CBSE Solved Sample Papers for Class 12 Chemistry

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SELECTED QUESTIONS OF CHAPTER :ALDEHYDE, KETONE, CARBOXYLIC ACID AND ORGANIC COMPOUND CONTAINING NITROGEN

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Q. 1. Suggest a reason for the large difference in the boiling points of butanol and butanal, although they have same solubility in water.

Ans. The b. pt. of butanol is higher than that of butanal because butanol has strong intermolecular H-bonding while butanal has weak dipole-dipole interaction. However both of them form H-bonds with water and hence are soluble.

Q. 2. Why HCOOH does not give HVZ (Hell Volhand Zelinsky) reaction but CH_3COOH does ?

Ans. CH_3COOH contains $\square$ hydrogens and hence give HVZ reaction but HCOOH does not contain $\square$-hydrogen and hence does not give HVZ reaction.

Q. 3. What makes acetic acid a stronger acid than phenol ?

Ans. Greater resonance stabilization of acetate ion over phenoxide ion.

Q.4. How will you distinguish between methanol and ethanol ?

Ans. By Iodoform test :

Ethanol having $\square$-methyl gp will give yellow ppt. of iodoform whereas methanol does not have $\square$-methyl gp will not give ppt. of iodoform.

Q. 5. Distinguish between :

    (i)   **Acetaldehyde and acetone**

    (ii)   **Methanoic acid and Ethanoic acid.**

Ans.   (i)   Acetaldehyde will give positive tests with Tollen's reagent and Fehling Solns. whereas acetone will not give these test.

      (ii)   Methanoic acid gives Tollen's reagent test whereas ethanoic acid does not due to difference in their boiling points.

**Q. 6.** Arrange the following in order of increasing boiling points :

$CH_3CH_2CH_2OH$, $CH_3CH_2CH_2CH_3$, $CH_3CH_2 — OCH_2CH_3$, $CH_3CH_2CH_2CHO$

Ans. $CH_3CH_2CH_2CH_3 < C_2H_5OC_2H_5 < CH_3CH_2CH_2CHO < CH_3(CH_2)_2OH$

(hydrogen)   (ether)   (aldehyde)   (alcohol)

increase in bond polarity.

Q. 7. **Although phenoxide ion has more no. of resonating structures than carboxylate ion, carboxylic acid is a stronger acid. Why ?**

Ans. Conjugate base of phenol —☐ phenoxide ion has non equivalent resonance structures in which –ve charge is at less electronegative C-atom and +ve charge is at more electronegative O-atom.

☐ Resonance is not so effective.
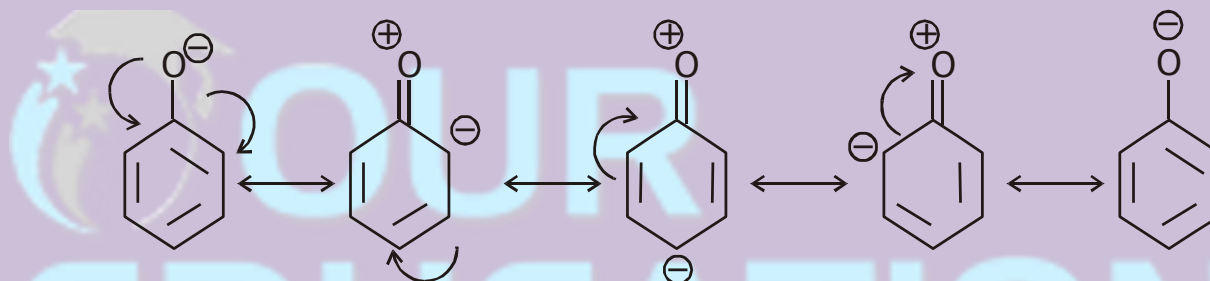
In carboxylate ion, – ve charge is delocalised on two electronegative O-atoms hence resonance is more effective

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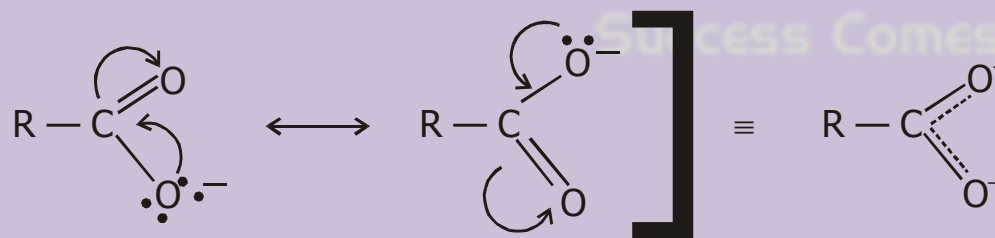
Q. 8. **An organic compound with the molecular formula $C_9H_{10}O$ forms 2, 4-DNP derivative, reduces Tollen's reagent and undergoes Cannizaro reaction. On vigorous oxidation, it gives 1, 2-benzenedicarboxylic acid. Identify the compound.**

Ans. (i)   Since the given compound with M. F. $C_9H_{10}O$ forms a 2, 4-DNP derivative and reduces Tollen's reagent, it must be an aldehyde.

(ii)   Since it undergoes Cannizaro reaction, therefore CHO gp. is directly attached to the benzene ring.

(iii)   Since on vigorous oxidation, it gives 1, 2-benzene dicarboxylic acid, therefore it must be an ortho substituted benzaldehyde. The only o-substituted aromatic aldehyde having M. F. $C_9H_{10}O$ is 2-ethyl benzaldehyde. All the reactions can now be explained on the basis of this structure

Ag □ +

$[Ag\,(NH_3)_2]^+\,OH^-$

□—————
Tollen's reagent

[O]

—————□
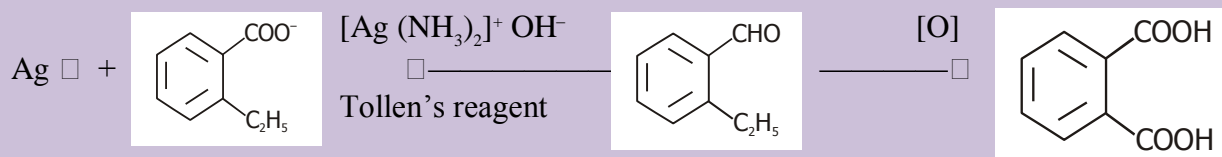
Silver
mirror 2-ethyl benzoate

2-ethyl benzaldehyde 1, 2-benzene dicarboxylic acid
(M. F. $C_9H_{10}O$)

2, 4-dinitrophenyl hydrozene
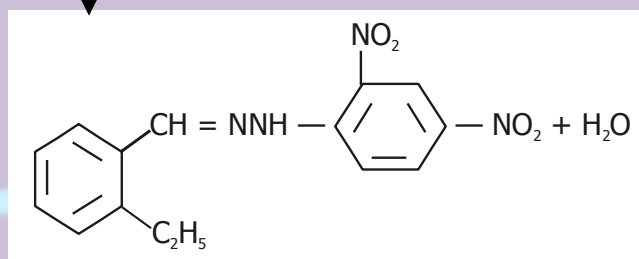
2, 4-DNP derivative

Q9   Give simple chemical test to distinguish between the following pair of compounds:-
(i)   Propanal & propanone
(ii)   Benzaldehyde and Acetophenone
(iii)   Ethanal & Propanal
(iv)   Acetophenone & Benzophenone

Ans:-
(i) Propanal & propanone
(ii) Benzaldehyde and Acetophenone   } Tollen's reagent Test

(i) Ethanal & Propanal
(ii) Acetophenone & Benzophenone   } By Iodoform Test.
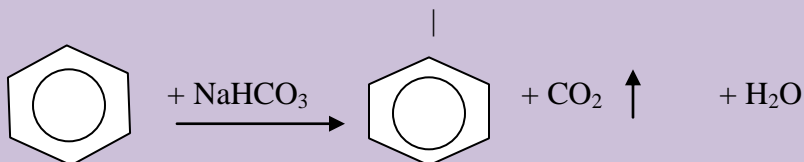
Q10. How will you distinguish?

(i)   Phenol & Benzoic Acid
(ii)   Benzoic Acid & Ethyl benzoate.

Ans:- By Sodiumbicarbonate test, Benzoic acid gives effervescence.

COOH   COONa

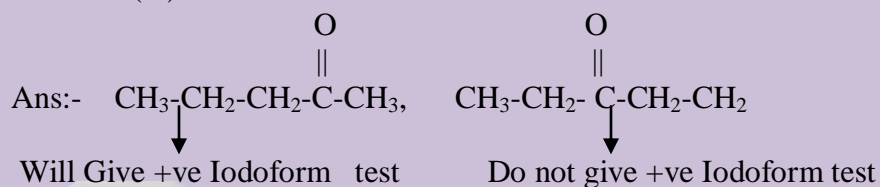$+ \text{NaHCO}_3 \longrightarrow$ $+ \text{CO}_2 \uparrow \qquad + \text{H}_2\text{O}$

Phenol and ethyl benzoate do not give this Test.

Q11 How will you distinguish the following pairs:-

    (i) Pentan- 2-one and Pentan- 3-one
    (ii) Propanol & Propanal
    (iii) Methanal & Ethanal

$$\text{Ans:-} \quad \underset{\downarrow}{CH_3\text{-}CH_2\text{-}CH_2\text{-}\overset{\overset{\displaystyle O}{\overset{\displaystyle ||}{}}}{C}\text{-}CH_3}, \quad \underset{\downarrow}{CH_3\text{-}CH_2\text{-}\overset{\overset{\displaystyle O}{\overset{\displaystyle ||}{}}}{C}\text{-}CH_2\text{-}CH_2}$$

Will Give +ve Iodoform   test   Do not give +ve Iodoform test

  (iii)   Propanol will give sodium metal test.

  Propanol will give +ve Fehling's Solution Test

Question 12

An organic compound contains 69.77% carbon, 11.63% hydrogen and rest oxygen. The molecular mass of the compound is 86. It does not reduce Tollens' reagent but forms an addition compound with sodium hydrogensulphite and give positive iodoform test. On vigorous oxidation it gives ethanoic and propanoic acid. Write the possible structure of the compound. (imp)

ANS: % of carbon = 69.77 %

% of hydrogen = 11.63 %

% of oxygen = {100 – (69.77 + 11.63)}%

= 18.6 %

Thus, the ratio of the number of carbon, hydrogen, and oxygen atoms in the organic compound can be given as:

$$C:H:O = \frac{69.77}{12} : \frac{11.63}{1} : \frac{18.6}{16}$$

$$= 5.81:11.63:1.16$$

$= 5:10:1$

Therefore, the empirical formula of the compound is $C_5H_{10}O$. Now, the empirical formula mass of the compound can be given as:

$5 \times 12 + 10 \times 1 + 1 \times 16$

$= 86$

Molecular mass of the compound = 86

Therefore, the molecular formula of the compound is given by $C_5H_{10}O$.

