 3.8 \times 10^8}{150 \times 10^{-12} \text{ m}}$$

$$= 13.25 \times 10^{-16} \text{ J}$$

Energy of the ejected electron

$$= \frac{1}{2}mv^2$$

$$= \frac{1}{2}(9.11 \times 10^{-31})(1.5 \times 10^7)^2$$

$$= \frac{20.49 \times 10^{-17}}{2}$$

$$= 1.024 \times 10^{-16} \text{ J}$$

$$\begin{aligned} \text{The energy with which the electron is bound to the nucleus} &= 13.25 \times 10^{-16} \text{ J} - 1.024 \times 10^{-16} \text{ J} \\ &= 12.226 \times 10^{-16} \text{ J} \end{aligned}$$

The energy with which the electron is bound to the nucleus is $12.226 \times 10^{-16} \text{ J}$.

OR

(a) Orbitals which possess equal energies are called degenerate orbitals.

For example: $2p_x$, $2p_y$ and $2p_z$ orbital which are oriented along X, Y and Z axes are degenerate. Similarly, five d-orbitals d_{xy} , d_{yz} , d_{zx} , $d_{x^2-y^2}$ and d_{z^2} are degenerate orbitals.

(b) The angular momentum of an electron in a given stationary state can be expressed as



$$mvr = n \frac{h}{2\pi} \text{ where } n = 1, 2, 3 \dots \text{ (Bohr equation)}$$

$$2\pi r = n \frac{h}{mv}$$

But

$$\frac{h}{mv} = \lambda \text{ (deBroglie equation)}$$

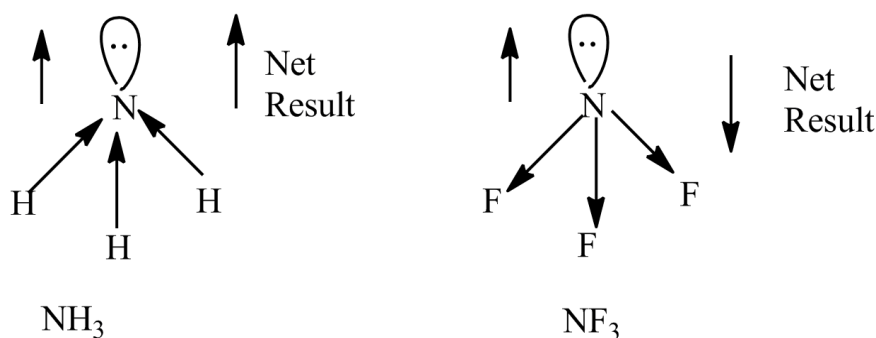
From the two equations, we have,

$$2\pi r = n\lambda$$

or

circumference of Bohr orbit = $n\lambda$

14. NH_3 and NF_3 both have pyramidal structure and a lone pair of electron on nitrogen as shown below:

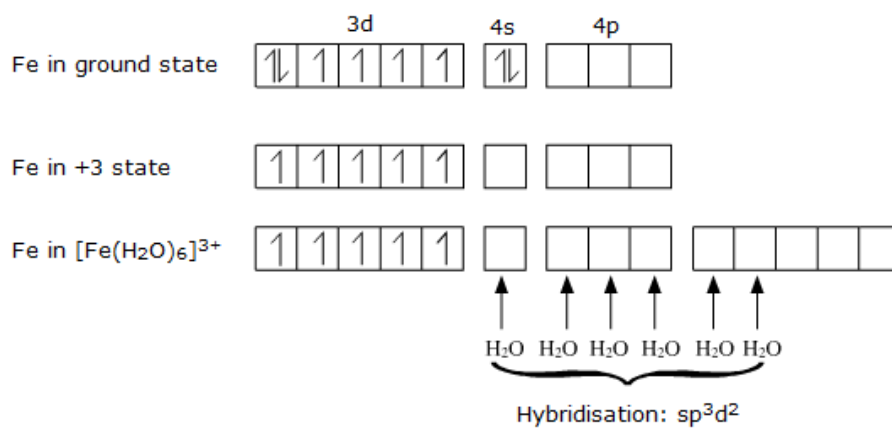


Dipole moments in NH_3 and NF_3

NH_3 has a higher dipole moment than NF_3 , the orbital dipole due to lone pair is in the same direction as the resultant dipole moment of N-H bonds whereas in NF_3 , the dipole due to lone pair is in a direction opposite to the resultant dipole moment of three N-F bonds. The dipole due to lone pair in NF_3 causes a decrease in the dipole moment of NF_3 .

