

AHSEC 2015 CHEMISTRY
PATTERN CLASSES.

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Q1

- (iv) Highest O.S. in first transition series of elements \rightarrow Manganese (Mn)
- (v) Write formula for tetracarbonylnickel (0)
 $[Ni(CO)_4]$
- (vi) Mention one use of tetrachloromethane
- (vii) IUPAC name of the following
 $CH_2 = \overset{3}{CH} - \overset{2}{CH_2} - \overset{1}{CHO}$
But - 3 - en - 1 - al
- (viii) Water soluble vitamin \rightarrow B, C
Fat soluble vitamin \rightarrow D, E, K, A
Both water & fat soluble vitamin \rightarrow vit. (H)

Pattern Classes

Diphenyl

Q2

State Henry's Law. Hydrogen gas

is more soluble in water than He gas. which has higher value of k_H ?

Ans

$$P = k_H \cdot X$$

$$\Rightarrow \frac{P}{X} = k_H \quad \rightarrow X \text{ represents solubility.}$$

$$(X)_{H_2} > (X)_{He}$$

\rightarrow Higher solubility

$$\Rightarrow (k_H)_{He} > (k_H)_{H_2}$$

Lesser value of k_H

\therefore Helium gas has higher value of k_H .

Q3 Define molar conductivity of an electrolytic solution. How does molar conductivity vary with concⁿ for weak electrolyte?

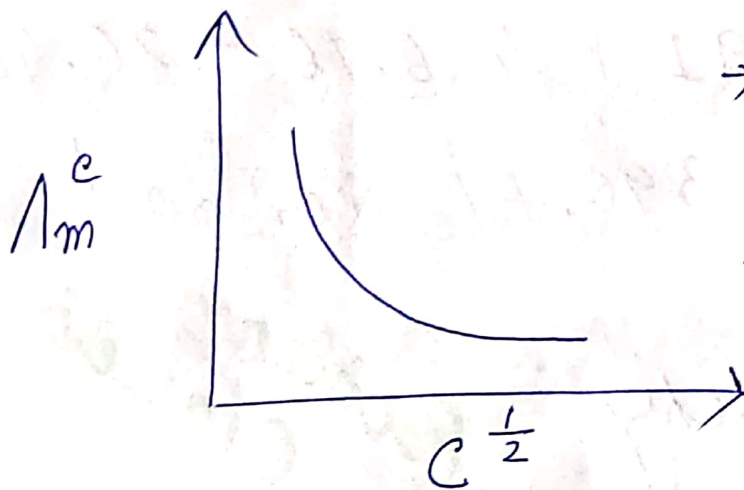
Ans Molar conductivity is defined as the conductance of all the ions that is produced by 1 mole of electrolyte

which is present in the given volume of the solution.

Mathematically,

$$\Lambda_m = \frac{1000 \kappa}{\text{Molarity}} \text{ Scm}^2 \text{ mol}^{-1}$$

For weak electrolyte,



→ At high concentration conductivity decreases

→ At low concⁿ conductivity increases

Q3
OR

Given, $\Lambda^\circ_{\text{NaCl}} = 126.45 \text{ Scm}^2 \text{ mol}^{-1}$

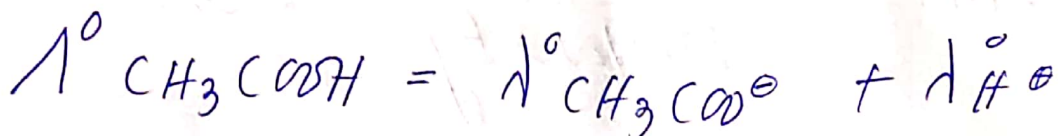
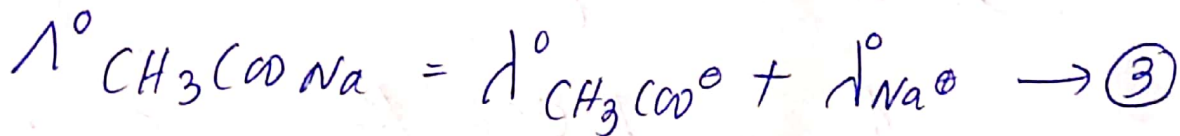
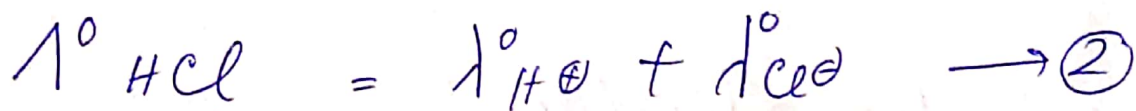
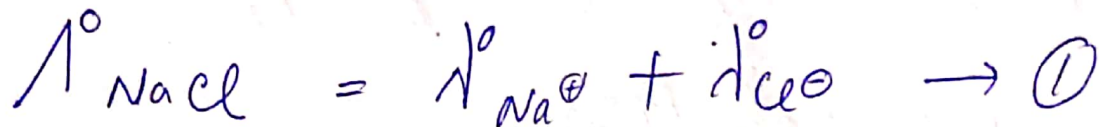
$\Lambda^\circ_{\text{HCl}} = 426.16 \text{ Scm}^2 \text{ mol}^{-1}$