Since the given compound does not reduce Tollen's reagent, it is not an aldehyde. Again, the compound forms sodium hydrogen sulphate addition products and gives a positive iodoform test. Since the compound is not an aldehyde, it must be a methyl ketone.

The given compound also gives a mixture of ethanoic acid and propanoic acid.

Hence, the given compound is pentan–2–ol.

$$CH_3 - \overset{\overset{O}{\|}}{C} - CH_2 - CH_2 - CH_3$$
Pentan – 2 – ol
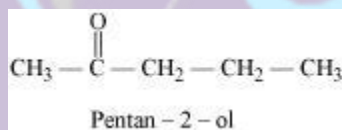
The given reactions can be explained by the following equations:
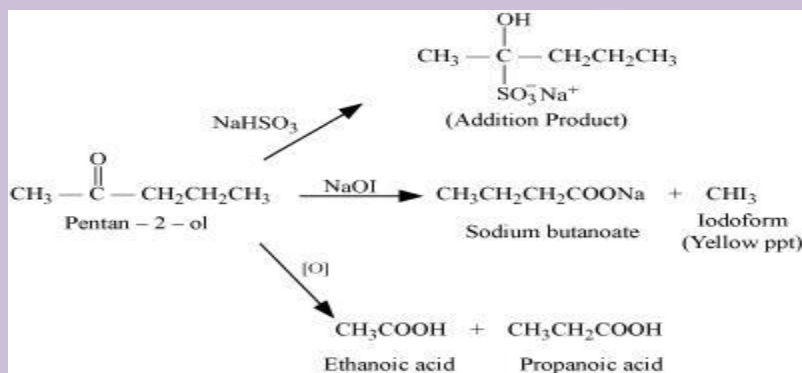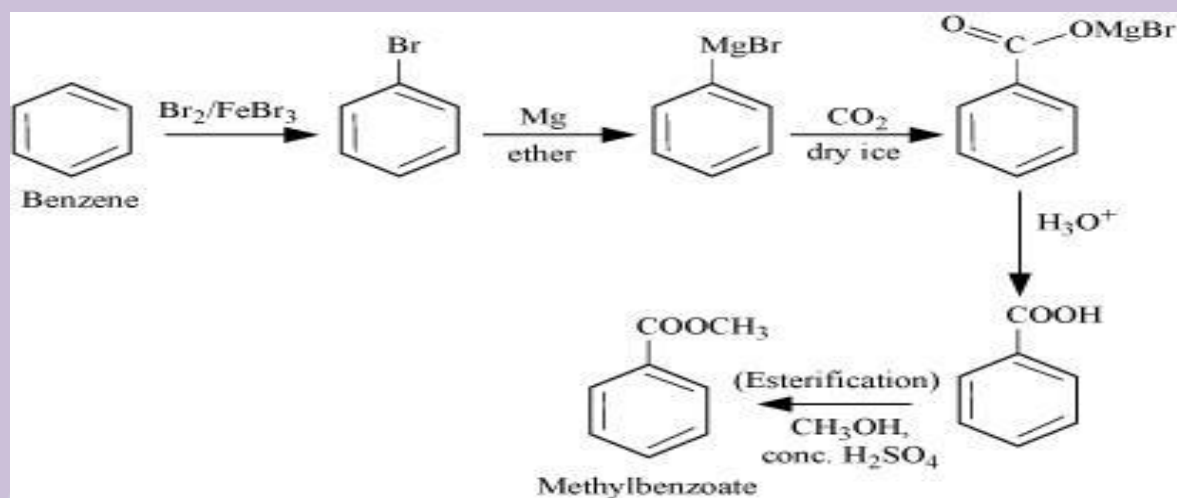

Q.13

How will you prepare the following compounds from benzene? You may use any inorganic reagent and any organic reagent having not more than one carbon atom
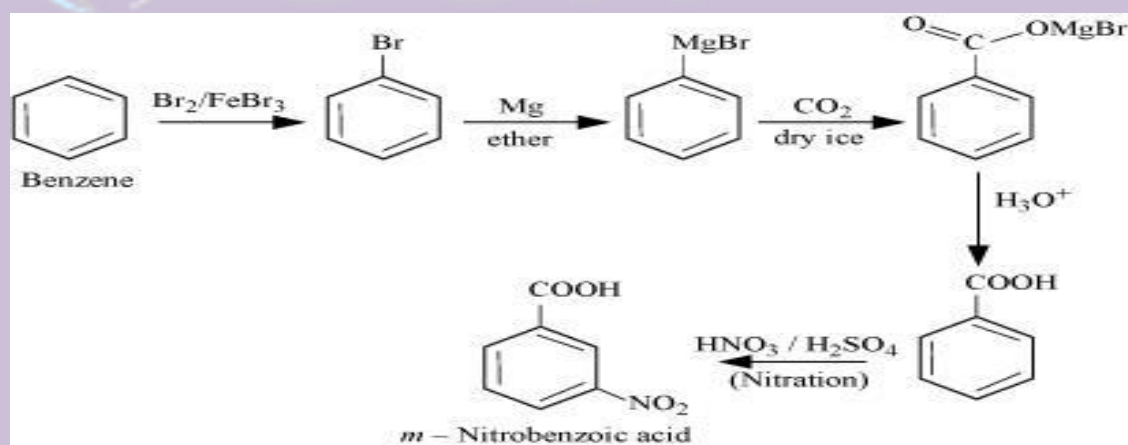
(i) Methyl benzoate (ii) *m*-Nitrobenzoic acid

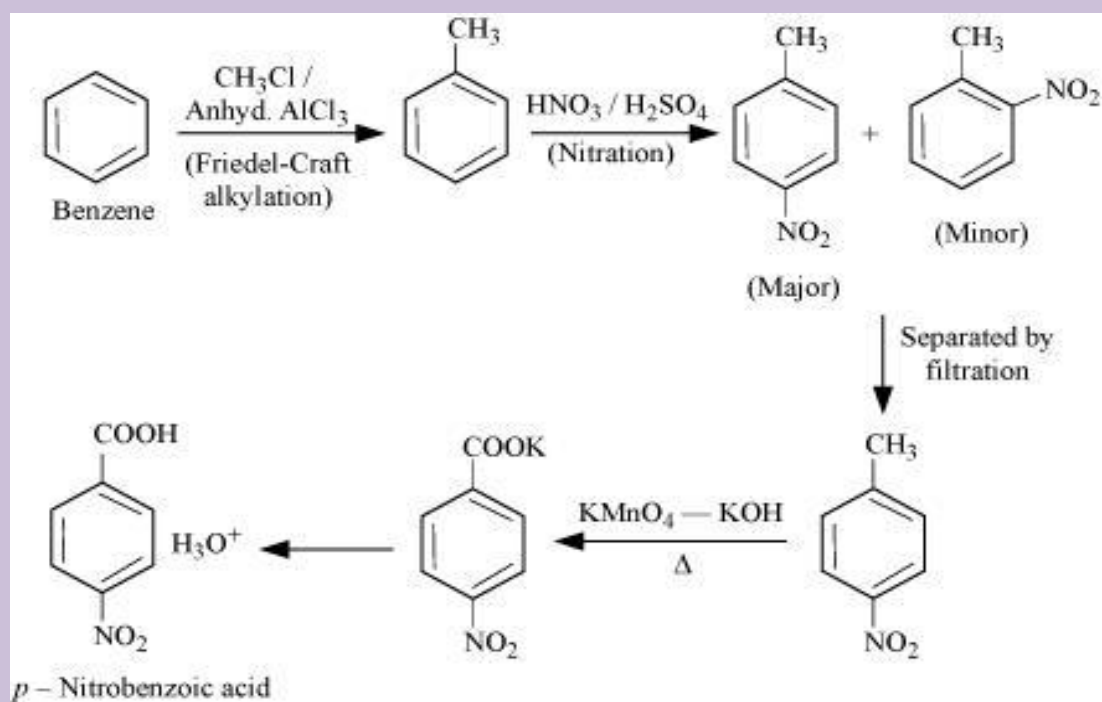**(iii)** *p*-Nitrobenzoic acid **(iv)** Phenylacetic acid
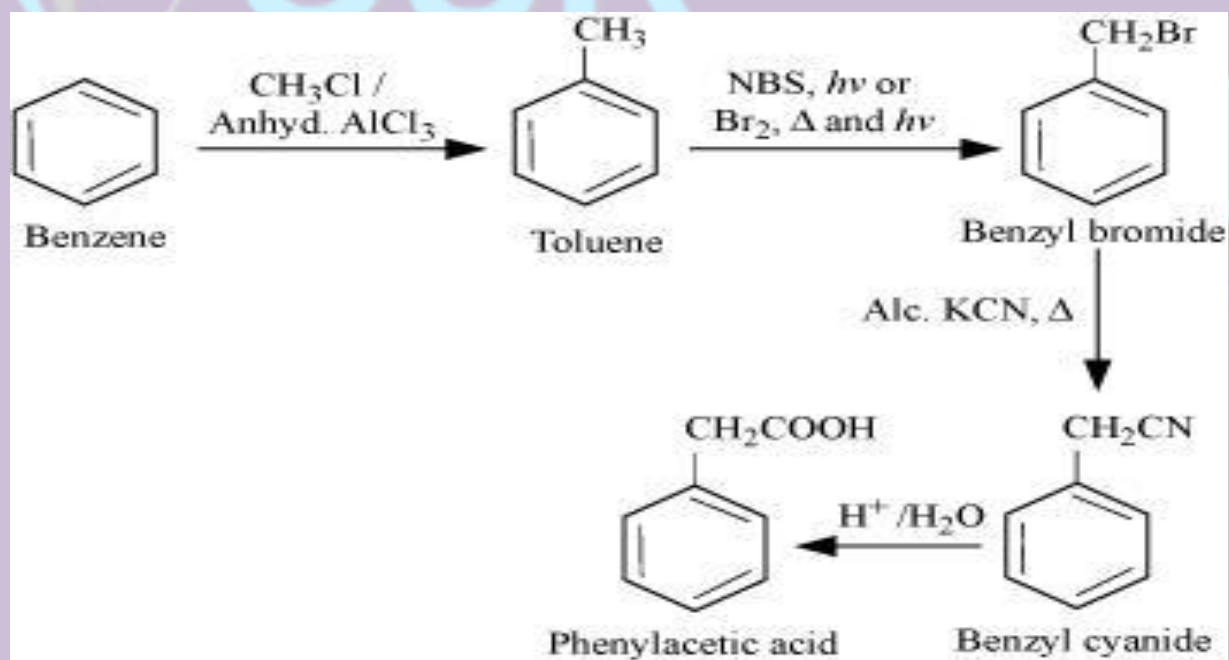
(v) *p*-Nitrobenzaldehyde.