OR

(a)

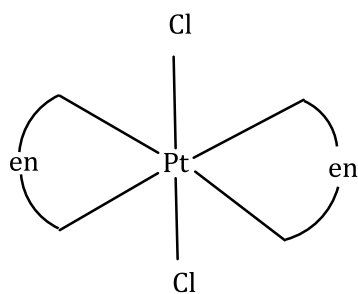


Hybridisation: sp^3d^2

Magnetic character: Paramagnetic

Spin of complex: High spin complex

(b) Trans isomer of $[\text{Pt}(\text{en})_2\text{Cl}_2]^{2+}$ is optically inactive.



15.

Calculation of volume of nitrogen at S.T.P

Experimental conditions

Pressure of dry gas $P_1 = 755.8 - 23.8 = 732$ mL

$V_1 = 31.7$ mL

$T_1 = 25 + 273 = 298$ K

S.T.P condition

$P_2 = 760$ mm

$V_2 = ?$

$T_2 = 273$ K

Applying gas equation,

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$\therefore \frac{732 \times 31.7}{298} = \frac{760 \times V_2}{273}$$

$$\Rightarrow V_2 = 27.97 \text{ mL}$$

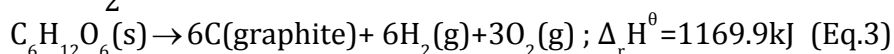
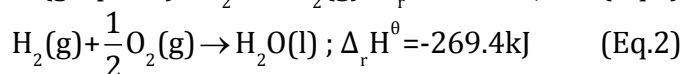
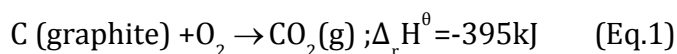
$$\% \text{ of Nitrogen} = \frac{28 \times \text{Volume of } N_2 \text{ at S.T.P} \times 100}{22400 \times \text{Mass of compound}}$$

$$= \frac{28 \times 27.97 \times 100}{22400 \times 0.2325}$$

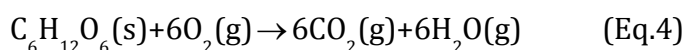
$$= 15.04$$



16. Given:

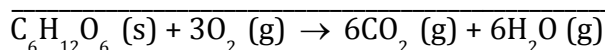
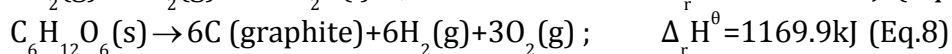


Combustion of graphite is given by the equation shown below



Thus enthalpy for combustion reaction can be obtained by multiplying

(Eq.1) and (Eq.2) by 6 and adding equation (Eq.3)



$$\text{Reaction enthalpy} = (-2370 \text{ kJ} - 1614 \text{ kJ}) + (1169.9 \text{ kJ} + 0)$$

$$= -2814.1 \text{ kJ}$$

17.

$$\text{For Ni(OH)}_2 \quad K_{\text{sp}} = 2.0 \times 10^{-15}$$

As K_{sp} is small, $2s \ll 0.10$ so that $2s + 0.10 = 0.10$

$$\therefore K_{\text{sp}} = s \times (0.10)^2$$

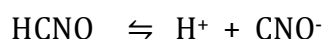
$$s = \frac{K_{\text{sp}}}{(0.10)^2}$$

$$= \frac{2.0 \times 10^{-15}}{(0.10)^2}$$

$$= 2.0 \times 10^{-13}$$

Molar solubility of Ni(OH)_2 in 0.1 M NaOH = 2.0×10^{-13} M

OR



pH = 2.34 that is,

$$-\log[\text{H}^+] = 2.34$$

$$\log[\text{H}^+] = -2.34$$

$$[\text{H}^+] = \text{antilog}(-2.34)$$



$$= 4.57 \times 10^{-3} \text{ M}$$

Ionisation constant:

$$K_a = \frac{(4.57 \times 10^{-3})(4.57 \times 10^{-3})}{0.1}$$

$$= 2.09 \times 10^{-4}$$

Degree of dissociation:

$$\alpha = \sqrt{\frac{K_a}{C}}$$

$$= \sqrt{\frac{2.09 \times 10^{-4}}{0.1}}$$

$$= 0.0457$$

18.

