

# Sample Paper 15 Solutions

Class XII 2023-24

## Chemistry

Time: 3 Hours

Max. Marks: 70

### General Instructions:

1. There are 33 questions in this question paper with internal choice.
2. SECTION A consists of 16 multiple-choice questions carrying 1 mark each.
3. SECTION B consists of 5 very short answer questions carrying 2 marks each.
4. SECTION C consists of 7 short answer questions carrying 3 marks each.
5. SECTION D consists of 2 case-based questions carrying 4 marks each.
6. SECTION E consists of 3 long answer questions carrying 5 marks each.
7. All questions are compulsory.
8. Use of log tables and calculators is not allowed.

## SECTION-A

**Directions (Q. Nos. 1-16) :** The following questions are multiple-choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.

1. Oxidation number of Ni in  $[\text{Ni}(\text{C}_2\text{O}_4)_b]^{4-}$  is

- (a) 3 (b) 4  
(c) 2 (d) 6

**Ans :** (c) 2

Oxidation number of Ni in  $[\text{Ni}(\text{C}_2\text{O}_4)_b]^{4-}$

$$= x + 3(-2) = -4$$
$$x = -4 + 6 = 2$$

2. An ester is boiled with KOH. The product is cooled and acidified with concentrated HCl. A white crystalline acid separates. The ester is

- (a) Methyl acetate (b) Ethyl acetate  
(c) Ethyl formate (d) Ethyl benzoate

**Ans :** (d) Ethyl benzoate

Methyl acetate and ethyl acetate on hydrolysis give  $\text{CH}_3\text{COOH}$  which is a liquid. Similarly ethyl formate on hydrolysis will give formic acid which is also a liquid. Only ethyl benzoate on hydrolysis acid which is a solid.

3. Several blocks of magnesium are fixed to the bottom of a ship to

- (a) make the ship lighter  
(b) prevent action of water and salt  
(c) prevent puncturing by under-sea rocks  
(d) keep away the sharks

**Ans :** (b) prevent action of water and salt

Magnesium provides cathodic protection and prevent rusting or corrosion.

4. In respect of the equation  $k = Ae^{-E_a/RT}$  in chemical kinetics, which of the following statements is correct?

- (a) A is adsorption factor  
(b)  $E_a$  is energy of activation  
(c) R is Rydberg's constant  
(d) k is equilibrium constant

**Ans :** (b)  $E_a$  is energy of activation

In equation,  $K = Ae^{-E_a/RT}$ ;

A = frequency factor,

K = velocity constant,

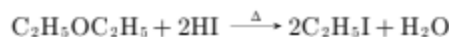
R = gas constant

and  $E_a$  = energy of activation

5. Diethyl ether on heating with conc. HI gives two moles of

- (a) ethanol (b) iodoform  
(c) ethyl iodide (d) methyl iodide

**Ans :** (c) ethyl iodide



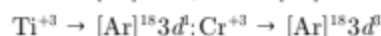
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6. Which of the following forms colourless compound ?

- (a)  $\text{Sc}^{3+}$  (b)  $\text{V}^{3+}$   
(c)  $\text{Ti}^{3+}$  (d)  $\text{Cr}^{3+}$

**Ans :** (a)  $\text{Sc}^{3+}$



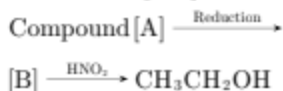
Scandium ions doesn't contain any unpaired electron in d-orbitals hence it form colourless compound.

7. Which one is a colligative property ?  
 (a) boiling point (b) vapour pressure  
 (c) osmotic pressure (d) freezing point

**Ans :** (c) osmotic pressure

Osmotic pressure is a colligative property.

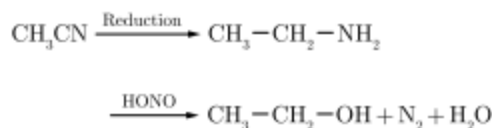
8. Consider the following sequence of reactions:



The compound [A] is:

- (a)  $\text{CH}_3\text{CH}_2\text{CN}$  (b)  $\text{CH}_3\text{NO}_2$   
 (c)  $\text{CH}_3\text{NC}$  (d)  $\text{CH}_3\text{CN}$

**Ans :** (d)  $\text{CH}_3\text{CN}$

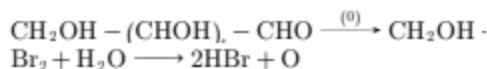


9. When glucose reacts with bromine water, the main product is

- (a) gluconic acid (b) glyceraldehyde  
 (c) saccharic acid (d) acetic acid

**Ans :** (a) gluconic acid

Glucose contains an aldehyde group. It is oxidised into acidic group by bromine water and gluconic acid is formed



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10. Which of the following is the use of electrolysis?