ANS:(i)

Benzene → (Br₂/FeBr₃) → Bromobenzene → (Mg, ether) → Phenyl MgBr → (CO₂, dry ice) → intermediate → (H₃O⁺) → COOH → (Esterification, CH₃OH, conc. H₂SO₄) → Methylbenzoate

(ii)

Benzene → (Br₂/FeBr₃) → Bromobenzene → (Mg, ether) → Phenyl MgBr → (CO₂, dry ice) → intermediate → (H₃O⁺) → COOH → (HNO₃ / H₂SO₄, Nitration) → *m* – Nitrobenzoic acid

(iii)

(iv)

(v)

p − Nitrobenzaldehyde
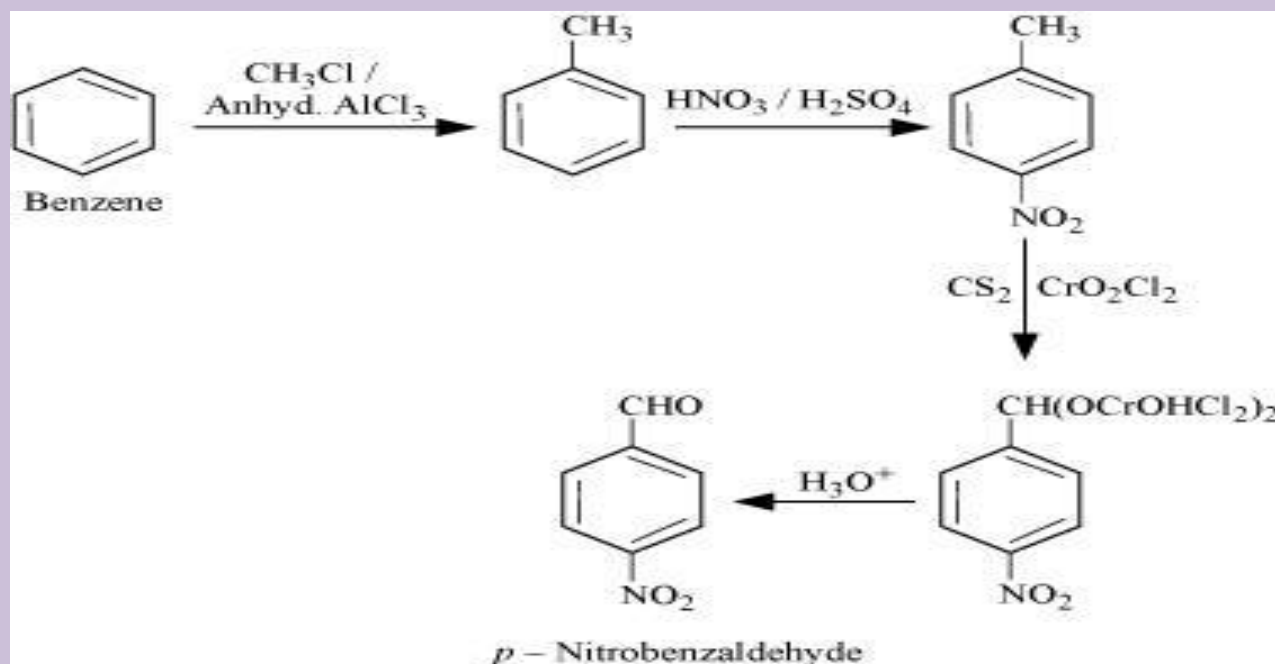
Q14 An organic compound 'A' with molecular formula C_8H_8O forms an orang e red precipitate with 2-4 DNP reagent & with yellow precipitate with on heating with iodine in the presence of sodium hydroxide. It neither reduce Tollens or fehling reagent nor does it decolorize bromine water. On drastic oxidation with chromic acid, it gives a carboxylic acid (B) having molecular formula n $C_7H_6O_2$. Identify the compound "A" and "B" and explain th e reaction involved

Q. 15 Although — NH_2 gp is an ortho and para directing gp, nitration of aniline gives along with ortho and para, meta derivatives also.

Ans. Nitration is carried out with a mixture of Conc. NO_3 + Conc. H_2SO_4 (nitrating mix). In the presence of these acids, most of aniline gets protonated to form anilinium ion. Therefore, in the presence of acids, the reaction mixture consists of aniline and anilinium ion. Now – NH_2 gp in aniline is O, p-directing and activating while $–N^+H_3$ gp in anilinium ion is m-directing and deactivating hence a mixture of all three–ortho, para and meta derivatives is formed.

Q. 16. Pk_b of aniline is more than that of methyl amine.
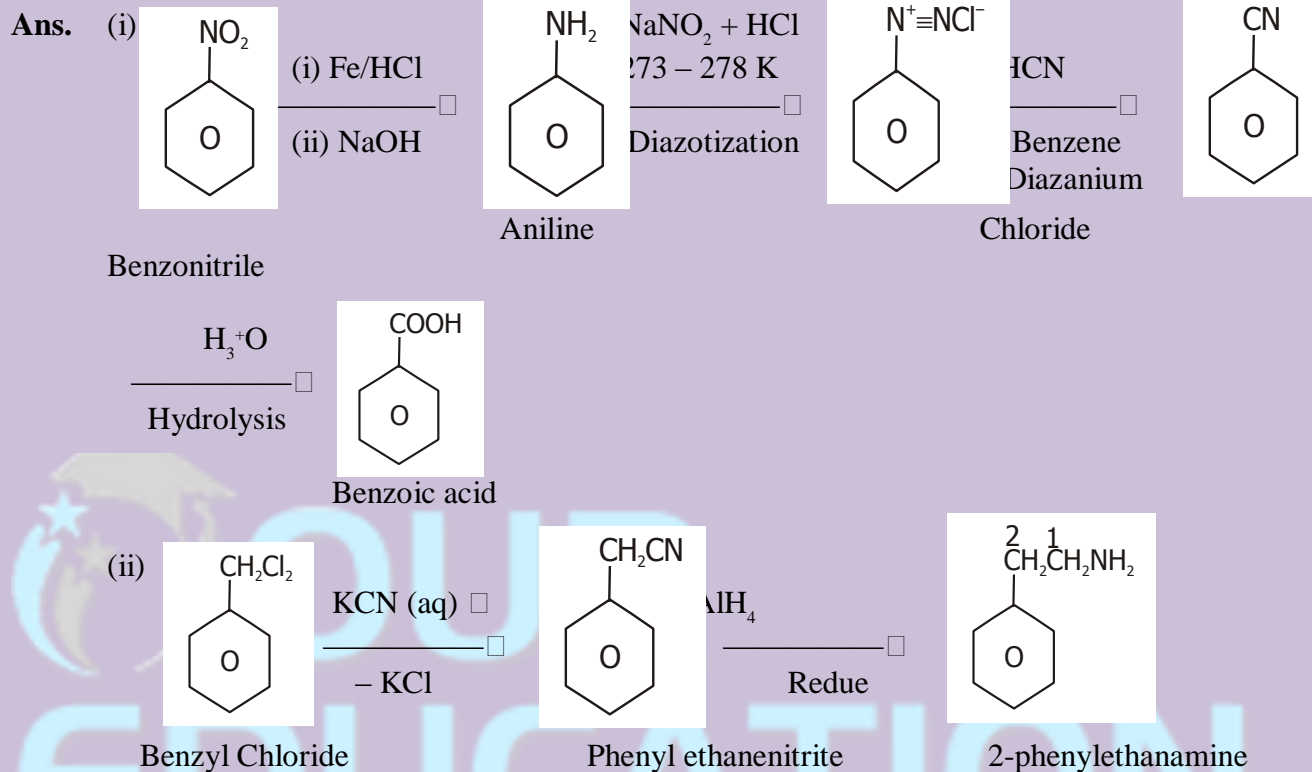
Ans. In aniline, the lone pair of electrons on the N-atom are delocalized over the benzene ring. As a result electron density on the nitrogen decreases. In contrast in CH_2NH_2, + I effect of CH_3 increase the electron density on the N-atom. Therefore, aniline is a weaker base than methylamine and hence its Pk_b value is higher than that of methylamine.

Q. 17 Accomplish the following conversions :

(i) Nitrobenzene to benzoic acid

(ii) Benzyl Chloride to 2-phenylethanamine

Ans. (i)

NO_2 (Benzonitrile) — (i) Fe/HCl (ii) NaOH → NH_2 Aniline — $NaNO_2 + HCl$ 273 – 278 K Diazotization → $N^+\equiv NCl^-$ Benzene Diazanium Chloride — HCN → CN

$\dfrac{H_3^+O}{\text{Hydrolysis}}$ → COOH Benzoic acid

(ii) CH_2Cl_2 Benzyl Chloride — $\dfrac{KCN\ (aq)}{-KCl}$ → CH_2CN Phenyl ethanenitrite — $\dfrac{AlH_4}{Redue}$ → $\overset{2}{C}H_2\overset{1}{C}H_2NH_2$ 2-phenylethanamine

Q. 18 Why are aliphatic amines more basic than aromatic amines ?

Ans. In Aromatic amines, due to resonance, N-atom acquries +ve charge and ∴ lone pair of N-atom is less available.
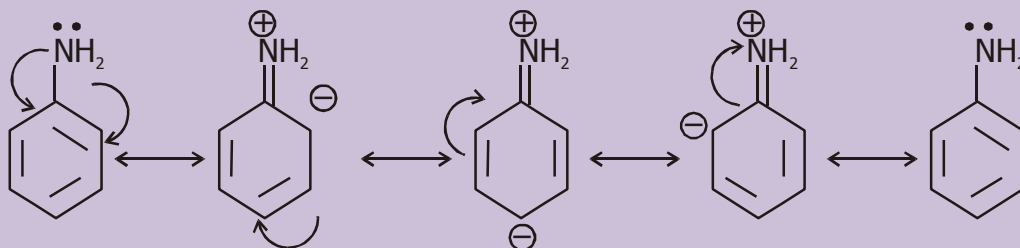
In aliphatic amines, due to e⁻ releasing nature of alkyl groups lone pair of e⁻ on N-atom is more available.

∴ More basic.