$\Lambda^\circ_{\text{CH}_3\text{COONa}} = 91 \text{ Scm}^2 \text{ mol}^{-1}$

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Calculate limiting molar conductivity of acetic acid (CH_3COOH)

Q7



$$= \textcircled{3} + \textcircled{2} - \textcircled{1}$$

$$= 91 + 426.16 - 126.45$$

$$= 390.71 \text{ S cm}^2 \text{ mol}^{-1}$$

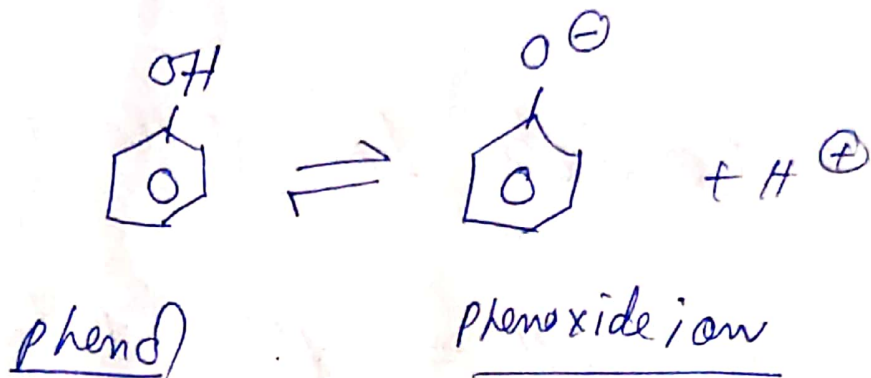
Q8

Explain why

pattern classes

- (i) Phenols are acidic in nature
- (ii) Ethers have lower boiling points than alcohols.
- (iii) Propan-2-ol is more basic than propan-1-ol

(i) Ans.



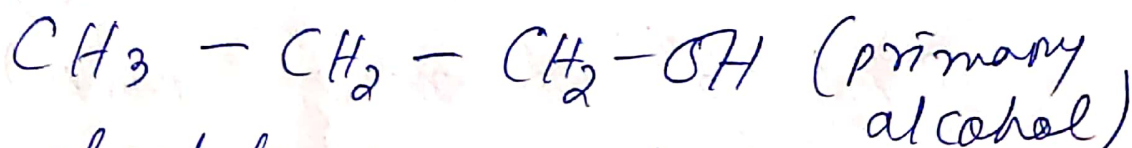
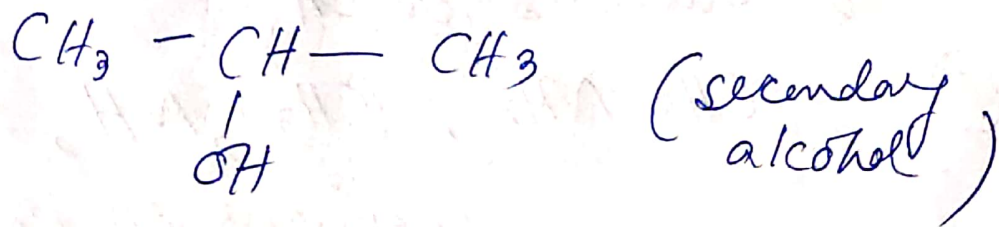
Phenol can easily release H^+ and forms phenoxide ion which is resonance stabilized. So, it is acidic in nature.

