

**XIITH FIRST REVISION EXAMINATION
CHEMISTRY
ANSWER KEY - 2025 DINDIGUL DISTRICT**

PART -A

I. CHOOSE THE CORRECT ANSWER.

(15 x 1 =15)

1. In the electrolytic refining of copper, which one of the following is used as anode?

- a) Carbon rod b) Pure Copper c) Platinum electrode **d) Impure copper**

2. Carbon atoms in fullerene with formula C_{60} have _____ hybridization

- a) sp^2** b) sp^3 c) sp^3d d) sp

3. Among the following, which is the strongest oxidizing agent?

- a) Cl_2 **b) F_2** c) Br_2 d) I_2

4. The magnetic moment of Mn^{2+} ion is

- a) 5.92BM** b) 2.80BM c) 8.95BM d) 3.90BM

5. Which one of the following complex compound have Co-ordination number 6

- a) $[Co(en)_2Cl_2]$ b) $[Cu(NH_3)_2Cl_2]$ c) $[Co(NH_3)_5Cl]^{2+}$ **d) Both (a) and (c)**

6. The cation leaves its normal position in the crystal and moves to some interstitial position, the defect in the crystal is known as

- a) Schottky defect b) F center
c) Frenkel defect d) non-stoichiometric defect

7. The addition of a catalyst during a chemical reaction alters which of the following quantities?

- a) Enthalpy **b) Activation energy** c) Entropy d) Internal energy

8. The pH of 10^{-5} M KOH solution will be

- a) 9** b) 5 c) 19 d) None of these

9. The Anode used in the Lithium- ion battery is

- a) CoO_2 b) Li **c) Porus graphite** d) Spongy lead

10. Hair cream is

- a) sol. b) gel c) emulsion d) solid sol

11. Which of the following compound can be used as antifreeze in automobile radiators?

- (a) methanol (b) ethanol (c) Glycerol **(d) Ethylene glycol**

d) Wolf Kishner reaction

d) yellow

d) Vitamins

d) molecular targets

II ANSWER ANY 6 QUESTIONS (Q.NO:24 IS COMPULSORY).

Ostwald's dilution law relates the dissociation constant of the weak acid (K_a) with its degree of dissociation (α) and the concentration (c).

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

α = degree of dissociation, K_a = dissociation constant, C = concentration

20. Why are lyophilic colloidal sols are more stable than lyophobic colloidal sols?

In lyophilic colloidal sols, definite attractive force exists between dispersion medium and dispersed phase. **E.g.: sols of starch.**

In lyophobic colloidal sols, no attractive force exists between the dispersed phase and dispersion medium. **E.g.: sols of gold, silver.**

Hence, lyophilic colloidal sols are more stable than lyophobic colloidal sol.

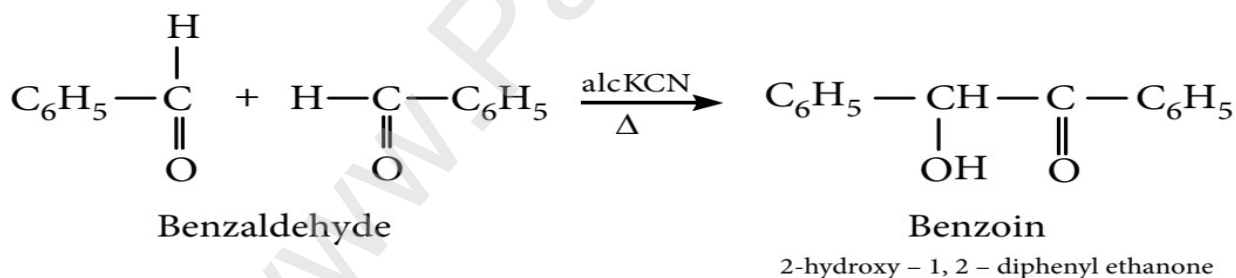
21. Give the uses of Diethyl ether.

- Diethyl ether is used as a surgical anaesthetic agent in surgery.
- It is a good solvent for organic reactions and extraction.
- It is used as a refrigerant

22. Write a note on Benzoin condensation.

The Benzoin condensation involves the treatment of an aromatic aldehyde with aqueous alcoholic KCN. The products are a hydroxy ketone.