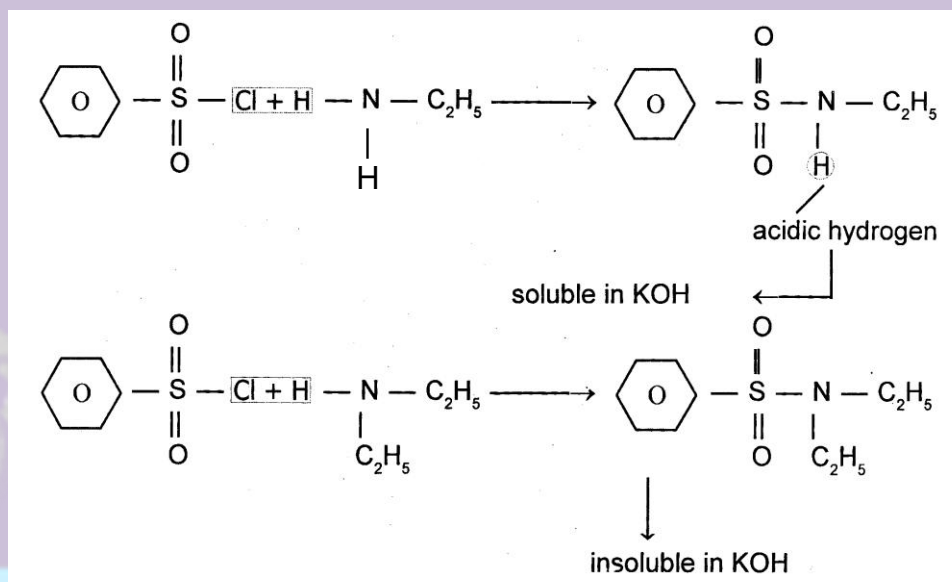**Q. 19. How can you distinguish between 1° and 2° amine ?**

Ans. (i) Carbylamine test :

$$R — NH_2 + CHCl_3 + 3\ KOH \longrightarrow R— NC + 3\ KCl + H_2O$$

<div align="center">(pungent smelling)</div>

2° amines do not give this test.

(ii) Aryl sulphonyl chloride test :

Q. 20. **Explain the order of basicity of the following compounds in (i) Gaseous phase and (ii) inaqueous soln. :**

$$(CH_3)_3N,\ (CH_3)_2NH,\ CH_3NH_2,\ NH_3$$

Ans. Due to + I effect of alkyl gps, the electron density on the N-atom of 1°, 2° and 3° amines is higher than that on the N-atom in NH_3. Therefore, all amines are more basic than NH_3.

(i) In gaseous phase, solvation effects are absent and hence the relative basicity of amines depends only on + I effect of the alkyl gps. Now since + I effect increases in going from 1° to 2° to 3° amine, so the basicity of amines decreases in the order :
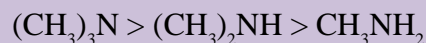
3° amine > 2° amine > 1° amine

$$(CH_3)_3N > (CH_3)_2NH > CH_3NH_2 > NH_3$$

(ii) In aq. soln, the basicity depends upon two factors :
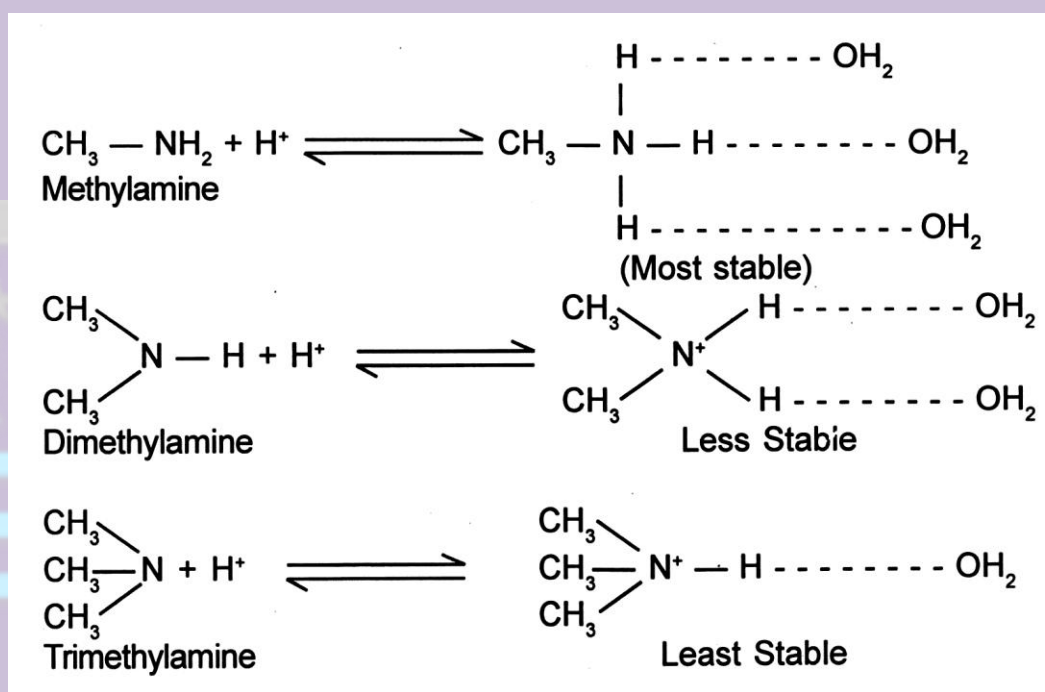
(a) $+ I$ effect of CH_3 gp and

(b)   Solvation effect.

Stabilization of the conjugate acid (formed addition of a proton to amine) by H-bonding explained above on the basis of $+ I$ effect, the order will be :

$(CH_3)_3N > (CH_3)_2NH > CH_3NH_2$

On the basis of Stabilisation of conjugate acids by H-bonding alone as explained below :

The combined effect of these two opposing factors is that $(CH_3)_2 NH$ is the strongest base. In case of CH_3NH_2 and $(CH_3)_3 NH$, the stability due to H-bonding predeminates over stability due to $+ I$ effect of CH_3 gp, thereby making CH_3NH_2 stronger than $(CH_3)_3 NH$. So the overall order in aq. soln will be :

$(CH_3)_2 NH > CH_3NH_2 > (CH_3)_3N > NH_3$

Q21   **Comment on the following-**
   a. Hoffmann's bromamide reaction.
   b. Carbylamine reaction
   c. Diazotization reaction (NCERT TEXT BOOK)

Q22.   **Write the chemical reactions** -
   a. Hinsberg's test for all amines.
   b. Test to distinguish aliphatic amines & aromatic amines.

Q23   An aromatic compound A on treatment with aqueous ammonia and heating form compound B which on heating with Br$_2$ and KOH form a compound C of molecular formula C_6H_7N. Write the structure and IUPAC name of compound A,B,C (NCERT TEXT BOOK)

Q 24 Write short notes on

    (1)Gabriel phthalimide synthesis

    (2)H.V.Z reaction

    (3)Aldol condensation

    (4)cannizaro reaction

Q 25 Which acid of each pair is stonger

    (a)CH_3COOH Or CH_2FCOO

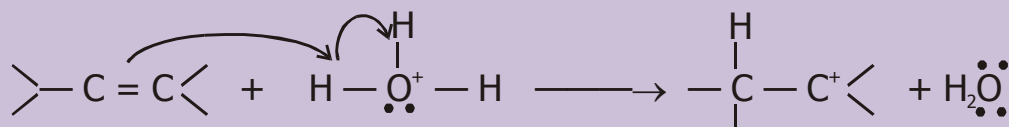   (b) $CH_2FCH_2CH_2COOH$ Or CH_3CHFCH_2COOH (FOR answer see in text of ncert aldehyde ketone carboxy acid

SELECTED QUESTIONS OF CHAPTER :HALOALKANE AND HALOARENE,ALCOHOL,PHENOL AND ETHER

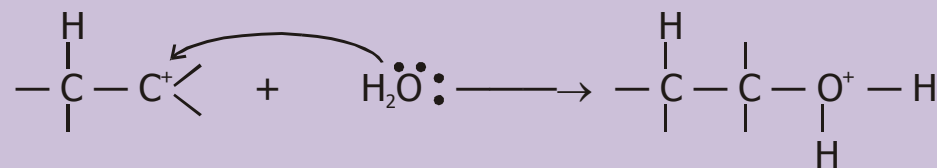**Q. 1.** **Write the mechanism of hydration of ethene to yield ethanol.**
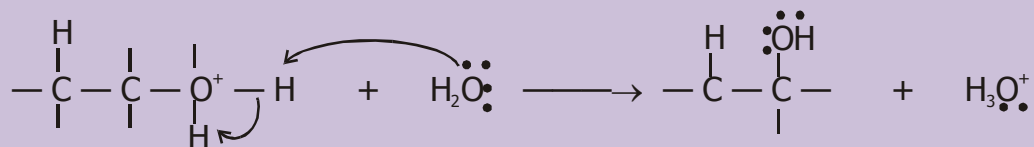
Ans. $H_2O + H^+ \longrightarrow H_3O^+$

Step (i) : — Protonation of alkene to form carbocation by electrophilic attack :

Step (ii) : — Nucleophilic attack of water on carbocation :

Step (iii) : — Deprotonation to form an alcohol :

$$-\overset{\underset{|}{H}}{\underset{|}{C}}-\overset{\underset{|}{H}}{\underset{|}{C}}-\overset{+}{\underset{\overset{|}{H}}{O}}-H \quad + \quad H_2\ddot{O}\colon \longrightarrow -\overset{\underset{|}{H}}{\underset{|}{C}}-\overset{\colon\ddot{O}H}{\underset{|}{C}}- \quad + \quad H_3\overset{+}{O}\colon$$
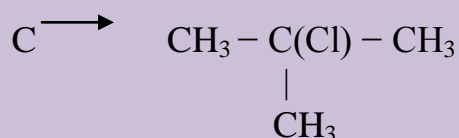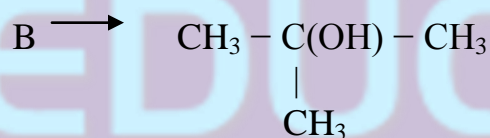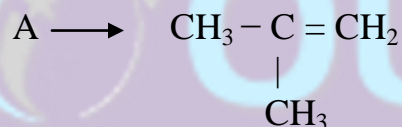
Q. 2. Alcohols acts as weak bases. Explain.

Ans.   The oxygen atom of the hydroxyl group has two lone pairs of electrons. Therefore alcohols accept a proton from strong mineral acid to form oxonium ions. Hence act as weak bases.

Q3. An Organic compound 'A' having molecular formula C4H8 on treatment with dil H2SO4 gives 'B' – 'B' on treatment with ione Hcl and anhydrous Zncl2 gives 'C' and on treatment with sodium ethoxide gives back 'A' . Identify the compound 'A' , 'B' and 'C' and write equation involved.

Ans:

$$A \longrightarrow \quad CH_3 - \underset{\underset{CH_3}{|}}{C} = CH_2$$

$$B \longrightarrow \quad CH_3 - \underset{\underset{CH_3}{|}}{C(OH)} - CH_3$$

$$C \longrightarrow \quad CH_3 - \underset{\underset{CH_3}{|}}{C(Cl)} - CH_3$$

Q.4. Explain why: -
   (a) H_2SO_4 cannot be used along with KI in the conversion of an alcohol to an alkyl halide.
   (b) Alkyl halide though polar are immiscible with water.

Ans: -
   (a) H_2SO_4 converts KI to corresponding HI and then oxidise it into iodine.
   (b)   When halo alkane interacts with water molecule , less amount of energy is released which is not sufficient to break the original H- bond

between water molecule and to form new H-bond with halo alkane and water.