(ii) Ans.

R-OH (alcohols) can easily form hydrogen bonding with water compared to ethers (R-O-R).

Alcohols are more soluble in water and as a result, boiling point of alcohols are higher than ether.

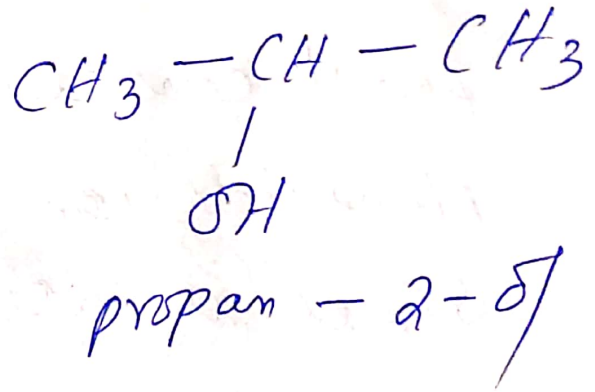
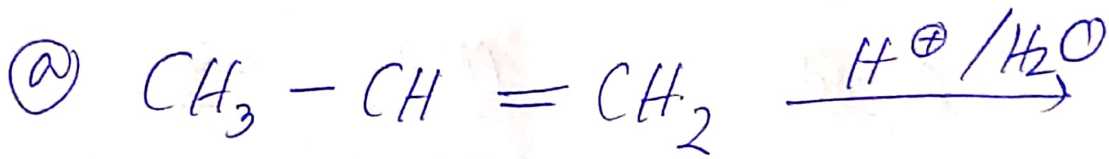
(iii) Ans.



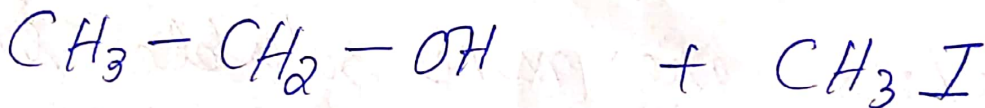
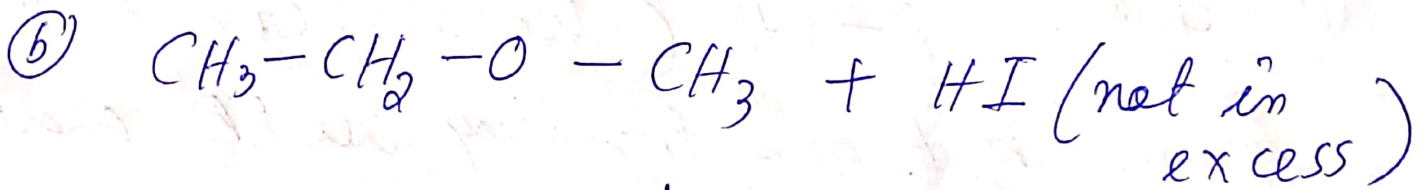
Secondary alcohols are more basic because it can release electrons easily to others.