Ex. Benzaldehyde reacts with alcoholic KCN to form benzoin



23. What are food preservatives?

- Preservatives are capable of inhibiting or arresting the process of fermentation or other decomposition of food by growth of microorganisms
- Acetic acid - preparation of pickles
- Sodium metabisulphite - preservatives for fresh vegetables and fruits

24. Write the IUPAC name for the following.

a) $\text{C}_2\text{O}_4^{2-}$ - Oxalato

b) en - ethylenediamine

c) H₂O - aquad) Cl⁻ - chlorido**PART - III****III ANSWER ANY 6 QUESTIONS (Q.NO:33 IS COMPULSORY).****25. Why HF cannot be stored in glass bottles?**

- HF is highly reactive with silicates and silica, dissolving glass by forming volatile SiF₄
- $\text{SiO}_2 + 4\text{HF} \rightarrow \text{SiF}_4 + 2\text{H}_2\text{O}$
- This property makes HF unique compared to other acids and requires it to be stored in plastic containers.

26. Write the Chromyl Chloride test.

- When potassium dichromate is heated with any chloride salt in the presence of Conc H₂SO₄, orange red vapours of chromyl chloride (CrO₂Cl₂) is evolved.
- This reaction is used to confirm the presence of chloride ion in inorganic qualitative analysis.

**27. What is linkage isomerism? Explain with example.**

This type of isomers arises when an ambidentate ligand is bonded to the central metal ion through either of its two different donor atoms.



(Nitro)



(Nitrito)

28. Write a note on the Frenkel defect.

- Arises due to dislocation of ions from its crystal lattice
- The ion which is missing from the lattice point occupies an interstitial position
- This defect found in ionic solids in which size of anion and cation differ
- Does not affect the density of crystal
- Ex : AgBr (Br larger size)

29. State Faraday's Laws of electrolysis.**First Law:**

The mass of the substance (m) liberated at an electrode during electrolysis is directly proportional to the quantity of charge (Q) passed through the cell.

$$m \propto Q$$

$$m = Z It$$

Where, m – mass of the substance, Z- electro chemical equivalent of the substance, I- current in Ampere & t- time in sec.

Faraday's Second Law

When the same quantity of charge is passed through the solutions of different electrolytes, the amount of substances liberated at the respective electrodes are directly proportional to their electrochemical equivalents.

$$m \propto Z$$

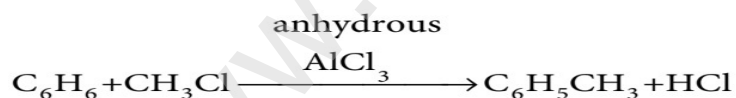
Where, m – mass of the substance & Z- electro chemical equivalent of the substance

30. Explain intermediate compound formation theory of catalysis with an example.

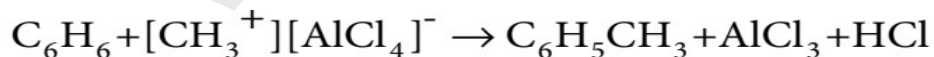
- According to this theory, the catalyst first forms an intermediate compound with one of the reactants.
- The compound is formed with less energy consumption than needed for the actual reaction.
- The intermediate compound being unstable combines with other reactant to form the desired product and the catalyst is regenerated

Example 1

- The mechanism of Friedel crafts reaction is given below

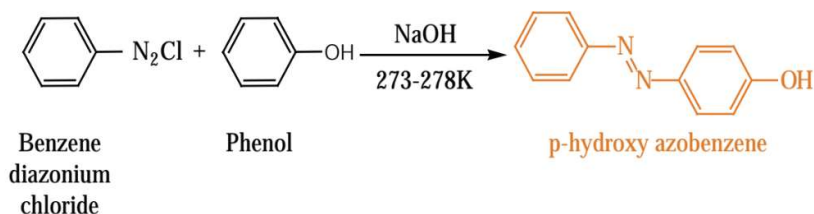


The action of catalyst is explained as follows



31. Give the coupling reaction of Phenol.

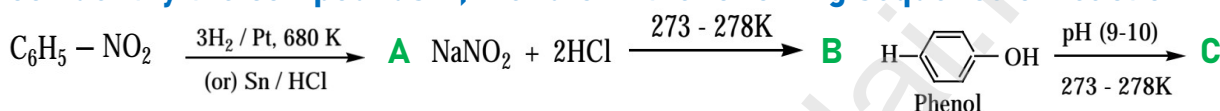
Phenol couples with benzene diazonium chloride in an alkaline solution to form p-hydroxy azobenzene (a red orange dye)



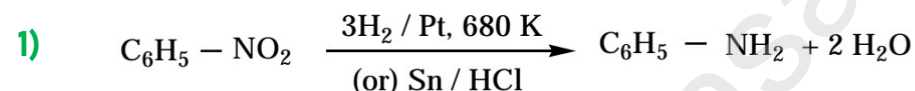
32. Write any three biological importance of lipids.