Q.5. Which one of the following has the highest dipole moment, and why?
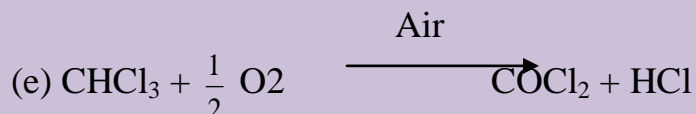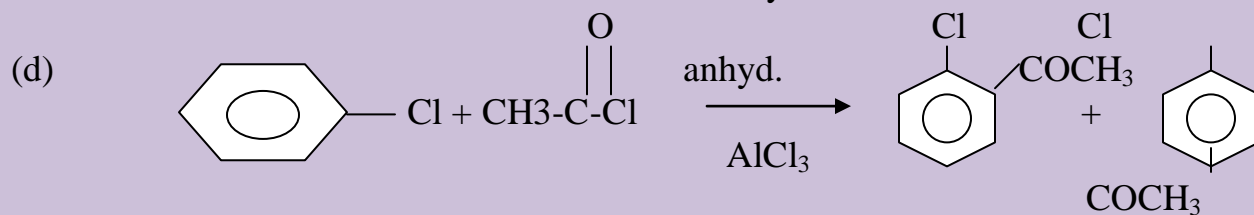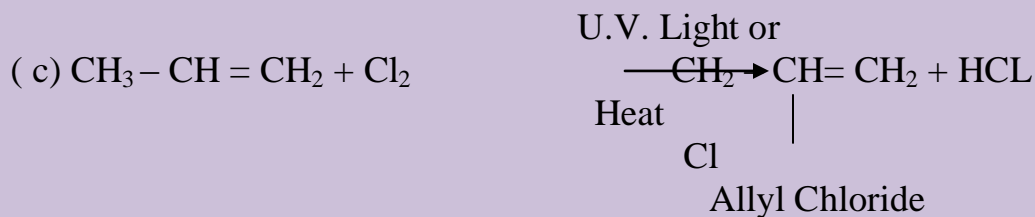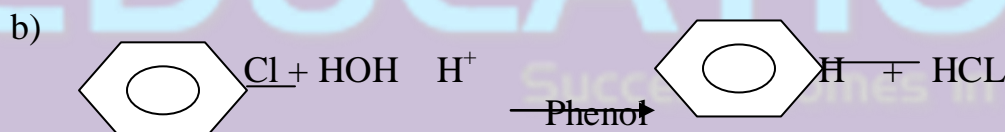   (a) CH_2Cl_2
    (b) $CHCl_3$
    (c) CCl_4

Ans:- CH_2Cl_2 has the highest dipole moment since both the Cl- atoms are present on one side (on the head) of c – atom and therefore cause a maximum dipole moment. In $CHCl_3$ and CCl_4, two Cl – atoms and four Cl – atoms cancel out their dipole moments.

Q.6. What happens when ───────
    a) Methyl Chloride is treated with KCN
    b) ChloroBenzene is subjected to hydrolysis
    c) Propene is treated with Cl_2 in the presence of U.V. light OR is heated.
    d) Chlorobenzene is treated with acetyl chloride in presence
    e) of anhyd. $AlCl_3$
    f) Chloroform is slowly oxidized by air in presence of light.

Ans:-

a) $CH_3 – Cl + KCN \longrightarrow CH_3 – CN + Kcl$
                                  Methyl cyanide

b)

$\langle\bigcirc\rangle$ Cl + HOH $\xrightarrow[\text{Phenol}]{H^+}$ $\langle\bigcirc\rangle$ H + HCL

(c) $CH_3 – CH = CH_2 + Cl_2 \xrightarrow[\text{Heat}]{\text{U.V. Light or}} CH_2 \rightarrow CH= CH_2 + HCL$

                                          Cl
                                Allyl Chloride

(d)
                                  O
$\langle\bigcirc\rangle$ Cl + CH3-C-Cl $\xrightarrow[AlCl_3]{\text{anhyd.}}$ $\langle\bigcirc\rangle$ (Cl, COCH$_3$) + $\langle\bigcirc\rangle$ (Cl, COCH$_3$)

(e) $CHCl_3 + \frac{1}{2} O2 \xrightarrow{\text{Air}} COCl_2 + HCl$

Q.7. Arrange the compounds in increasing order of their boiling pts.

(a) $CH_3CH_2CH_2CH_2Br$, $CH_3CH_2CHBrCH_3$, $(CH_3)_3C\ Br$

(b) CH_3Br, $CH_2Br_2,$ $CHBr_3$

Ans:

(a) $(CH_3)_3C-Br < CH_3CH_2CHBrCH_3 < CH_3CH_2CH_2CH_2Br$

— Boiling point increases. ⟶

Boiling point decreasing on increasing the branching

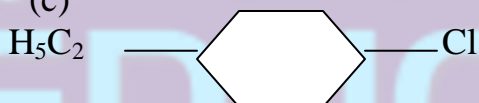(b) $CH_3Br < CH_2Br_2 < CHBr_3$

⟶

Boiling point increases

Boiling point increases due increasing molecular mass.

Q.8. Write down the IUPAC name of the following organic compounds: -

(a) CH_3CHCl_2

(b) $CH_3CH_2CH_2CH(C(CH_3)_3)CH(I)CH_2CH_3$

(c)

H_5C_2 ———⬡——— Cl

Ans: - (a) 1,1- Dichloroethane

(b) 3-Iodo – 4 – (1,1 – dimethyl ethyl) heptane

(c) 1- Chloro – 4 – ethyl cyclo hexane

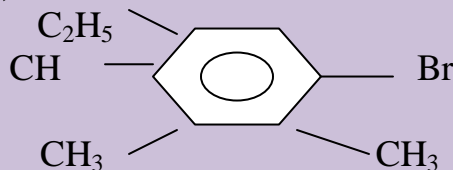Q.9.   Write down the structures of the following organic compounds

(a) 1- Bromo – 4 – sec. butyl – 2 – methyl benzene

(b) 2 – Chloro – 3 – methyl pentane

(c) Vinyl chloride

Ans:-   **(a)**

C_2H_5

CH ——⬡—— Br

CH_3 CH_3

(b) $CH_3CH_2CH(CH_3)CH(Cl)CH_3$

(c) $CH_2 = CHCl$

Q.10. How can the following interconversions are carried out

(a) Ethanol to but-1-yne

(b) Benzene to 4-bromo nitro benzene

(c) Toluene to benzyl alcohol

Ans:-

a) CH_3CH_2OH $\xrightarrow[160-170^0C]{Conc.\ H_2SO_4}$ $CH_2=CH_2$ $\xrightarrow[2.Alc.KOH]{1.\ Br_2}$ $CH\equiv CH$

$\downarrow NaNH_2$

$CH_3CH_2C\equiv CH^-$ $\xleftarrow{C_2H_5Cl}$ $CH\equiv CNa$

b)

c)
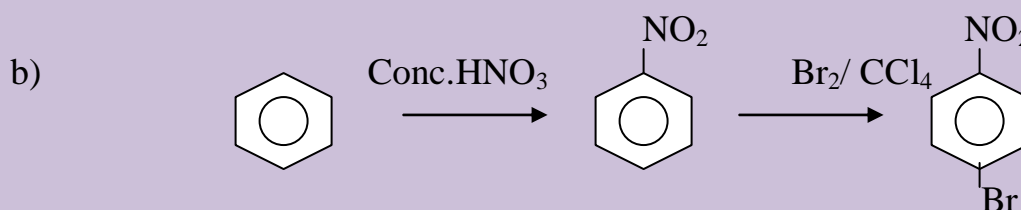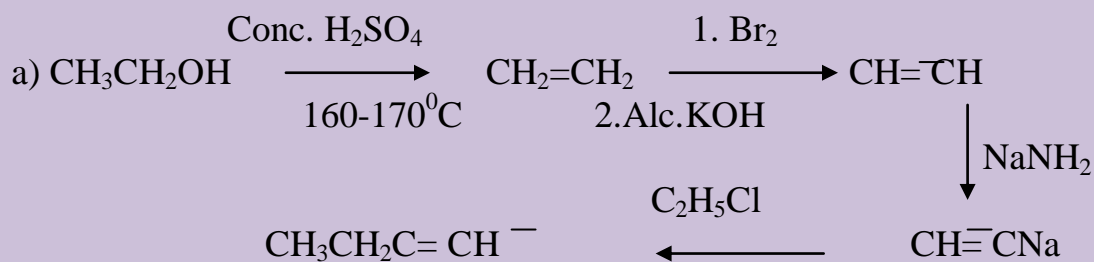
Q11. Explain the following .
   (a) Allyl chloride is hydrolysed more readily than n-propyl chloride.
   (b) Vinyl chloride is hyolrolysed more slowly than ethyl chloride

Ans:- (a)   Allyl chloride readily undergoes ionization tpo produce sesonance stabilized allye

carbocation. Science carbocation are rective species, therefore allyle cotion reading combines with OH ions to form allyl alcohol. In contrast n-propyl chloride does not   undergo ionization to produce n-propyl chloride.

a. Vinyl chloride get reacting stabilization Carbon-chlorine bond acquires some double bond character. In contrast in ethyl chloride, the carbon-chlorine bond is a pure single bond. This Vinyl chloride under goes hydrolysis more slowly than ethyl chloride.

Q12What happened when
   (1)propene is treated with HBr in the presence of peroxide.
   (2)methyl chloride is treated with KCN. (ANS SEE NCERT TEXT BOOK)

Q 13Explain why Grignard reagent should be prepare under anhydrous condiction?

Q14.Predict the order of reactivity of the following compound in SN^1 and SN^2 reaction.

   (a) The four isomeric bromobutone
   (b) $C_6H_5CH_2Br$, $C_6H_5CH(C_6H_5)Br$, $C_6H_5CH(CH_3)Br$, $C_6H_5C(CH_3)C_6H_5Br$

 Ans:- $CH_3CH_2CH_2CH_2Br < (CH_3)_2CH\ CH_2Br < CH_3\ CH_2\ CH(Br)CH_3 < (CH_3)_3C\text{-}Br$
$\longrightarrow$

Reactivity towards SN^1 Reaction

$CH_3CH_2CH_2CH_2Br > (CH_3)_2CH\ CH_2Br > CH_3\ CH_2\ CH(Br)CH_3 > (CH_3)_3C\text{-}Br$
$\longleftarrow$

Reactivity towards SN^2 Reaction

(b)   Reactivity towards SN1 Reaction

   $C_6H_5C(CH_3)(C_6H_5)Br > C_6H_5(CH(C_6H_5)Br > C_6H_5CH(CH_3)Br > C_6H_5CH_2Br$
Reactivity towards SN^2 Reaction

   $C_6H_5C(CH_3)(C_6H_5)Br < C_6H_5(CH(C_6H_5)Br < C_6H_5CH(CH_3)Br < C_6H_5CH_2Br$

Q 15In the following pair of halogen compound which is faster undergoing S_N2 REACTION

Q. 16. Alcohols are easily protonated than phenols. Justify.

Ans.   In phenols lone pair of electrons on the oxygen atom are delocalised over the benzene ring due to resonance and hence are not easily available for protonation. In contrast in alcohols, the lone pairs of electrons on the oxygen atom are localized due to absence of resonance and hence are easily available for protonation

Q17   Why phenol is acidic compare it with ethanol ?