- (a) Electro-refining (b) Electroplating  
 (c) Both (a) and (b) (d) None of these

**Ans :** (c) Both (a) and (b)

Electro-refining and electroplating are done by electrolysis.

11. Chloropicrin is

- (a)  $\text{C}_2\text{H}_5\text{C}(\text{NO})_2\text{SH}$  (b)  $\text{CCl}_3\text{CHO}$   
 (c)  $\text{CCl}_3\text{NO}_2$  (d)  $\text{CCl}_3\text{NO}_3$

**Ans :** (c)  $\text{CCl}_3\text{NO}_2$

Chloropicrin is  $\text{CCl}_3\text{NO}_2$  also known as nitrochloroform is a useful insecticide and lachrymatory substance.

12. The molecular weight of benzoic acid in benzene as determined by depression in freezing point method corresponds to:

- (a) ionization of benzoic acid.  
 (b) dimerization of benzoic acid.  
 (c) trimerization of benzoic acid.  
 (d) solvation of benzoic acid.

**Ans :** (b) dimerization of benzoic acid.

Benzoic acid exists as dimer in benzene.

**Directions (Q. Nos. 13-16) :** Each of the following questions consists of two statements, one is Assertion and the other is Reason. Give answer :

13. **Assertion :**  $\text{KCl}$ ,  $\text{NaCl}$  and  $\text{NH}_4\text{Cl}$  cannot be used in the salt bridge of a cell containing silver.

**Reason :** A salt bridge contains concentrated solution of an inert electrolyte like  $\text{KCl}$ ,  $\text{KNO}_3$ ,  $\text{K}_2\text{SO}_4$  or solidified solution of such an electrolyte in agar-agar and gelatine.

- (a) Both Assertion and Reason are correct and Reason is a correct explanation of the Assertion.  
 (b) Both Assertion and Reason are correct but Reason is not the a correct explanation of the Assertion.  
 (c) Assertion is correct but Reason is incorrect.  
 (d) Both the Assertion and Reason are incorrect.

**Ans :** (b) Both Assertion and Reason are correct but Reason is not the a correct explanation of the Assertion.

$\text{KCl}$ ,  $\text{NaCl}$  and  $\text{NH}_4\text{Cl}$  cannot be used as salt bridge in a cell containing silver as one of the electrodes because they react to form a precipitate of  $\text{AgCl}$ .

14. **Assertion :** Members of  $4d$  and  $5d$  series of transition elements have nearly same atomic radii.

**Reason :** Atomic and ionic radii for transition elements are smaller than their corresponding  $s$ -block elements.

- (a) Both Assertion and Reason are correct and Reason is a correct explanation of the Assertion.  
 (b) Both Assertion and Reason are correct but Reason is not the a correct explanation of the Assertion.  
 (c) Assertion is correct but Reason is incorrect.  
 (d) Both the Assertion and Reason are incorrect.

**Ans :** (b) Both Assertion and Reason are correct but Reason is not the a correct explanation of the Assertion.

It is due to lanthanide contraction.

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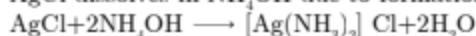
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15. **Assertion :** AgCl dissolves in  $\text{NH}_4\text{OH}$  solution.  
**Reason :** Due to formation of a complex.
- (a) Both Assertion and Reason are correct and Reason is a correct explanation of the Assertion.  
 (b) Both Assertion and Reason are correct but Reason is not the a correct explanation of the Assertion.  
 (c) Assertion is correct but Reason is incorrect.  
 (d) Both the Assertion and Reason are incorrect.

**Ans :** (a) Both Assertion and Reason are correct and Reason is a correct explanation of the Assertion.

AgCl dissolves in  $\text{NH}_4\text{OH}$  due to formation of complex.