- Lipids are the integral component of cell membrane.
- The main function of triglycerides(lipids)in animals is as an energy reserve.
- They act as protective coating in aquatic organisms.
- Lipids of connective tissues give protection to internal organs.

33. Identify the compounds A, B and C in the following sequence of reaction.

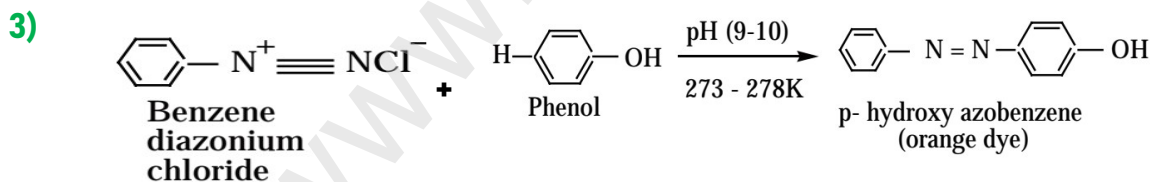
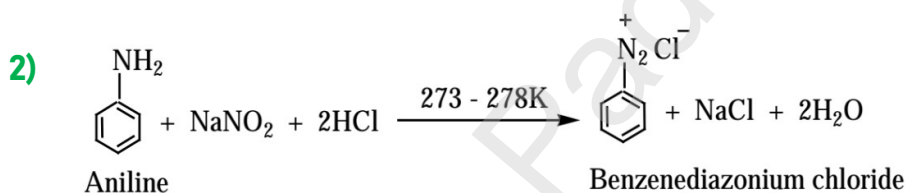


The reactions are:



Nitrobenzene

Aniline



PART-IV

V ANSWER ALL THE QUESTIONS.

34. a) Explain zone refining process with an example

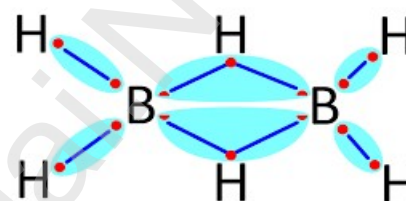
- ❖ Principle - Fractional crystallisation
- ❖ The impure metal is taken in the form of a rod
- ❖ When the metal rod is heated with mobile induction heater, the metal melts.

- ❖ The heater is slowly moved from one end to the other end, the pure metal crystallises.
- ❖ The impurity dissolves in the molten zone.
- ❖ When the heater moves the molten zone also moves.
- ❖ This process is repeated again and again to get the pure metal.
- ❖ This process is carried out in an inert gas atmosphere to prevent the oxidation of metals.
- ❖ **Eg. Silicon (Si), Germanium (Ge) and Gallium (Ga)**

[OR]

b) Describe the structure of Diborane.

- Two BH₂ units are linked by two bridged hydrogens.
- It has eight B-H bonds and 12 valence electrons
- The four terminal B-H bonds are 2c-2e bond
- The remaining four electrons have to be used for the two bridged B-H-B bonds (3C - 2e)
- In diborane, the boron is SP³ hybridised
- The bridging hydrogen atoms are in a plane
- B-H-B bond formed by overlapping the half filled hybridised orbital of one boron, the empty hybridised orbital of the other boron and the half filled s orbital of hydrogen.
- It is also called as banana bond



35. a) What is lanthanoid contraction and what are the effects of lanthanoid contraction?

As we move across 4f series, the atomic and ionic radii of Lanthanoids show gradual decrease with increase in atomic number.

This decrease in ionic size is called Lanthanoid contraction.

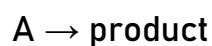
Cause of lanthanoid contraction - The shielding effect of 4f electrons are poor

Effects of lanthanoid contraction

- Size and radius of ions decreases
- Basicity decreases
- Covalent character increases
- The elements of second and third transition series resemble each other more closely.