 Ans: In phenol dissociation takes place as follows.

+H^+
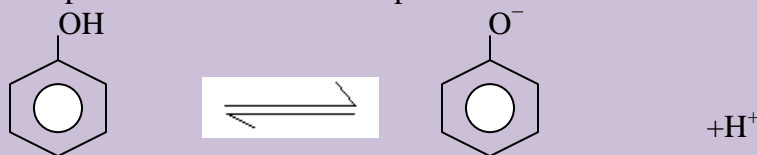
(Phenol)   (Phenoxideion)

The conjugate base of phenol ie. Phenoxide ion is resonance stabilized. This is why the negative charge on oxygen atom is delocalized through out the ring. So, the oxygen present in phenoxide ion has less tendency to form undissociated phenol molecule and equilibrium lies towards right direction.

Q.18. Give the IUPAC name of $CH_3O – CH – CH_3$

CH_3

Ans:- 2- Methoxypropane

Q.19. Convert the following : -
- **(i)   Aniline to Phenol**
- **(ii)   Phenol to picric acid**

Q.20. Explain the following with an example: -
- **(i)   Kolbe's reaction**
- **(ii)   Williamson's ether synthesis**

Q.21. Write chemical reaction for the preparation of phenol from **cumen**

Q.22.

Distinguish Primary, Secondary and tertiary alcohols with the help of Lucastest.

Q.23 Write the equation of the following reactions : -
- (i)   **Friedel Craft reaction**
- (ii)   **Nitration of anisole**

Q.24 Explain the following with an example :
- **(i)   Kolbe reaction**
- **(ii)   Reimer Tiemann's reaction**

Q. 25 Convert the following: -
- (i)   **Phenol** to **bezene**
- (ii)   **Phenol** to **benzoquinone**

Q.26 Explain **Williiamson's** synthesis with one example

Q.27
- (i)   Explain why is **ortho - nitro phenol** more acidic than **o- methoxy phenol**?
- (ii)   Write the mechanism of the reaction of HI with **methoxy methane**.

Q.28 Name the reagents used in the following reactions:

- (i)   **Benzyl alcohol** and **Benzoic Acid**
- (ii)   **Butan- 2- one** to **Butan – 2- ol**
- (iii)   **Bromination of phenol to 2,4,6, tribromophenol (text book)**

Q29 Write mechanism of the reaction of HI with methoxymethane (text book)

Q 30What is Luca reagents? Text book
Q31How phenol is obtained from aniline?

SELECTED QUESTIONS OF CHAPTER :   P-BLOCK ELEMENTS

Q1. Why Nitrogen is a gas whereas Phosphorous is a solid?
Ans: Nitrogen molecules have less Vander Waal's forces of attraction whereas molecular phosphorous has more Vander Waal's forces of attraction.

Q2. Complete the following reactions :-
$$\text{i) } XeF_6 + H_2O \rightarrow \text{---} + \text{----} \text{ (partial hydrolysis)}$$
$$\text{ii) } XeF_6 + H_2O \rightarrow \text{---} + \text{----} \text{ (Complete hydrolysis)}$$
iii) $Cl_2 + H_2O \rightarrow$ --- + ----
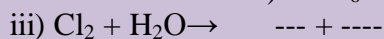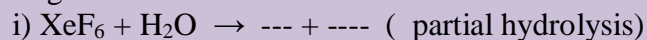
Ans: i) $XeOF_4$ + HF
  ii) XeO_3 + HF
  iii) HOCl + HCl

Q3. Arrange the following in decreasing order :-
  i) NaF, NaI, NaCl,NaBr(Ionic nature)
  ii) PH_3, NH_3, ,AsH_3,SbH_3 (Basic Strength)
  iii) HF,HBr,HCl,HI (Acid Strength)

Ans i) NaF> NaCl > NaBr> NaI
  ii) NH_3> PH_3> AsH_3> SbH_3
  iii) HI> HBr> HCl> HI

Q4 Find hybridization and shape i) XeF_2 ii) XeO_3 iii) XeF_4
Ans: i) sp3d, Linear
  ii) sp3, Pyramidal
  iii) $sp3d^2$, Square planar

Q5 Give reasons
  i) H_2O is a liquid but H_2S a gas.
  ii) Ammonia has higher boiling point than phosphine
  ii) Krypton & xenon make compounds.

Ans: i) Hydrogen bond is found in H_2O but not in H_2S.
  ii) Hydrogen bond is found in NH_3 but not in PH_3.
  iii) Because they have low ionization energy.

Q6 Write down the chemical reactions that take place in the manufacture of sulphuric acid by contact's process.
Ans: i) $S + O_2 \rightarrow SO_2$

  ii) $SO_2 + O_2 \xrightarrow{V_2O_5} SO_3$
  iii) $SO_3 + H_2SO_4 \rightarrow H_2S_2O_7$
  iv) $H_2S_2O_7 + H_2O \rightarrow 2H_2SO_4$

Q.7. Which forms of Sulphur show paramagnetic behaviour ?
Ans : In Vapour State sulphurPartly exists as S_2 molecule which has two unpaired electrons in the *
  Orbitals hence exhibit paramagnetic

Q.8. Why does O_3 act as powerful Oxidising agent ?
Ans: Due to ease with Which it liberates atoms of nascent oxygen ($O_3 \rightarrow O_2$ +0)
  $2Pbs (S) + 4O_3 (g) \rightarrow PbSO_4(S) + 4O_2 (g)$

Q.9. How is the presence of SO_2 detected ?
Ans : 1. It has pungent characteristic smell .
  2. It decolourises $KMn O_4$ solution
  3. It turns acidified $K_2 Cr_2 O_7$ green

Q.10. Are all the five bonds in PCl_5 molecule equivalent ?
Ans – PCl_5 has a trigonal bipyramidal structure and the three equatorial p-cl bonds are equivalent . while trhe
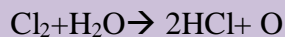 two axial bonds are different and longer than equatorial bonds

Q.11 Why is helium used in diving apparatus ?
Ans: Because heliun is very low solubility in blood

Q.12 Give reason for bleaching action of Cl_2
Ans   Due to oxidation
$Cl_2 + H_2O \rightarrow 2HCl + O$
Coloured substance $+O \rightarrow$ colourless substance

Q.13 Why H_3PO_3 is dibasic and H_3PO_4 is tribasic ?
Ans   In H_3PO_3 only two replacable hydrogen but in H_3PO_4 , three hydrogens are replacable

Q14 Arrange the following as mentioned:

1. M-F, M-Cl, M-Br, M-I.   (Decreasing order of ionic nature)

2. F_2, Cl_2, Br_2, I_2.   (Increasing order of bond energy)

3. H_2O, H_2S, H_2Se, H_2Te.   (Decreasing order of boiling points)

4. NH_3, PH_3, AsH_3, SbH_3.   (Increasing order of basic nature)

5. HI, HBr, HCl, HF.   (Increasing order of thermal stability)

6. HI, HBr, HCl, HF.   (Increasing order of reducing power)

7. HOCl, HOClO, $HOClO_2$, $HOClO_3$. (Increasing order of acid strength)

8. H_2O, H_2S, H_2Se, H_2Te.   (Increasing order of acid strength)

Q15 $HClO_4$, $HBrO_4$, HIO_4.   (Decreasing order of acid strength

1. Explain the process and necessary conditions involved in the preparation of NH_3, H_2SO_4 or HNO_3.

2. What are interhalogen compounds? How are they classified?

3. Why do noble gases have comparatively larger atomic size? Give the reasons which prompted Bartlett to prepare first noble gas compound.

Q16 Complete the following reactions:-

01. XeF2 + H2O $\rightarrow$
02. XeF2 +PF5 $\rightarrow$
03. XeF4 +H2O $\rightarrow$
04. XeF6 +H2O $\rightarrow$
05. XeF4 +SbF5 $\rightarrow$
06. I2+H2O+Cl2 $\rightarrow$

Q17
01. CaF2+H2SO4 $\rightarrow$
02. NaOH +Cl2 $\rightarrow$

03. $F_2 + H_2O$ →
04. $PCl_3 + H_2O$ →
05. $PCl_5 + H_2O$ →
06. $C + H_2SO_4$ →
07. $Ca(OCl)Cl + HCl$ →

QUESTIONS ON POLYMERS

Q. 1 Define the term polymerisation?
Sol. Polymerisation is a process of formation of a high molecular mass polymer from one or more monomers by linking together of repeating structural unit with covalent bond.

Q. 2 In which classes, the polymer are classified on the basis of molecular forces?
Sol. On the basis of molecular forces present between the chain of various polymers, the classification of polymer is given as follows,
    (1) Elastomers
    (2) Fibres
    (3) Thermoplastics
    (4) Thermosetting plastics

Q. 3 How you can differentiate between addition and condensation polymerisation?
Sol. In addition polymerisation, the molecule of same or different monomers add together to form a large polymers molecule. Condensation polymerisation is process in which two or more bifunctional molecules undergo a series of condensation reactions with the elimination of some simple molecule and leading the formation of polymers.