16. **Assertion :** Nitration of aniline can be conveniently done by protecting the amino group by acetylation.  
**Reason :** Acetylation increases the electron-density in the benzene ring.
- (a) Both Assertion and Reason are correct and Reason is a correct explanation of the Assertion.  
 (b) Both Assertion and Reason are correct but Reason is not the a correct explanation of the Assertion.  
 (c) Assertion is correct but Reason is incorrect.  
 (d) Both the Assertion and Reason are incorrect.

**Ans :** (c) Assertion is correct but Reason is incorrect.

Acetylation decreases the electron density in the benzene ring thereby preventing oxidation.

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## SECTION-B

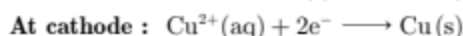
**Directions (Q. No. 17-21) :** This section contains 5 questions with internal choice in two questions. The following questions are very short answer type and carry 2 marks each.

17. Write down the half cell reaction and cell reaction for the Daniel cell.

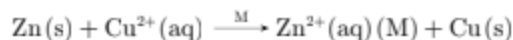


**Ans :**

**Half cell reactions :**



**Cell reaction :**



18. What is denaturation of alcohol?

**Ans :**

The commercial alcohol is made unfit for drinking by mixing in it some copper sulphate (to give it a colour) and pyridine (a foul smelling liquid). It is known as **denaturation** of alcohol.

19. Write two main functions of carbohydrates in plants.

**Ans :**

Two main functions of carbohydrates in plants are as follows :

- (i) Structural material for plant cell wall e.g. cellulose.  
 (ii) Reserve food material in plant e.g. starch.

20. How will rate of a reaction change when  $[A]_0$  is doubled and tripled for

1. zero order reaction.  
 2. second order reaction ?

**Ans :**

When  $[A]_0$  is doubled

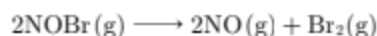
1. the rate of zero order reaction remains unchanged.  
 2. the rate of second order reaction becomes four times.

When  $[A]_0$  is tripled

1. the rate of zero order reaction remains unchanged.  
 2. the rate of second order reaction becomes 9 times.

**or**

State the order with respect to each reactant and overall order for the following reaction—



$$\text{Rate} = k[\text{NOBr}]^2$$

What are the units of rate constant ?

**Ans :**

$$\text{Order w.r.t. NOBr} = 2$$

$$\text{Overall order} = 2$$

$$\text{Units of rate constant} = \text{mol}^{-1}\text{L s}^{-1}$$

21. Why is it not possible to measure the single electrode potential ?

**Ans :**

It is not possible to measure single electrode potential because the half cell containing single electrode cannot exist independently, as charge cannot flow on its own in a single electrode. Thus, another electrode is needed to complete the electric circuit which is called reference electrode.

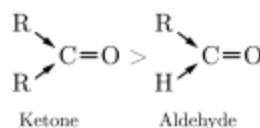
## SECTION-C

**Directions (Q. No. 22-28) :** This section contains 5 questions with internal choice in two questions. The following questions are short answer type and carry 3 marks each.

22. Why aldehydes are more reactive than ketones ?

**Ans :**

1. +I effect is more in ketones as compared to aldehydes



2. Steric hindrance is more in ketones than aldehydes. Because reactivity decreases with increase in +I effect and steric hindrance therefore aldehydes are more reactive than ketones.

23. What are the fuel cells? How are they different from galvanic cells? Give the construction of  $H_2$ ,  $O_2$  fuel cell?

**Ans :**

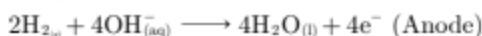
A fuel cell is a galvanic cell in which the chemical energy of fuel-oxidant system is converted directly into electrical energy.

→ Conventional Galvanic cell converts chemical energy into electrical energy by spontaneous redox reactions.

→ Fuel cell convert energy of combustion of fuels like hydrogen, methane etc., into electrical energy. These cause less pollution.

$H_2 - O_2$  fuel cell : In this cell, hydrogen and oxygen are bubbled through porous carbon electrodes into Conc. NaOH solution. Electrodes are embedded with suitable catalysts.