(a)

(i) Cr is getting oxidized and MnO_4^- is getting reduced.

(ii) Cr is negative electrode, Pt in MnO_4^- acts as positive electrode.

(b)

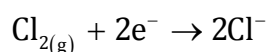
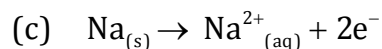
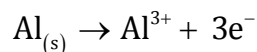
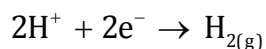
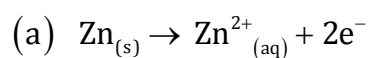
(i) KMnO_4

K(+1), Mn(+7), O(-2)

(ii) $\text{K}_2\text{Cr}_2\text{O}_7$

K(+1), Cr(+7), O(-2)

OR



19.

(a) $\text{BeH}_2 < \text{TiH}_2 < \text{CaH}_2$

(b) $\text{LiH} < \text{NaH} < \text{CsH}$

(c) $\text{F-F} < \text{H-H} < \text{D-D}$



20.

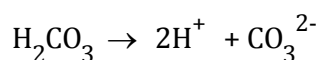
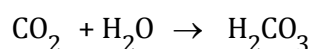
- (a) This is because, in the presence of sulphuric acid, lead acetate will react with it forming white precipitate of PbSO_4 , thus interfering with the test.
- (b) $(\text{CH}_3)_3\text{C}^+$ is most stable because it has the maximum number of alkyl groups i.e. three. Greater the number of alkyl groups on the carbon carrying positive charge, greater would be the dispersal of charge and hence more will be the stability of carbocation. So, tertiary carbocation is the most stable due to maximum dispersal of charge.
- (c) In steam distillation, water and organic substance vaporize together and total pressure becomes equal to atmospheric pressure. Thus organic substance vaporizes and distills at a temperature lower than its boiling point.

21.

- (i) Functional isomerism or functional group isomerism
(ii) Position isomerism
(iii) Metamerism

22.

- (a) As the temperature increases solubility of gas in water decreases. Due to high temperature of water, amount of dissolved oxygen is less, which creates a problem for fish. So, fish do not grow well in warm water.
- (b) Rain water is acidic due to dissolution of CO_2 in it, leading to formation of H_2CO_3 which lowers the pH. Hence the pH is about 5.6



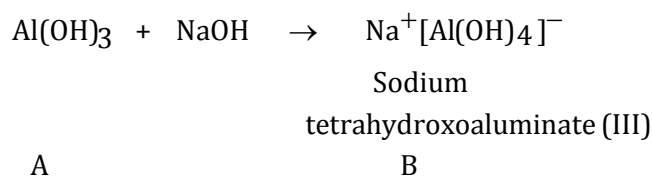
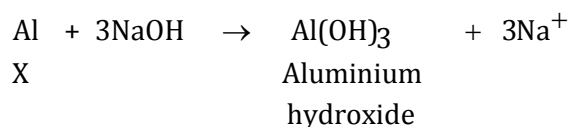
- (c) Carbon dioxide and methane are two major greenhouse gases.

23.

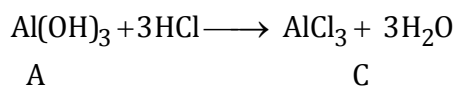
- (a) 2-Methylbut-2-ene
(b) 2-Methylphenol
(c) 4-Phenylbut-1-ene

24. Since metal X reacts with NaOH to first give a white ppt. A which dissolves in excess of NaOH to give a soluble complex B, therefore metal X is aluminium; ppt A is $\text{Al}(\text{OH})_3$ and complex B is sodium tetrahydroxoaluminate (III)

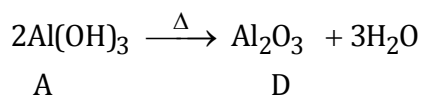




Since A is amphoteric in nature, it reacts with dilute HCl to form compound C which is AlCl_3



Since A on heating gives D which is used to extract metal, therefore, D must be alumina (Al_2O_3)



25.