Q9

Complete the following reactions

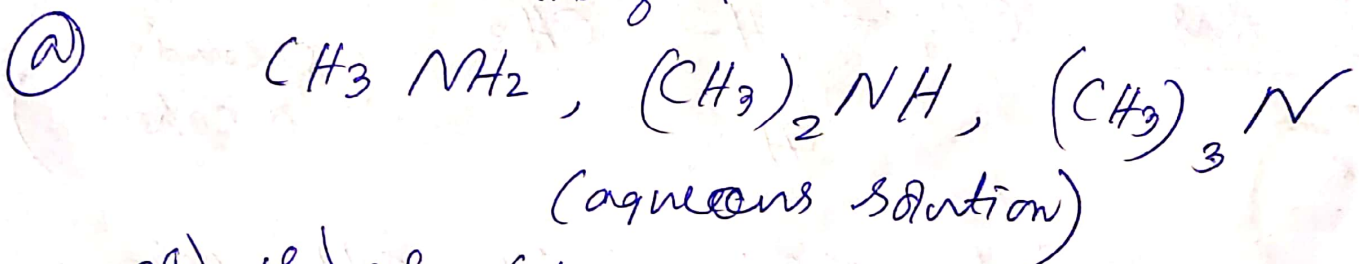


Pattern
Classes

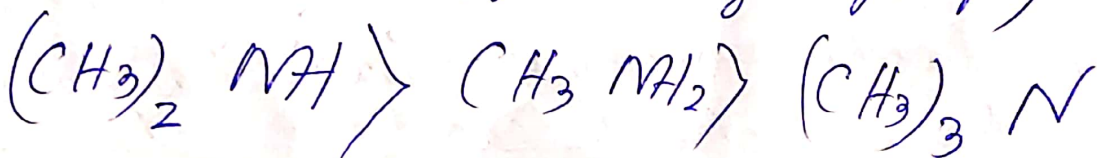


Q10

Arrange in increasing order of basic strength

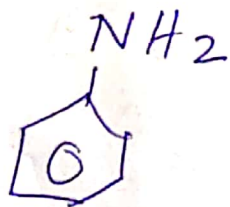


$2^\circ > 1^\circ > 3^\circ$ (for methyl group)



(b) K_b value of aniline is less than that of methyl amine. why?

Ans



aniline

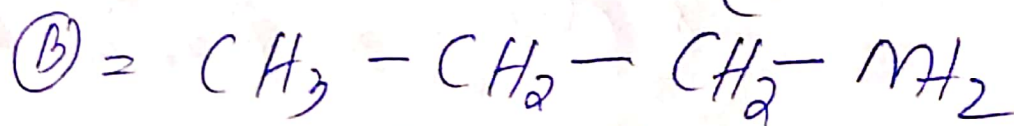
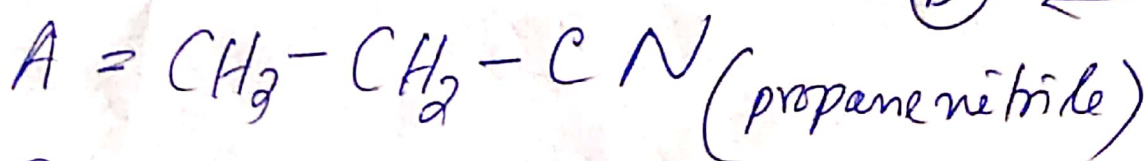
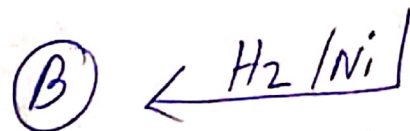


methyl amine

Methyl amine is more basic than aniline. Due to resonance, aniline can't donate electrons to others.

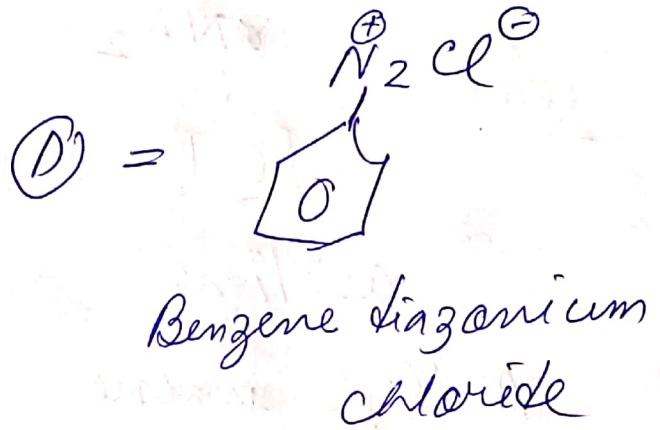
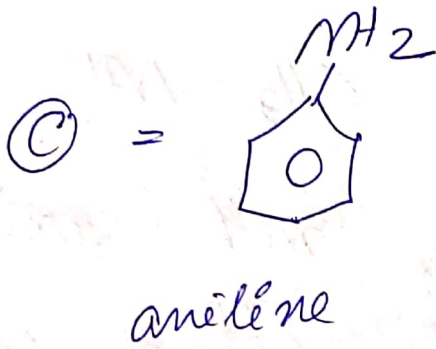
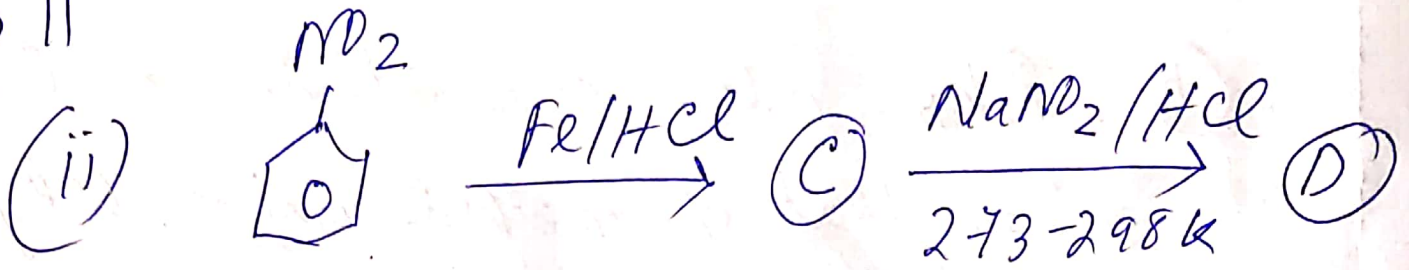
Basicity $\propto K_b \propto \frac{1}{PK_b}$