The electrode reactions are :



**Overall reaction :**



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24. For  $M^{2+}/M$  and  $M^{3+}/M^{2+}$  systems,  $E^\circ$  values for some metals are as follows :

$$Cr^{2+}/Cr = -0.9 \text{ V}$$

$$Cr^{3+}/Cr^{2+} = -0.4 \text{ V}$$

$$Mn^{2+}/Mn = -1.2 \text{ V}$$

$$Mn^{3+}/Mn^{2+} = +1.5 \text{ V}$$

$$Fe^{2+}/Fe = -0.4 \text{ V}$$

$$Fe^{3+}/Fe^{2+} = +0.8 \text{ V}$$

Use this data to comment upon:

- the stability of  $Fe^{3+}$  in acid solution as compared to that of  $Cr^{3+}$  and  $Mn^{3+}$ .
- the ease with which iron can be oxidised as compared to a similar process for either chromium or manganese metal.

**Ans :**

- Standard reduction potential of  $Cr^{3+}$  is negative i.e.,  $E^\circ_{Cr^{3+}/Cr^{2+}} = 0.4 \text{ V}$ . It can not be reduced to  $Cr^{2+}$ . Hence it is most stable  $E^\circ_{Mn^{3+}/Mn^{2+}} = +1.5 \text{ V}$ ; large positive value,  $Mn^{3+}$  can be easily reduced to  $Mn^{2+}$ . Hence it is least stable.

$E^\circ_{Fe^{3+}/Fe^{2+}} = +0.8 \text{ V}$ ; Small positive. Hence  $Fe^{3+}$  is more stable than  $Mn^{3+}$  but less stable than  $Cr^{3+}$ .

- Oxidation potential of Mn, Cr, Fe will be +0.9 V, +1.2

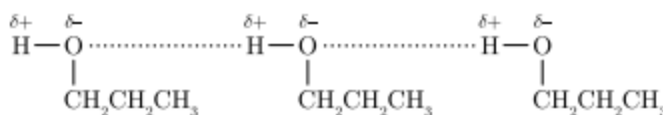
V and +0.4 V respectively. Thus, the order of getting oxidized will be



25. Explain why propanol has higher boiling point than that of the hydrocarbon, butane?

**Ans :**

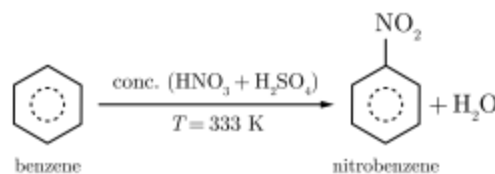
The molecules of butane are held together by weak Van der Waals forces of attraction while those of propanol are held together by stronger intermolecular hydrogen bonding.



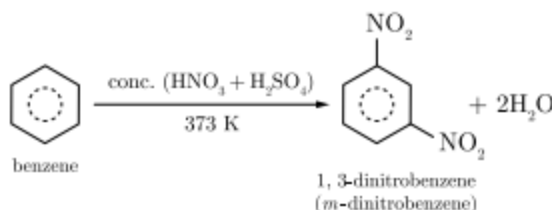
26. Describe method of nitration of benzene.

**Ans :**

When nitrated with a mixture of conc.  $HNO_3$  and conc.  $H_2SO_4$  at a temperature below 333 K ( $60^\circ C$ ) gives nitrobenzene.



But, if the temperature is raised to 373 K ( $100^\circ C$ ), *m*-dinitrobenzene is formed.



27. What are Carbohydrates ? Give the classification of carbohydrates.

**Ans :**

Carbohydrates are optically active polyhydroxy aldehydes or polyhydroxy ketones or substances which give these on hydrolysis. Carbohydrates are also known as Saccharides.

**Classification :** Carbohydrates are classified on the basis of their behaviour on hydrolysis. They have been broadly divided into following three groups.

- Monosaccharides :** The simplest carbohydrates that can not be hydrolysed further to give simple unit of polyhydroxy aldehyde or ketone are called Monosaccharides. About 20 monosaccharides are known to occur in nature.

**Examples :** glucose, fructose, ribose etc.

- (ii) **Oligosaccharides** : Carbohydrates which on hydrolysis give 2 to 10 monosaccharides units are called oligosaccharides. They are further classified as disaccharides, trisaccharides, tetrasaccharides etc. depending upon the number of monosaccharides.

**Examples** : sucrose, maltose etc.

- (iii) **Polysaccharides** : Carbohydrates which give a large number of monosaccharides are called polysaccharides. Their general formula is  $(C_6H_{10}O_5)_n$  where  $n = 100 - 3000$ .