[OR]**b) Derive integrated rate law for a first order reaction.**

A reaction whose rate depends on the reactant concentration raised to the first power is called a first order reaction.



Rate law can be expressed as

Rate = $k[A]^1$ Where, k is the first order rate constant.

$$\frac{-dA}{dt} = k[A]^1$$

$$\frac{-dA}{[A]^1} = k dt$$

Integrate the above equation between the limits of time $t = 0$ and time equal to t , while the concentration varies from the initial concentration $[A_0]$ to $[A]$ at the later time.

$$\int_{[A_0]}^{[A]} \frac{-d[A]}{dt} = k \int_0^t dt$$

$$(-\ln [A])_{[A_0]}^{[A]} = k(t)_0^t$$

$$-\ln [A] - (\ln [A_0]) = k(t - 0)$$

$$-\ln [A] + (\ln [A_0]) = k(t)$$

$$\ln \left(\frac{[A_0]}{[A]} \right) = kt$$

$$2.303 \times \log \left(\frac{[A_0]}{[A]} \right) = kt$$

$$\frac{2.303}{t} \times \log \left(\frac{[A_0]}{[A]} \right) = k$$

36. a) i) What are the Limitations of Arrhenius concept? (2)

- It does not explain the behaviour of acids and bases in non aqueous solvents like acetone, THF...
- It does not account for the basic nature of the substances like ammonia (NH₃) which do not possess OH⁻ ion

ii) Explain Common ion effect with example.

❖ When a salt of a weak acid is added to the acid itself, the dissociation of the weak acid is suppressed further.

❖ Acetic acid is a weak acid. It is not completely dissociated in aqueous solution and hence the following equilibrium exists.



❖ However, the added salt, sodium acetate, completely dissociates to produce CH₃COO⁻ and Na⁺ ions.



❖ Hence, the overall concentration of CH₃COO⁻ is increased, and the acid dissociation equilibrium is disturbed.

❖ So, in order to maintain the equilibrium, the excess CH₃COO⁻ ions combine with H⁺ ions to produce

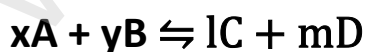
much more unionized CH₃COOH i.e., the equilibrium will shift towards the left. In other words, the dissociation of CH₃COOH is suppressed.

❖ Thus, the dissociation of a weak acid (CH₃COOH) is suppressed in the presence of a salt (CH₃COONa) containing an ion common to the weak electrolyte

[OR]

b) Derive an expression for the Nernst Equation.

Let us consider an electrochemical cell for which the overall redox reaction is,



The reaction quotient Q for the above reaction is $Q = \frac{[\text{C}]^l [\text{D}]^m}{[\text{A}]^x [\text{B}]^y}$

$$\Delta G = \Delta G^0 + RT \ln Q$$

Gibbs free energy can be related to the cell emf as follows

$$\Delta G = -nFE_{\text{cell}} \quad ; \quad \Delta G^0 = -nFE_{\text{cell}}^0$$

Substituting these values,

$$-nFE_{\text{cell}} = -nFE_{\text{cell}}^0 + RT \ln \frac{[C]^l [D]^m}{[A]^x [B]^Y}$$