Q.4 Write the free radical mechanism for polymerisation of an alkene?
Sol. The mode of free radical polymerisation consist of three steps :
    (i)   Chain initiation step

$$C_6H_5-\overset{\overset{O}{\|}}{C}-O—O-\overset{\overset{O}{\|}}{C}-C_6H_5 \ ----------\to \ 2C_6H_5-\overset{\overset{O}{\|}}{C}-\overset{.}{O}$$

$$2C_6\overset{.}{H}_5$$
Phenyl radical

$$C_6\overset{.}{H}_5 + CH_2 = CH_2 ----\to C_6H_5-CH_2-\overset{.}{C}H_2$$
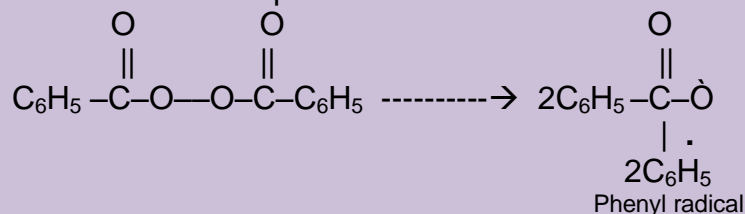
(ii) Chain propagating step :

$$C_6H_5 - CH_2 - \overset{.}{C}H_2 + CH_2 = CH_2$$

$$C_6H_5 - CH_2 - CH_2 - CH_2 - CH_2$$
$$|$$
$$CH_2 = CH_2 \quad |$$
$$|$$
$$C_6H_5 - (-CH_2CH_2-) - CH_2\overset{.}{C}H_2$$
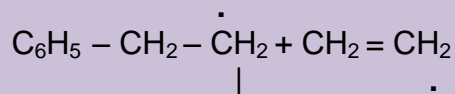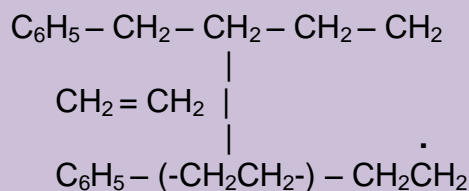
(iii) Chain terminating step :

$$C_6H_5-(-CH_2-CH_2-)-CH_2-\overset{.}{C}H_2 + \overset{.}{C}_6H_5$$

$$|$$
$$C_6H_5-(-CH_2-CH_2-)-CH_2-CH_2-CH_2-CH_2-(-CH_2-CH_2-)-C_6H_5$$
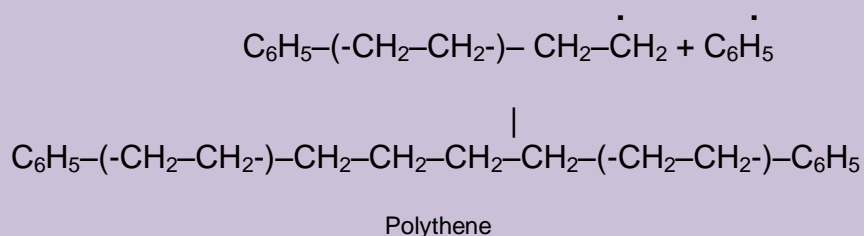
Polythene

Q.5 Define the thermoplastics and thermosetting polymers with two example of each.
Sol. A thermoplastic polymers can be repeatedaly soft ended o heating and hareden on cooling hence it can be use again and again. The example are polythene and polypropylene etc. A thermosetting polymers is a permanent setting polymer as it get harden and set during molding process and can not be soften again. The example are bakerlight and melamine – formaldehyde polymers.

Q. 6 Write structures of monomers used for getting the following polymers?
(A) PVC
(B) Teflon
(C) PMMA
Sol. (A) PVC : Is stands for polyvinyl chloride. Monomers used : Vinyl chloride structure of monomer is $CH_2 = CH – Cl$
(B) Teflon : It is also called polyteraflouro ethylene, PTFE. Monomers used : Teraflouro ethylene $CF_2 = CF_2$
(C) PMMA : Its stands for polumethylmethacrylate. It is also known as 'Plexi glass'.
Monomers used : Metyl meth acrylate, $HC_2 = C – COOCH_3$
$$|$$
$$CH_3$$

Q. 7 Write the name and structure of one of the common initiators used in free radical addition polymerisation.
Sol. A commonly used reagent used for initiating of free radical change reaction is tertiary butylparoxide $(CH_3)_3 CO – OC (CH_3)_3$ it is decomposes under mild condition to form two turtbutoxide radical.

$$(CH_3)_3C–O—O–C(CH_3)_3$$
tert. butylperoxide
$$|$$
heat, light etc   370 – 420 K
split up
$$2(CH_3)_3 C –\grave{O}(\text{let it represent it by })$$
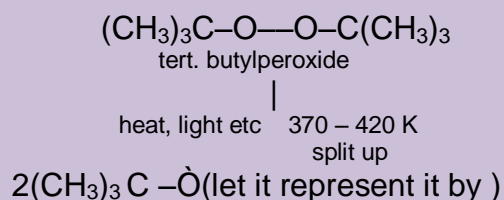
Q. 8 Write the name and structures of the monomers of the following polymers? (1) Buna – S

(2) Buna – N

(3) Dacron

(4) Neoprene

Sol. The names and the structures of monomers are

Name	Monomeric unit	Structure of monomer
(i) Buna – S	1, 3 – Butadiene styrene	$CH_2 = CH – CH = CH_2$ $C_6H_5CH = CH_2$
(ii) Buna – N	1, 3 – Butadiene acrylonitrile	$CH_2 = CH – CH = CH_2$ $CH_2 = CH – CN$
(iii) Neoprene	Chloroprene	Cl | $CH_2 = C – CH = CH_2$
(iv) Dacron	Ethylene glycol Terephthalic acid	$OHCH_2 – CH_2OH$

CHEMISTRY IN EVERY DAY LIFE

Q.1 List two major classes of antibiotics with an example of each class?

Sol. See the NCERT text book.

Q.2 What are antacid? List some of the compound which are used as antacids?

Sol. See the NCERT text book.

Q.3 Define the term chemotherapy.

Sol. See the NCERT text book.

Q.4 What is mean by the term 'broad spectrum antibiotics' ?

Sol. The total range of microorganism which can be killed by a particular antibiotic is refered to its spectrum. Antibiotics which are effective agains several different type of harmful microorganism and thus capable of curing several infections are called broad spectrum antibiotic. Chloranphenical is such type of antibiotic.

Q.5 Why are cimetidine and ranitidine better antacid than sodium bicarbonate or magnesium or aluminium hydroxide?

Sol. Over production of hydrochloric acid in the stomach cause acidity. So, sodium bicarbonate or magnesium or aluminium hudroxide are used as treatment of acidity. However excessive bicarbonate can make the stomach alkaline and trigger the production of even more acid. But the drugs cimetidine and rentidine work in different

way. They prevent the interaction of histamine with the receptor present in the stomach wall and this results in release a lesser amount of acid.

Q.6 Name the substance which can be used as an antiseptics as well as disinfectant.
Sol. Phenol can be used as antisepics as well as disinfectant. 0.2 % solution of phenol is used as an antiseptic and 1 % solution of phenol is disinfectant.

Q.7 What are main constituents of dettol?
Sol. Chloroxylenol and terpineol are the main constituent of dettol.

Q.8 What is tincture of iodine? What its used?
Sol. A 2-3 % of solution of iodine in alcohol water mixture is called tincture of iodine. It is used as an antiseptic.

Q. 9 What are food preservative?
Sol. Chemical substance which when added to food material inhibit the growth of microorganism and thus prevent the spoilage of food are known as food preservative for example sodium benzoate.

Q.10 Why is use of aspartame limited to cold food and drinks?
Sol. Aspartame is unstable to heat and therefore it can be used as sugar substitute in cold drinks and cold food only.
Q.11 what are artificial sweetening agents? Give two examples?
Sol. Substance which are used as sweetening agents in place of sugar but have no nutritive value are called artificial sweetening agent. Saccharine and aspartame are example of artificial sweetening agent.

Q.12 Explain the following term with suitable example?
(A) Cationic detergents
(B) Anionic detergent
(C) Neutral detergent
Sol. See the NCERT text book.

Q.12 What are biodegradable and non- biodegradable detergents? Give one example of each?
Sol. The detergents which are decomposed by microorganisms like bacteria are called biodegradable and detergents are not decomposed by microorganism are called non-biodegradable detergents containing unbranched hydrocarbon chain are biodegradable while the deterents containing branched hydrocarbon chain are non-biodegradable.
          For example n-lauryl sulphonate is biodegradable. On the other hand, a detergent such as shown below is non-biodegradable.

Q.12 Give structural formula of aspirin, what is its chemical name?

Q.13 Give the name one broad spectrum antibiotic?

Q.14 What type of drug is chloramphenicol?

Q.15 Define the following and give one example of each :
(i) Antipyretics
(ii) Antibiotics

Q.16 Account of the following :
(A) Aspirin drug helps in the prevention of heart attack.
(B) Diabetic patients are advise to take artificial sweeteners instead of natural sweeteners

CHEMICAL KINETICS

Q. 1. **Out of PO_4^{3-}, SO_4^{2-}, Cl^-, which wil act as the best coagulating agent for for Fe $(OH)_3$?**

Ans. PO_4^{3-}.

Q. 2. **Arrange the following in correct order of their coagulating power :**

Na^+, Al^{3+}, Ba^{2+}

Ans. $Na^+ < Ba^{2+} < Al^{3+}$

Q. 3. **Which type of charged particles are adsorbed on the surface of As_2S_3 during its preparation ?**

$As_2O_3 + 3 H_2S \longrightarrow As_2S_3 + 3 HOH$

Ans. S^{2-}.

Q. 4. **Out of CO and NH_3 which is adsorbed on activated charcoal to a large extent and why ?**

Ans. Ammonia; because more easily liquefiable gas undergoes adsorption to a greater extent.

Q. 5. **Out of NaCl, $MgSO_4$, $Al_2 (SO_4)_3$, $K_4[Fe(CN)_6]$, which one will bring about the coagulation of a gold sol quickest and in the least of concentration ?**

Ans. $Al_2 (SO_4)_3$.

Q. 6. **What is the purpose of adding gelatin to ice cream ?**

Ans. Ice cream is a colloid. Gelatin imparts stability to it because gelatin is a protective colloid.

Q7 Explain the following terms :
(i) Electrophoresis, (ii) Coagulation, (iii) Dialysis (iV) Tyndal Effect

Ans.: (i) Electrophoresis :- The immigration of colloidal solute towards oppositely charged electrode under an electric potential is called Electrophoresis.
(ii) Coagulation :- The process of settling down of colloidal partcles is known as coagulation.
(iii) Dialysis :- It is a process of removing dissolved impurities from colloidal solution by means of diffusion through a suitable membrane.
(iv) Tyndal effect :- The scattering of light in colloidal solution by colloidal solute is known as Tyndal effect.

Q8. Comment on the statement that " colloid is not a substance but state of a substance" .

Ans. A substance shows different physical properties in different medium. It may exist as colloid or crystalloids under certain conditions. Eg. NaCl in water behaves like crystalloid while in benzene behaves like colloid. Similarly dilute soap solution behaves like crystalloid whereas concentrated soap solution like colloids. It is the size of particles which matters i.e. the state in which the substances exists. If the size of the particles lies in the range 1 to 1000 no., it is in colloidal state.

Q9. Why it is necessary to remove CO when ammonia is obtained by Haber's process?

Ans.: Because CO acts as poison for the catalyst in the manufacture of NH_3 by Haber's process.

10. What is observed
(i) When a beam of light is pressed through a colloidal sol
(ii) An electrolyte, NaCl is added to hydrated ferric oxide sol.
(iii) Electric current is passed through colloidal sol.

Ans.: (i) Tyndal Effect
(ii) Coagulation
(iii) Electrophoresis

Q11. What do you mean by activity and selectivity of catalysis?

Ans. Activity of catalyst means to increase the extent of chemisorption.
Selectivity of Catalyst means to direct a reaction to form selective product.