**Examples** : starch, cellulose, glycogen, gums etc.

Polysaccharides are not sweet in taste, hence they are called non-sugars. All the monosaccharides and oligosaccharides are soluble in water and sweet in taste, they are called sugars.

or

- (i) What are vitamins?  
 (ii) How are vitamins classified? Name the vitamin responsible for coagulation of blood?

**Ans :**

- (i) Vitamins are organic compounds required in the diet in small amounts to perform specific biological functions for normal maintenance of optimum growth and health of the organism.  
 (ii) Vitamins are classified into two groups depending upon their solubility in water or fat.  
 (a) **Fat Soluble Vitamins** : Vitamins, A, D, E, K are soluble in fat and oils but insoluble in water. They are stored in liver and adipose (fat storing) tissues.  
 (b) **Water Soluble Vitamins** : B group vitamins and vitamin C are soluble in water. Water soluble vitamins must be supplied regularly in diet because they are readily excreted in urine and can not be stored (except vit  $B_{12}$ ) in our body.

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28. Give the IUPAC names of the following:

- (i)  $Cl - CH_2C \equiv C - CH_2 - Br$   
 (ii)  $CH_3CH_2CH(CH_3)CH(C_2H_5)Cl$

**Ans :**

- (i) 1-Bromo-4-chlorobut-2-yne  
 (ii) 3-chloro-4-methylhexane

## SECTION-D

**Directions (Q. No. 29-30)** : The following questions are case-based questions. Each question has an internal choice and carries 4 marks each. Read the passage carefully and answer the questions that follow.

29. The stability of complex in solution refers to degree of association between the two species involved in the state of equilibrium. The magnitude of the equilibrium constant (stability or formation) for the association, quantitatively expresses the stability. If complex is formed in steps then

the stepwise and overall stability constant is related as follows—

$$\beta_n = k_1 \times k_2 \times k_3 \times k_4 \dots k_n$$

The addition of four amine groups to copper shows a pattern found for most formation constants, in which the successive stability constant decreases. The instability constant or the dissociation constant of coordination compound is defined as reciprocal of formation constant  $\beta_4$ .

**Table : Stability Constants of Some Complexes**

	Complex	Stability Constant ( $\beta$ )
1.	$[Cu(NH_3)_4]^{2+}$	$4.5 \times 10^{11}$
2.	$[Cu(CN)_4]^{2-}$	$2.0 \times 10^{27}$
3.	$[Ag(NH_3)_2]^+$	$1.6 \times 10^7$
4.	$[Co(NH_3)_6]^{3+}$	$5.0 \times 10^{33}$
5.	$[Ag(CN)_2]^-$	$5.4 \times 10^{18}$
6.	$[Ni(NH_3)_6]^{2+}$	$6.1 \times 10^{18}$
7.	$[Ni(en)_3]^{2+}$	$4.6 \times 10^{18}$
8.	$[Fe(CN)_6]^{3-}$	$1.2 \times 10^{31}$
9.	$[Fe(CN)_6]^{4-}$	$1.8 \times 10^6$
10.	$[Cd(NH_3)_4]^{2+}$	$1.0 \times 10^7$

According to the given paragraph, answer the following questions :

- (a) Why is stability constants of cyanides are higher than complexes with  $NH_3$  as a ligand?  
 (b) Which of the complexes given in table is least stable? Why?  
 (c) (i) Why is  $[Fe(CN)_6]^{3-}$  is more stable than  $[Fe(CN)_6]^{4-}$ ?  
 (ii) Why is  $[Ag(NH_3)_2]^+$  is less stable than  $[Cu(NH_3)_4]^{2+}$ ?

or

- (d) Calculate the overall complex dissociation equilibrium constant for the  $[Cu(NH_3)_4]^{2+}$  ion, given that for this complex  $\beta_4 = 2.0 \times 10^{13}$ .