Dividing by $-nF$ on both sides,

$$E_{\text{cell}} = E_{\text{cell}}^0 + RT \ln \frac{[C]^l [D]^m}{[A]^x [B]^Y}$$

$$\ln = 2.303 \log$$

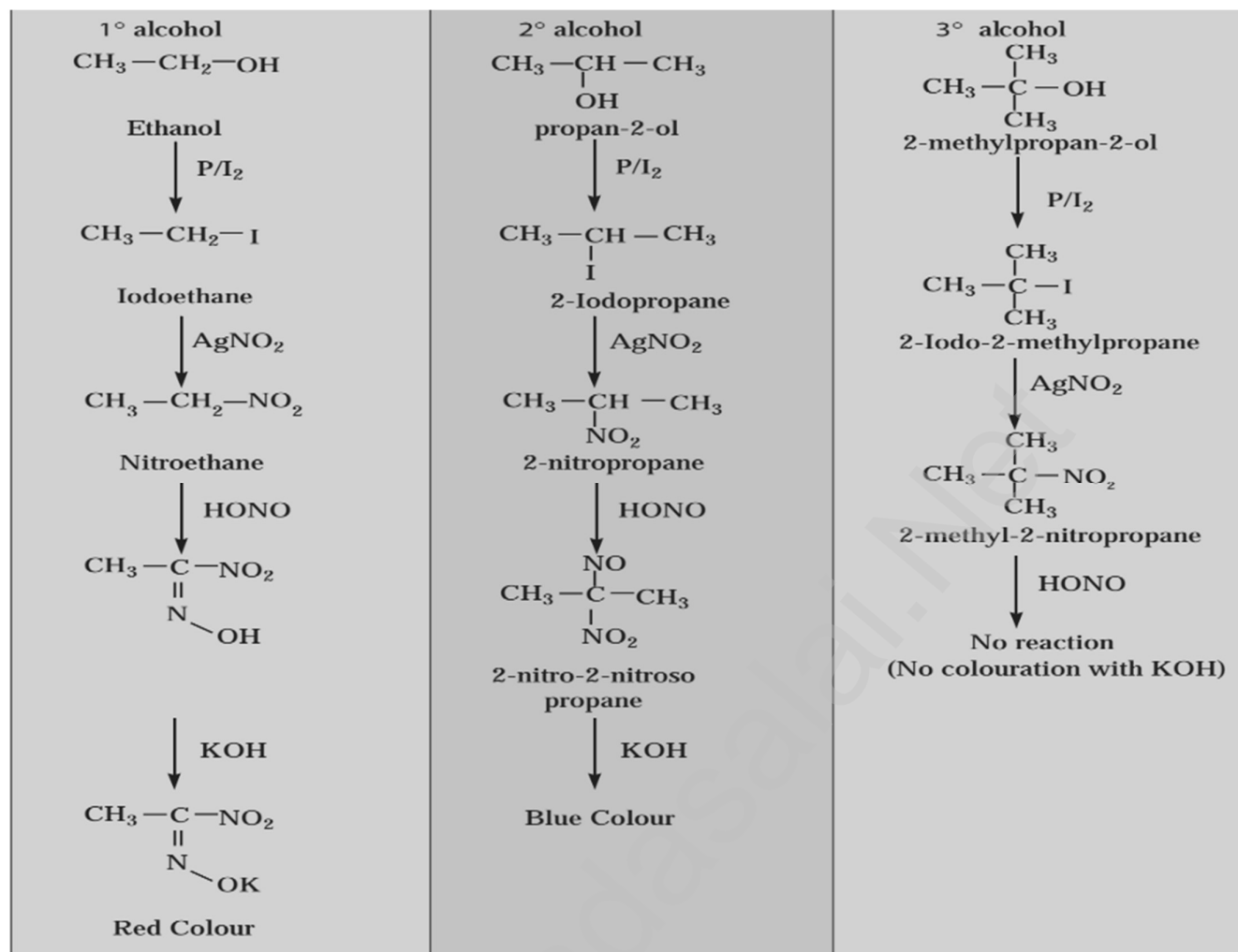
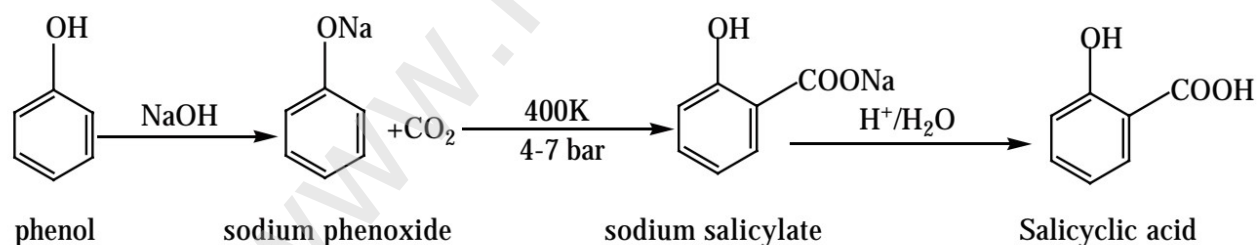
$$E_{\text{cell}} = E_{\text{cell}}^0 + 2.303 \times \frac{RT}{nF} \ln \frac{[C]^l [D]^m}{[A]^x [B]^Y}$$

The above equation is called Nernst equation.