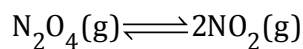
(a) A process which can take place of its own or initiate under some condition.

Conditions for spontaneity in terms of free energy:

If ΔG is negative, the process is spontaneous.

If ΔG is positive the process is non-spontaneous.

(b)



If N_2O_4 is 50% dissociated, the mole fraction of both the substances is given by

$$x_{\text{N}_2\text{O}_4} = \frac{1-0.5}{1+0.5} = \frac{0.5}{1.5};$$

$$x_{\text{NO}_2} = \frac{2 \times 0.5}{1+0.5} = \frac{1}{1.5}$$

$$p_{\text{N}_2\text{O}_4} = \frac{0.5}{1.5} \times 1 \text{ atm} = \frac{0.5}{1.5}$$

$$p_{\text{NO}_2} = \frac{1}{1.5} \times 1 \text{ atm} = \frac{1}{1.5}$$

The equilibrium constant K_p is given by

$$K_p = \frac{(p_{\text{NO}_2})^2}{p_{\text{N}_2\text{O}_4}}$$

$$= \frac{1.5}{(1.5)^2(0.5)}$$

$$= 1.33 \text{ atm}$$

Since $\Delta_r G^\theta = -RT \ln K_p$

$$\Delta_r G^\theta = (-8.314 \text{ JK}^{-1} \text{ mol}^{-1}) \times (333 \text{ K}) \times (\ln(1.33))$$

$$= (-8.314 \text{ JK}^{-1} \text{ mol}^{-1}) \times (333 \text{ K}) \times (2.303) \times (0.1239)$$

$$\Delta_r G^\theta = -789.98 \text{ kJ mol}^{-1}$$

26.

- (a) Unlike NaHCO_3 , the intermediate KHCO_3 formed during reaction, is highly soluble in water and thus cannot be taken out from solution to obtain K_2CO_3 . Hence, K_2CO_3 cannot be prepared by Solvay process.
- (b) Alkali metals are highly reactive because of low ionization enthalpy value and therefore are not found in nature. They are present in combined state only in form of halides, oxides etc.
- (c) Ionization Energy of potassium is less than sodium because of large size or less effective nuclear charge. Thus, potassium is more reactive than sodium.
- (d) Alkali metals are strong reducing agents due to their greater ease to lose electrons.



(e) Alkali metals have one unpaired electrons (ns^1) and are paramagnetic. However, during the salt formation, the unpaired electron is lost by alkali metals to other atom forming anion. Their salts have all paired electrons and show diamagnetic nature.

OR

(a) The size of anions being much larger compared to cations, the lattice enthalpy will remain almost constant within a particular group. Since the hydration enthalpies decrease down the group, solubility will decrease as found for alkaline earth metal carbonates and sulphates

(b) $Cs^+ > Rb^+ > K^+ > Na^+ > Li^+$

Smaller the size of the ion greater is the degree of hydration. Lithium being small in size is hydrated to a large extent and cesium being large in size is hydrated to small extent.

(c) The M-OH bond in hydroxides of alkali metal is very weak and can easily ionize to form M^+ ions and OH^- ions. This accounts for the basic character. Since ionization energy decreases down the group, bond between metal and oxygen becomes weak. Therefore basic strength of hydroxides increases accordingly.

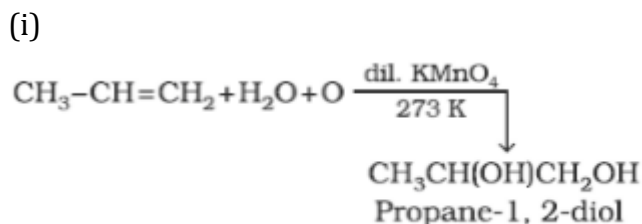
Thus NaOH is a stronger base than LiOH.