**Ans :**

- (a) It is because  $CN^-$  is stronger than  $NH_3$ .  
 (b)  $[Fe(CN)_6]^{4-}$  because it has least value of stability constant,  $Fe^{2+}$  gets oxidised to  $Fe^{3+}$  in presence of air.  
 (c) (i) It is because  $Fe^{3+}$  is smaller than  $Fe^{2+}$  and has higher charge, therefore, forms more stable complex.  
 (ii) It is because  $Ag^+$  is bigger than  $Cu^{2+}$  and has coordination number 2.

or

- (d)  $K(\text{Dissociation constant}) = \frac{1}{\beta_4} = \frac{1}{2.0 \times 10^{13}} = 5 \times 10^{-13}$

30. The vapour pressure of solvent is lowered by the presence of non-volatile solute and this lowering of vapour pressure is governed by Raoult's law, according to which 'the relative lowering of vapour pressure of the solvent over a solution is equal to mole fraction of solute present in the solution. However in a binary solution if both components are volatile then another form of Raoult's law is used. The partial vapour pressure of each component is directly proportional to their mole fractions and  $p_{total} = p_1^0 x_1 + p_2^0 x_2$ .

Solutions which obey Raoult's law over the entire range of concentration are called ideal solutions. Two types of deviations from Raoult's law are observed, positive and negative by non-ideal solution depending upon interaction between the components. Azeotropes are formed due to very large deviations from Raoult's law.

Read the passage and answer the following questions:

- (a) What type of solution is formed by ethanol and water?  
 (b) What type of solution is formed by benzene and toluene?  
 (c) The vapour pressure of pure 'A' and 'B' are 450 mm and 700 mm Hg respectively at 350 K. What are the mole fraction of 'A' and 'B' in vapour phase, if total pressure on mixing is 600 mm.

or

- (d) Calculate the mass of solute (non-volatile) with molar mass 40 g/mol which must be dissolved in 114 g octane to reduce its vapour pressure to 80%.

Ans :

- (a) They form non-ideal solution showing positive deviation.  
 They form minimum boiling azeotropes.  
 (b) They will form ideal solution.

$$(c) p_A^\circ x_A + p_B^\circ (1 - x_A) = 600 \text{ mm}$$

$$450x_A + 700(1 - x_A) = 600$$

$$450x_A - 700x_A = 600 - 700 = -100$$

$$-250x_A = -100$$

$$x_A = 0.4,$$

$$x_B = 0.6 \text{ in liquid phase}$$

$$p_A = p_A^\circ x_A = 450 \times 0.4 = 180 \text{ mm}$$

$$p_B = p_B^\circ x_B = 700 \times 0.6 = 420 \text{ mm}$$

$$y_A = \frac{p_A}{p_A + p_B} = \frac{180}{180 + 420} = \frac{180}{600}$$

or

$$(d) \frac{p_A^\circ - p_A}{p_A^\circ} = x_B$$

$$\frac{100 - 80}{100} = \frac{\frac{W_2}{M_2}}{\frac{W_1}{M_1} + \frac{W_2}{M_2}}$$

$$\frac{20}{100} = \frac{\frac{W_2}{40}}{\frac{W_2}{40} + \frac{114}{114}}$$

$$W_B = 10 \text{ g}$$

## SECTION-E

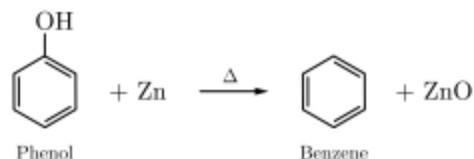
**Directions (Q. No. 31-33) :** The following questions are long answer type and carry 5 marks each. Two questions have an internal choice.

31. Write chemical reactions of following :

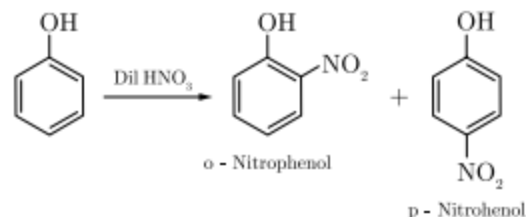
1. Phenol with zinc dust.
2. Electrophilic aromatic substitution of phenol.