\therefore K_b value of aniline is less than that of methyl amine.



(propan-1-amine)

Q 11



Q 13
a

What is an ideal solution?

Ans: Any solution which obeys Raoult's law is called ideal solution.

$$\Delta H_{\text{mix}} = 0, \Delta V_{\text{mix}} = 0$$

(b) Urea forms an ideal solution in water. Calculate the vapour pressure of an aqueous solution containing 5% by mass of urea at 298K. At 298K, vapour pressure of water is 23.75 mm of Hg.

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(13) (b) Ans. $p^0 = 23.75$ mm of Hg
 $p = v.p.$ of solution
 solute = urea = 5 g; solvent = 95 g

$$\frac{p^0 - p}{p^0} = \frac{\text{mole of solute}}{\text{mole of solute} + \text{mole of solvent}}$$

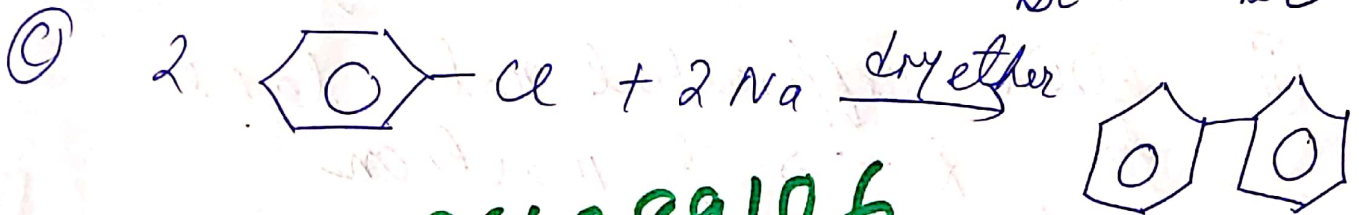
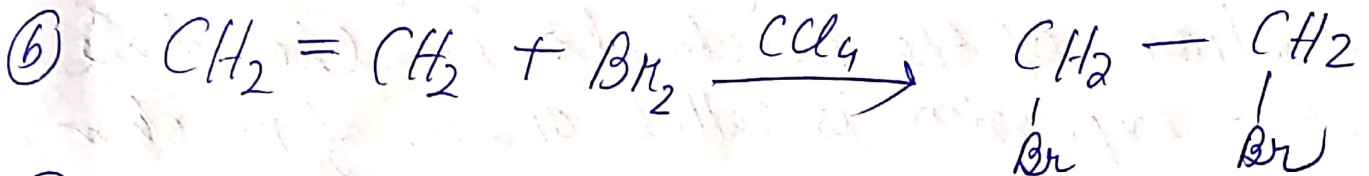
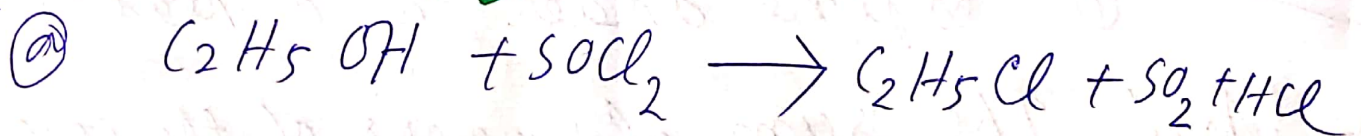
$$\Rightarrow \frac{23.75 - p}{23.75} = \frac{5/60}{5/60 + (95/18)}$$