(d) Alkali metals are highly sensitive towards air and water and are kept therefore in kerosene or paraffin oil.

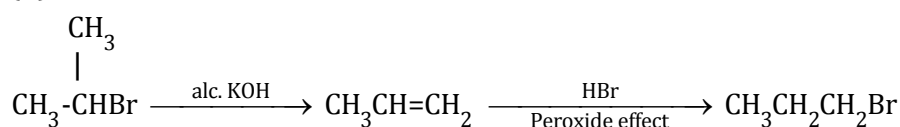
(e) This is because of exceptionally small size of Lithium and high charge to radius ratio of Li^+ .

27.

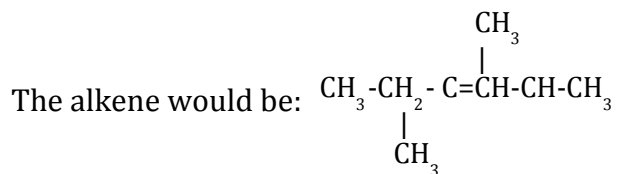
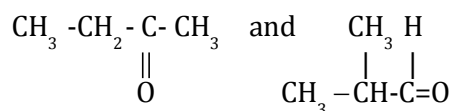
(a)



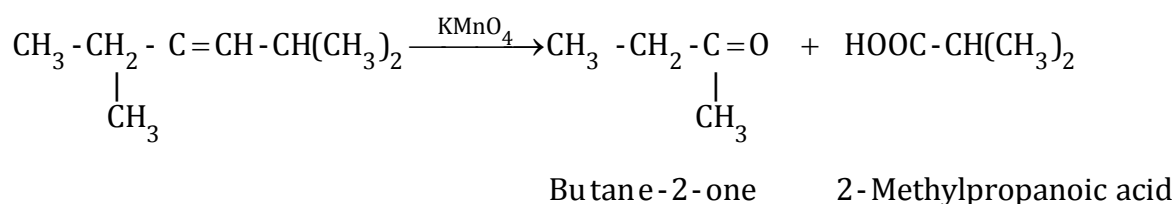
(ii)



(b) From the given products of Ozonolysis,

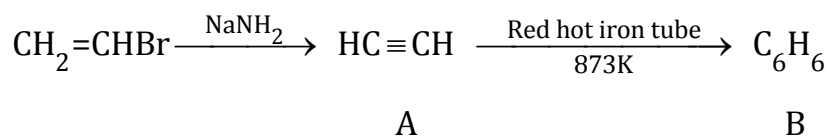


IUPAC Name: 2, 4-dimethylhex-3-ene

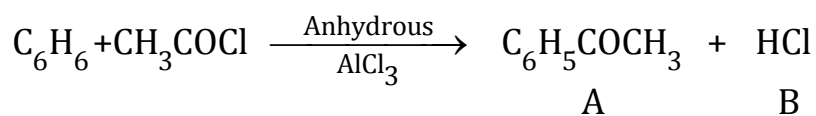


OR

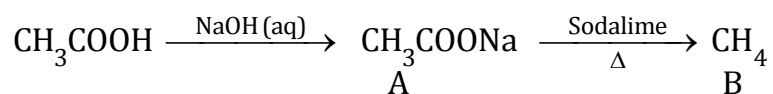
(i)



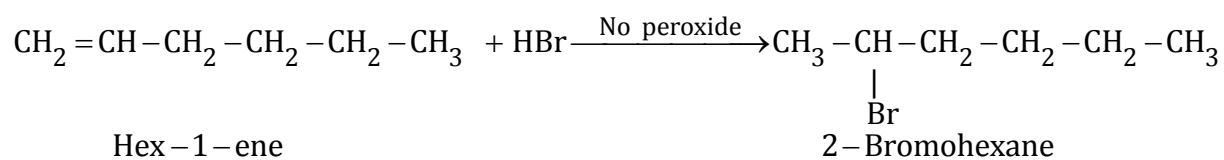
(ii)



(iii)



(iv)



(v)