Ans :

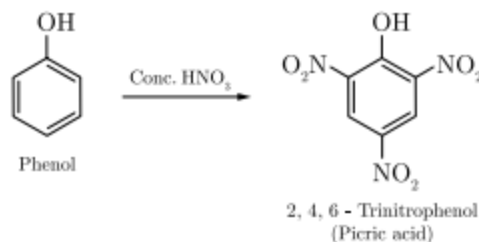
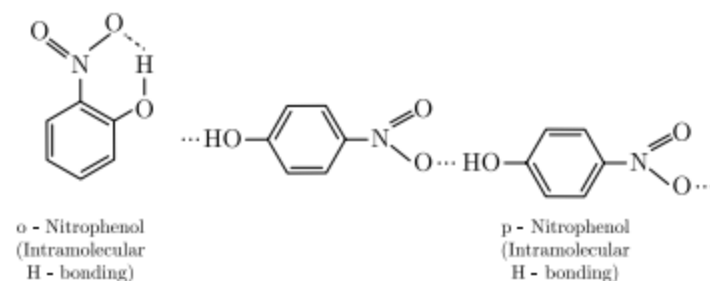
1. Reaction with Zinc dust



2. Electrophilic aromatic substitution



The ortho and para isomers can be separated by steam distillation. O-Nitrophenol is steam volatile due to intramolecular hydrogen bonding while p-nitrophenol is less volatile due to intermolecular hydrogen bonding which cause the association of molecules.



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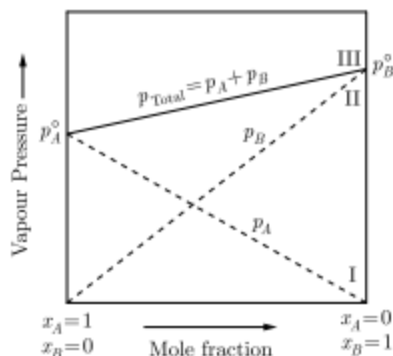
32. State the Explain :

1. Raoult's law for volatile solute.
2. Raoult's law for non-volatile solute.

Ans :

1. **Raoult 's law for volatile solute :**

In a solution, the vapour pressure of a component at a given temperature is directly proportional to its mole fraction. For example, if we have two miscible liquids A and B then



$$P_A \propto x_A \text{ or } P_A = P_A^0 \times x_A$$

$$P_B \propto x_B \text{ or } P_B = P_B^0 \times x_B$$

Where  $x_A$  and  $x_B$  are mole fractions of A and B respectively,  $P_A^0$  and  $P_B^0$  are vapour pressure of A and B respectively in pure state.

If  $P_s$  is total vapour pressure of the solution at some temperature then according to Dalton's Law of partial pressure.

$$P_s = P_A + P_B$$

$$P_s = P_A^0 x_A + P_B^0 x_B$$

$$= P_A^0(1 - x_B) + P_B^0 x_B$$

$$= P_A^0 + (P_B^0 - P_A^0) x_B$$

A plot of  $P_A$  and  $P_B$  against  $x_A$  or  $x_B$  for a solution is a straight line (line I and line II) and total vapour pressure of solution is shown by line III.

2. **Raoult's law for non-volatile solute :**

If the solute B is non-volatile it will not contribute to total vapour pressure of the solution. Therefore, vapour pressure of solution = vapour pressure of the solvent, A in solution

$$P_s = x_A \times P^0 \quad \dots(1)$$

Where  $p_s$  is vapour pressure of solution,  $x_A$  is mole fraction of solvent in solution and  $p^0$  is the vapour pressure of the pure solvent. A plot between vapour pressure and mole fraction of solvent at constant temperature is a straight line eq (1) can be written as

$$\frac{p_s}{p^0} = x_A \text{ (here } x_A = \frac{n_A}{n_A + n_B} \text{)}$$

$$\frac{p_s}{p^0} = \frac{n_A}{n_A + n_B}$$

Subtracting each side from 1, we get

$$1 - \frac{p_s}{p^0} = 1 - \frac{n_A}{n_A + n_B} \text{ or } \left( \frac{p^0 - p_s}{p^0} = \frac{n_B}{n_A + n_B} \right)$$

The relative lowering of vapour pressure of solution containing a non volatile solute is equal to the mole fraction of the solute in the solution.

or

Give the difference between ideal and non-ideal solutions.