$$\Rightarrow \frac{23.75 - p}{23.75} = \frac{0.083}{0.083 + 5.278}$$

$$\Rightarrow p = 23.38 \text{ mm of Hg}$$

Pattern
class 18

Q17



Diphenyl

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Q 20

(a) A non-narcotic analgesic
→ Aspirin

(b) An artificial sweetener
→ Saccharin

(c) A food preservative chemical
→ Common salt, NaCl

Q 21

(i) Define order of a reaction

Ans. The sum of powers of the concentration of the reactants in the rate law expression is called order of reaction

(ii) Write differential rate law for $R \rightarrow P$ reaction

Ans $-\frac{d[R]}{dt} = k[R]$

Q21

(iii)

$R \rightarrow P$, the rate becomes 4 times faster when the reactant (R) is doubled at a given temp.
What is the order of reaction?

Ans



$$R_1 = k[R]^n \rightarrow (i)$$

$$R_2 = 4R_1 = k[2R]^n \rightarrow (ii)$$

$$\frac{(i)}{(ii)} \quad \frac{R_1}{R_2} = \frac{R_1}{4R_1} = \frac{k[R]^n}{k[2R]^n}$$

$$\Rightarrow \frac{1}{4} = \frac{1}{2^n}$$

$$\Rightarrow \left(\frac{1}{2}\right)^2 = \left(\frac{1}{2}\right)^n$$

$$\Rightarrow n = 2$$

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Q21

(b) (i) Show that for 1st order kinetics

$$k = \frac{2.303}{t} \log \frac{R_0}{R_t}$$

Ans



$$\Rightarrow -\frac{d[R]}{dt} = k[R] \quad (\text{rate law})$$

$$\Rightarrow -\frac{d[R]}{[R]} = k \cdot dt$$

$$\Rightarrow \int_{R_0}^{R_t} \frac{d[R]}{[R]} = -k \int_0^t dt$$

$$\Rightarrow \ln [R]_{R_0}^{R_t} = -k \times t$$

$$\Rightarrow \ln \frac{R_t}{R_0} = -k t$$

$$\Rightarrow \ln \frac{R_0}{R_t} = k t$$

$$\Rightarrow 2.303 \log \frac{R_0}{R_t} = k t$$

$$\Rightarrow \frac{2.303}{t} \log \frac{R_0}{R_t} = k$$

Pattern classes

Q21

(b) (ii) A first order rxn takes place for 40 min for 20% decomposition. Calculate half life.

$$\text{Ans } t = \frac{2.303}{k} \log \frac{R_0}{R_t}$$

$$\Rightarrow k = \frac{2.303}{40} \log \frac{100}{100-20} \\ = 5.6 \times 10^{-3} \text{ min}^{-1}$$

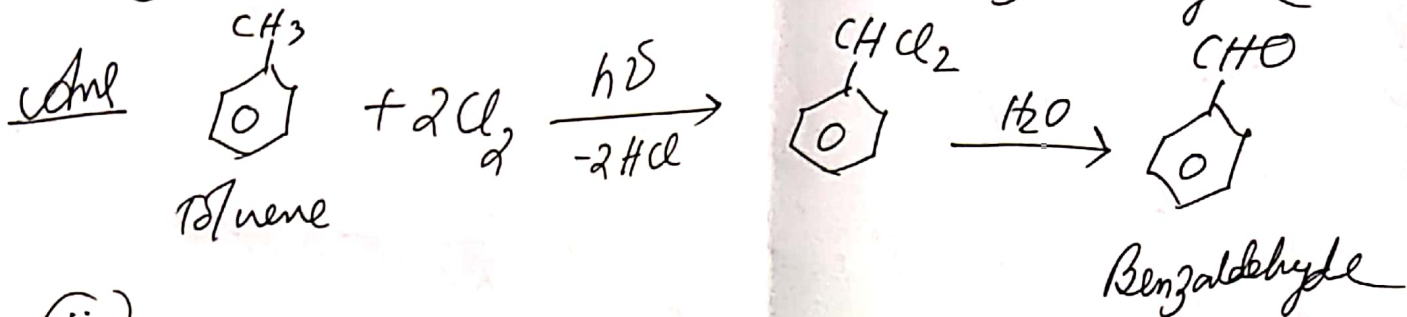
$$T_{1/2} = \frac{0.693}{k} \\ = \frac{0.693}{5.6 \times 10^{-3} \text{ min}^{-1}} \\ = 123.75 \text{ min}$$