Q12 What is ZSM-5? What is its formula?

Ans.: ZSM-5 is a zeoli8te seine of molecular porosity5. Its formula is
$H_x[(AlO_2)_x(SiO_2)_{96-x}]$. $16H_2O$

Q13 Why adsorption is always exothermic?

Ans.: In Adsorption, change of entropy ΔS is –ve i.e. non favourable condition for exothermic change where as change of enthalpy ΔH is –ve i.e. favourable condition for exothermic change. Overall ΔG becomes –ve in adsorption; therefore adsorption is always exothermic.

14 Write brief notes on
(a) Brownian Movement and
(b) Electrophoresis.

Q 15.   State Hardy-Schulze Rule. What is its application?

1.   How can be Lyophobic colloids prepared?

2.   Give two examples for preparation of colloids by chemical methods.

3.   What are the characteristics of Enzyme catalysis?

4.   Write three differences between Lyophilic and Lyophobic colloids.

SOLUTION

Q-1.   State Raoult's law for a binary solution containing volatile components.

Q-2.   What is expected value of van't Hoff factor for K_3 [Fe(CN)$_6$] in dilute solution?

Q-3.   Of 0.1 molal solutions of glucose and sodium chloride respectively, which one will have a higher boiling point and Why?

Q-4.   State the condition resulting in reverse osmosis.

Q-5.   Why is the elevation in b.p. of water different in the following solutions? 0.1 molar NaCl solution. (ii)0.1 molar sugar solution.

Q-6.   Define Henry's law about solubility of a gas in a liquid.

Q-7.   What are azeotropes? Give an example.

Q-8.   What happens when blood cells are placed in pure water?

Q-9.   Why does molality of a solution remain unchanged with change in temperature while its molarity changes?

Q-9.   Why is an increase in temperature observed on mixing chloroform with acetone?

Q-10. What are hypertonic and hypotonic solutions?

Q-11. Why is osmotic pressure of 1 M KCl is higher than that of 1 M urea solutions?

Q-12. What is reverse osmosis? Give its use.

Q-13. Define colligative property.

Q-14. Draw a suitable diagram to express the relationship for ideal solutions of A and B between vapour pressures and mole fractions of components at constant temperature.

Q-15. The vapour pressure of pure Liquids A and B are 70mm Hg and 90 mm Hg respectively at 25^0C. The mole fraction of 'A' in a solution of the two is 0.3. Assuming that A and B form an ideal solution, calculate the partial pressure nof each component in equilibrium with the solution.

Q-16. The freezing point of a solution composed of 5.85 g of NaCl in 100g of water is- 3.348^0C Calculate the van't Hoff factor *'i'* for this solution, K$_f$ (water) = 1.86 K kg mol^{-1}.

Q-17. If N_2 gas is bubbled through water at 293K, how many millimoles of N_2 gas would dissolve in 1 litre of water ? Assume that N_2 exerts a partial pressure of 0.987 bar. Given that Henry's law constant for N_2 at 293K is 76.48 kbar.

Q18. Benzene and naphthalene form ideal solution over the entire range of composition. The vapoour pressure of pure benzene and naphthalene at 300 K are 50.71 mm Hg and 32.06 mm Hg respectively. Calculate the mole fraction of benzene in vapour phase if 80 g of benzene is mixed with 100g of naphthalene.

Q-19. The molal freezing point depression constant of benzene (C_6H_6) is 4.90 K kg mol^{-1}. Selenium exists as a polymer of the type Se_x. When 3.26g of selenium is dissolved in 226 g of benzene, the observed freezing point is 0.112^0C lower than for pure benzene. Deduce the molecular formula of selenium. (Atomic mass of Se = 78.8 g mol^{-1})

Q-20. An anti-freeze solution is prepared from 222.6 g of ethylene glycol ($C_2H_6O_2$), and 200g of water. Calculate the molality of the solution. If the density of the solution is 1.072 g ml^{-1} then what shall be the molarity of the solution ?

3. ELECTROCHEMISTRY

Q-1. State Kohlrausch's law for electrical conductance of an electrolyte at infinite
   dilution.

Q-2. How many faradays of electricity are required to liberate 2 moles of hydrogen gas in electrolysis of a solution?

Q-. What is the effect of an increase in concentration of zinc ions on the electrode potential of zinc electrode for which $E^0_{Zn^{2+}/Zn}$ equals – 0.76V ?

Q-. Write an expression to relate the molar conductivity of electrolyte in terms of degree of dissociation.

Q-. Rusting of iron is quicker in saline water than in ordinary water. Why is it so?

Q-. What are secondary cells?

Q. How many Faradays of charge are required to convert:
   I mole of MnO_4^- to Mn^{2+} ion,
   I mole of $Cr_2O_7^{2-}$ to Cr^{3+} ?

Q-. Write the cell reactions which occur in lead storage battery (i)_ when the battery is in use and (ii) when the battery is on charging.

Q-. How does molar conductivity vary with concentration for (i) weak electrolyte and for (ii) Strong electrolyte? Give reasons for these variations.

Q-. What is fuel cell? Write cathodic & anodic reactions of H_2-O_2 fuel cell.

Q-. Calculate the E.M.F. of following cell at 298 K:

Fe(s) I Fe $^{2+}$ (0.1M) II Ag$^+$ (0.1M) I Ag(s)

Given : E^o Fe $^{2+}$/Fe =- 0.44 V, E^o Ag $^+$/Ag =- 0.80 V,

R = 8.31 JK^{-1} mol^{-1}, 1F = 96500 C mol^{-1}

Q-. A solution of Ni (NO3)2 is electrolysed between platinum electrodes using a

current of 5.0 amperes for 20 minutes, What mass of Ni is deposited at the

cathode? [At. Wt of Ni = 58.9 u]

Q-. When a certain conductivity cell was filled with 0.1 M KCl, it has a resistance of 85 ohm at 25^0 C. When the same cell was filled with an aqueous solution of 0.052 M unknown electrolyte the resistance was 96 ohm. Calculate the molar conductivity of the unknown electrolyte at this concentration (Specific conductivity of 0.1 M KCl= 1.29 x 10^{-2} ohm^{-1}cm^{-1}

Q-. The resistance of a conductivity cell containing 0.001 M KCl solution at 298K is 1500 ohm. What is the cell constant if conductivity of 0.001 M KCl solution at 298 K is 0.146 X 10^{-3} S cm $^{-1}$?

4. CHEMICAL KINETICS

Q-1. Express the rate of the following reaction in terms of disappearance of hydrogen in

the reaction : 3 H_2 (g) + N_2 (g) →2NH_3 (g)

Q-2. For the reaction Cl_2(g) + 2NO (g) →2NOCl(g) the rate law is expressed as

rate = k [Cl_2][NO]^2 what is the overall order of this reaction?

Q-3. Define Zero order reaction with one example.

Q-4. The rate of reaction X →Y becomes 8 times when the concentration of the reactant X is doubled. Write the rate law of the reaction.

Q-5. Define activation energy of a reaction.

Q-6 Express the relation between the half-life period of a reactant and its initial concentration for a reaction of nth order.

Q-7. Give an example of pseudo first order reaction.

Q-8. What is the difference between average rate and instantaneous rate of a chemical reaction?

Q-9. Define elementary reaction with one example.

Q-10. Given the following data : D+E→ F

S.No.	[D] mol L^{-1}	[E] mol L^{-1}	Initial rate mol L^{-1}h^{-1}

01-	0.35	1.28	0.032
02-	0.35	0.64	0.008
03-	0.70	0.64	0.16

What is the order with respect to 'D' ?

Q-11. At 300 K a certain reaction is 50% completed in 20 minutes. At 350 K, the same reaction is 50% completed in 5 minutes. Calculate the activation energy for the reaction.

Q-12. The following rate data were obtained at 300 K for the reaction : 2A + B → C + D

Expt. No.	[A] mol L^{-1}	[B] mol L^{-1}	Rate of formation of D (mol L^{-1} min^{-1})
01-	0.1	0.1	6.0×10^{-3}
02-	0.3	0.2	7.2×10^{-2}
03-	0.3	0.4	2.88×10^{-1}
04-	0.4	0.1	2.4×10^{-2}

Calculate the rate of formation of D, when [A] = 0.5 mol L^{-1} and [B] = 0.2 mol L^{-1}

Q-13. For a first order reaction, it takes 5 minutes for the initial concentration of 0.6 mol L^{-1} to become 0.4 mol L^{-1}. How long will it take for the initial concentration to become 0.3 mol L^{-1}?

Q-17. Show that in a first order reaction, time required for completion of 99.9% is 10 times of half-life ($t_{\frac{1}{2}}$) of the reaction.

Q-18. The following data were obtained during the first order thermal decomposition of $SO_2 Cl_2$ at a constant volume. $SO_2 Cl_2$ (g) → SO_2 (g) + Cl_2 (g)

Experiment.	Time/s $^{-1}$	Total Pressure/ atm
01-	0	0.5

02-	100	0.6

Calculate the rate of the reaction when total pressure is 0.65 atm.

Q-19. Following reaction takes place in one step, $2NO(g) + O_2(g) \rightleftharpoons 2NO_2(g)$
How will the rate of the above reaction change if the volume of the reaction vessel is diminished to one-third of its original volume ? will there be any change in the order of the reaction with the reduced volume?

GENERAL PRINCIPLES AND PROCESSES OF ISOLATION OF ELEMENTS

Q-1. Name the process in which a particular mineral is dissolved selectively by using acids, bases or other regents.

Q-2. What is the role of depressant in froth floatation process?

Q-3. Out of C and CO, which is a better reducing agent at 673 K?

Q-4. What is meant by the term "chromatography" ?

Q-5. What is the role of graphite rod in the electrometallurgy of aluminium?

Q-6. Explain the process of zone refining. Give two examples of elements purified by this process.

Q-7. What is van-Akel method of refining metals? Explain by giving an example.

Q-8. What is electro-refining? Explain with the help of example.

Q-9. Outline the Principle of refining of metals by the following methods :
(i) Electrolytic refining (ii) Zone refining (iii) Vapour phase refining

Q-10. Name the processes by which chlorine is obtained as a by-product. What will happen if an aqueous solution of NaCI is subjected to electrolysis?

Q-11. Give an account of the extraction of silver by the cyanide process. Describe briefly how a pure sample of silver obtained by electro refining.

Q-12. Giving examples, differentiate between 'roasting' and 'calcinations'.

Q-13. Why is the extraction of copper from pyrite difficult than that from its oxide ore through reduction?

Q-14. Copper can be extracted by hydrometallurgy but not zinc. Explain.

Q-15. Name the common elements present in the anode mud in electrolytic refining of copper. Why are they so present?

Q-16 What is the use of ALLENGHAM DIAGRAM

Q-17. Although thermodynamically feasible, in practice, magnesium metal is not used for the reduction of alumina in the metallurgy of aluminum. Why?