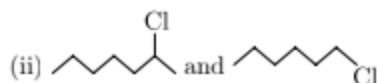
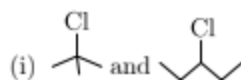
Ans :

	Ideal Solutions	Non-ideal Solutions
1.	The interaction between the components are similar to those in the pure components.	The interactions between the components are different from those of the pure components.
2.	There is no volume change and enthalpy change on mixing the components ( $\Delta V = 0, \Delta H = 0$ )	$\Delta V \neq 0, \Delta H \neq 0$ on mixing the components.
3.	Each components obey Raoult's law at all temperature and concentrations i.e., $P_A = x_A P_A^0$ $P_B = x_B P_B^0$	They do not obey Raoult's law. They show positive or negative deviations from Raoult's law i.e., $P_A \neq x_A P_A^0$ $P_B \neq x_B P_B^0$
4.	They do not form azeotropes eg. Benzene + Toluene n - Hexane + n-Heptane Bromoethane + Chloroethane.	They form azeotropes eg. Methyl alcohol + chloroform chloroform + Acetone.

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33. In the following pairs of halogen compounds which compound undergo faster  $S_N1$  reaction ?




Ans :

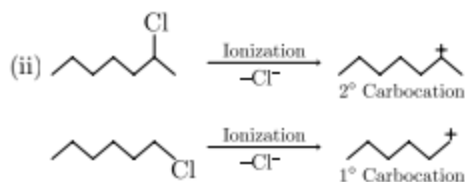
(i) on ionization gives  $3^\circ$  carbocation




on ionization gives  $2^\circ$  carbocation



Since  $3^\circ$  carbocations are more stable than  $2^\circ$  carbocation, therefore  will react fast in  $S_N1$  reaction.



Since  $2^\circ$  carbocation are more stable than  $1^\circ$  carbocation therefore  will react faster in  $S_N1$  reaction.

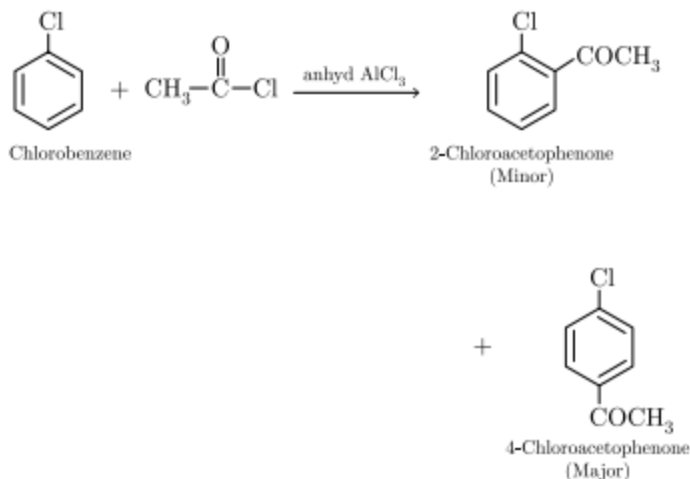
or

Write the following reaction :

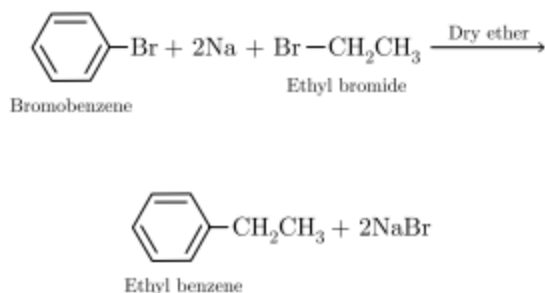
- (i) Friedel-Crafts acylation.
- (ii) Wurtz-Fitting reaction.
- (iii) Dow's process.
- (iv) Ullmann biaryl synthesis.

Ans :

(i) **Friedel-Crafts Acylation :**



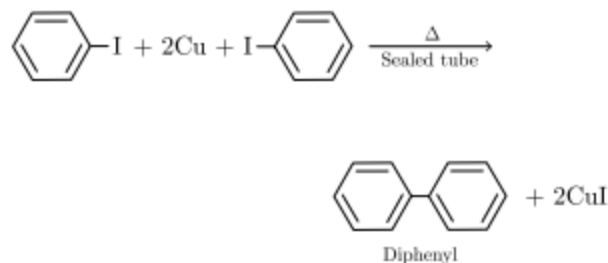
(ii) **Wurtz-Fitting Reaction :**



(iii) **Dow's Process :**



(iv) **Ullmann Biaryl Synthesis :** (Reaction with Cu powder of Iodobenzene) When an iodobenzene is heated with Cu powder in a sealed tube, diaryl is formed.



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