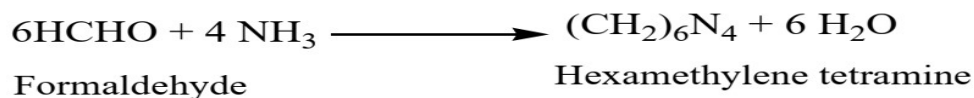
37. a) Differentiate physisorption and chemisorption

Physisorption	Chemisorption
It is instantaneous	It is very slow.
It is non-specific	It is very specific
Heat of adsorption is low	Heat of adsorption is high
Occurs at all sides	Occurs at fixed sites
No transfer of electrons	Transfer of electrons between the adsorb and adsorbate
Multilayer of the adsorbate is formed	Monolayer of the adsorbate is formed

[OR]

b) i) Differentiate 1°, 2° and 3° alcohols by Victor Meyer's test. (3)**ii) Write Kolbe's reaction.****38. a) i) What is Urotropin? How it is prepared? Mention its uses. (3)**

Formaldehyde reacts with ammonia to form hexa methylene tetramine, which is also known as Urotropin.



Uses

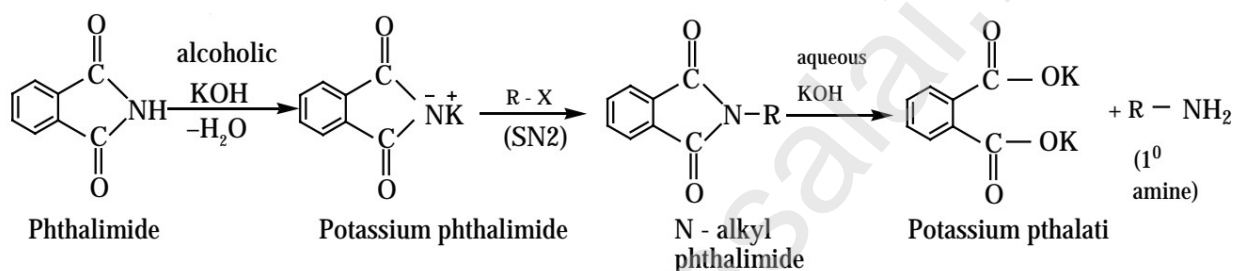
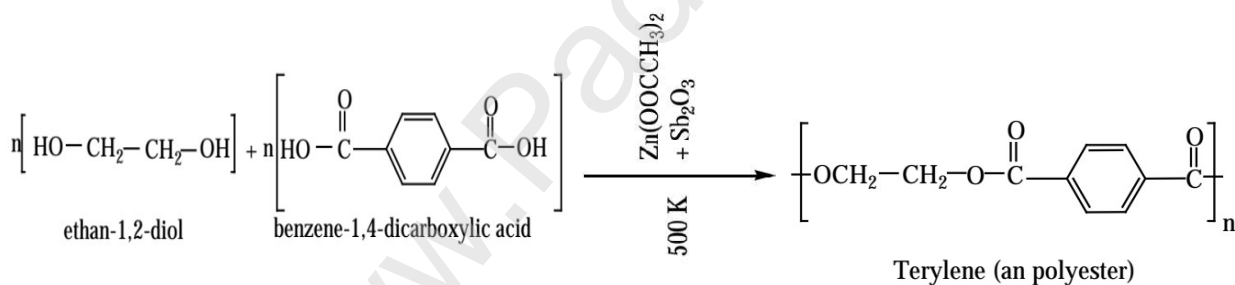
- Urotropine is used as a medicine to treat urinary infection.
- Nitration of Urotropine under controlled condition gives an explosive RDX

ii) Aniline doesnot undergo Fridel – Crafts reaction. Give reason. (2)

Aniline is basic in nature and it donates its lone pair to the lewis acid AlCl_3 to form an adduct which inhibits further the electrophilic substitution reaction

[OR]**b) i) Give short note on Gabriel Phthalimide Synthesis. (3)**

- Gabriel synthesis is used for the preparation of Aliphatic primary amines.
- Phthalimide on treatment with ethanolic KOH forms potassium salt of phthalimide which on heating with alkyl halide followed by alkaline hydrolysis gives primary amine.

**ii) How terylene is prepared? (2)**

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