Q22

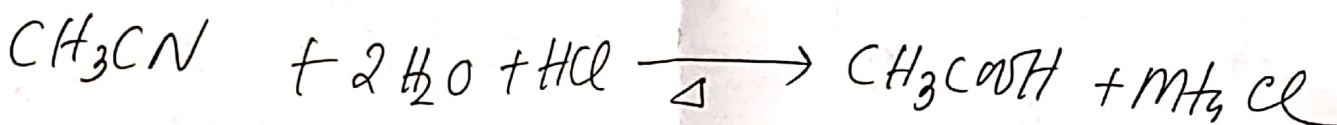
out of syllabus (p-block elements)

Q23

(i) Convert toluene to benzaldehyde

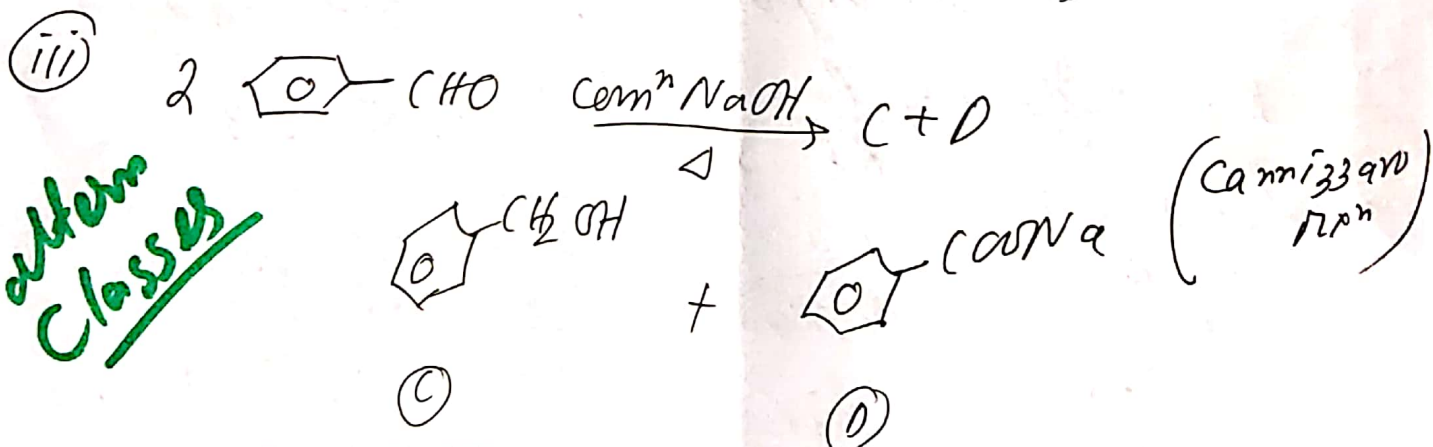
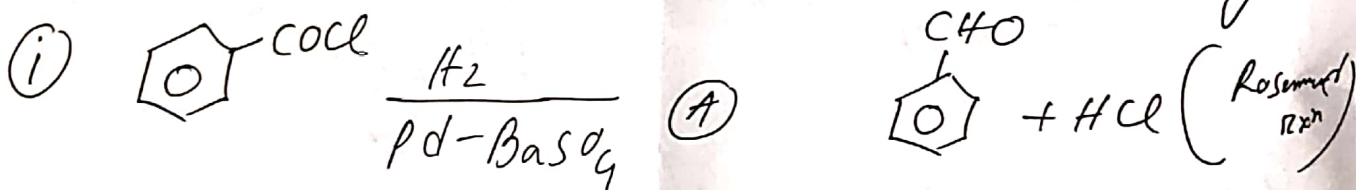


(ii) Convert ethanenitrile to ethanoic acid



Q23

(b) identify (A), (B), (C), (D) from following



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THNX a lot
for

10K

SPB (27A) 27/11/2021

For any
doubt

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