कुल पृष्ठ संख्या–32 (कवर पेज सहित)

क्रम संख्या 2259768

माध्यमिक शिक्षा बोर्ड, राजस्थान, अजमेर

उच्च माध्यमिक परीक्षा

(परीक्षार्थी द्वारा स्वयं भरा जाना चाहिये)

नोट :– परीक्षार्थी उपरोक्त के अतिरिक्त उत्तर पुस्तिका के अन्य किसी भी भाग में अपना नामांक नहीं लिखें।

माध्यम – हिन्दी ☐ अंग्रेजी ☑

विषय Chemistry

परीक्षा का दिन Saturday

दिनांक 22/03/25

नोट :– परीक्षार्थी के लिए आवश्यक निर्देश इस पृष्ठ के पिछले भाग पर उल्लेखित हैं। जिन्हें सावधानी पूर्वक पढ़ लें व पालना अवश्य करें।

परीक्षक हेतु निर्देश :– (1) परीक्षक को उपरोक्त सारणी अनुसार प्राप्तांक भरना अनिवार्य हैं, अन्यथा नियमानुसार दंडित किया जायेगा।

(2) परीक्षक उत्तर पुस्तिका के अन्दर के पृष्ठों के बायीं ओर निर्धारित कॉलम में लाल इंक से अंक प्रदत करें।

(3) कुल योग भिन्न में प्राप्त होने पर उसे पूर्णांक में ही परिवर्तित कर अंकित करें (उदाहरणार्थ: 15 ¼ को 16, 17 ½ को 18, 19 ¾ को 20)

प्रश्नवार प्राप्तांकों की सारणी
(परीक्षक के उपयोग हेतु)

प्रश्नों की क्रम संख्या	प्राप्तांक	प्रश्नों की क्रम संख्या	प्राप्तांक
1	9	19	
2	5	20	
3	10	21	
4	11/2	22	
5	11/2	23	
6	1½	24	
7	1½	25	
8	1½	26	
9	1½	27	
10	1½	28	
11	3/4	29	
12	1½	30	
13	1½	31	
14	3	योग	55¼
15	3	प्राप्त अंकों का कुल योग (Round off)	
16	3	अंकों में	शब्दों में
17	4	56	छप्पन
18	4		

परीक्षक के हस्ताक्षर ..... अंकेतांक 3 5 7 4 7

प्रमाणित किया जाता है कि इस उत्तर पुस्तिका के निर्माण में 60 जी.एस.एम. ईकों सैपलिथो कागज ही उपयोग में लिया गया है। 180/2025

परीक्षक द्वारा प्रदत्त अंक | प्रश्न संख्या | परीक्षार्थी उत्तर

"Section- A"

Q①

Ans

(i) (B) 2

(ii) (C) r.m

(iii) (D) Na(s) and $Cl_2(g)$

(iv) (C) $mol^{-1}\ L\ s^{-1}$

(v) (A) Thorium

(vi) (B) Zn^{2+}

(vii) (D) $[Co(NH_3)_6]^{3+}$

(viii) (D) 6

(ix) (A) $SOCl_2$

(x) (C) sp^3

(xi) (D) $C_6H_5-O-CH_3$

(xii) (B) $C_2H_5-O-C_2H_5$

परीक्षक द्वारा प्रदत्त अंक	प्रश्न संख्या	परीक्षार्थी उत्तर
	(xiii)	(D) C_6H_5-CHO
	(xiv)	(A) FCH_2COOH
	(xv)	(A) $C_6H_5SO_2Cl$
	(xvi)	(C) N- Methyl ethanamine.
	(xvii)	(C) Sucrose
	(xviii)	(D) Glycine.
18×1/2 = 9		
	Q(2)	
	(i)	K.Kg mol^{-1}
	(ii)	Increase
	(iii)	Zero.
	(iv)	Ni (Nickel)
	(v)	0
	(vi)	337 K.
	(vii)	Picric acid (2,4,6 trinitro phenol)

BSER-180/2024

परीक्षक द्वारा प्रदत्त अंक | प्रश्न संख्या | परीक्षार्थी उत्तर

(viii) Ethanal $\left(CH_3-\overset{O}{\overset{\|}{C}}-H\right)$

(ix) Vitamin C.

(x) Fructose

$10 \times \frac{1}{2} =$ (5)

Q(3)

(i) Molality → Molality state that number of moles of solute present in 1kg of solvent.

It is represented by (m)

$m \Rightarrow \frac{\text{moles of solute}}{\text{mass of solvent (in kg)}}$

Unit ⇒ $\frac{\text{mol}}{\text{kg}}$, molal.

(ii) Mathematical form of Raoult's law:-
Partial pressure is directly proportional to the molefraction of either component in solution phase

$P \propto x$

$P = P^\circ x$ P° = V.P of either component in it's pure form

For solute $P_2 = P_2^\circ x_2$ For solvent $P_1 = P_1^\circ x_1$

परीक्षक द्वारा प्रदत्त अंक | प्रश्न संख्या | परीक्षार्थी उत्तर

(iii) Complex reactions → The chemical reaction which finish into many several steps such reaction is known as complex reactions.
For an complex reaction we are not able to find the molecularity of a reaction.

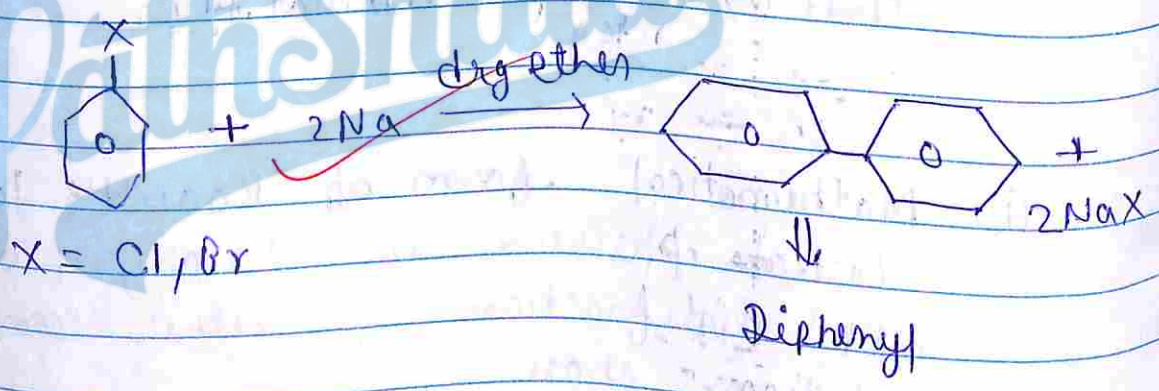
(iv) IUPAC name of $K_3[Cr(C_2O_4)_3]$ is
⇒ Potassium trioxalatochromate (III)

(v) Example of Grignard reagent :-

$CH_3-Cl + Mg \xrightarrow{\text{Dry ether}} CH_3-Mg-Cl$

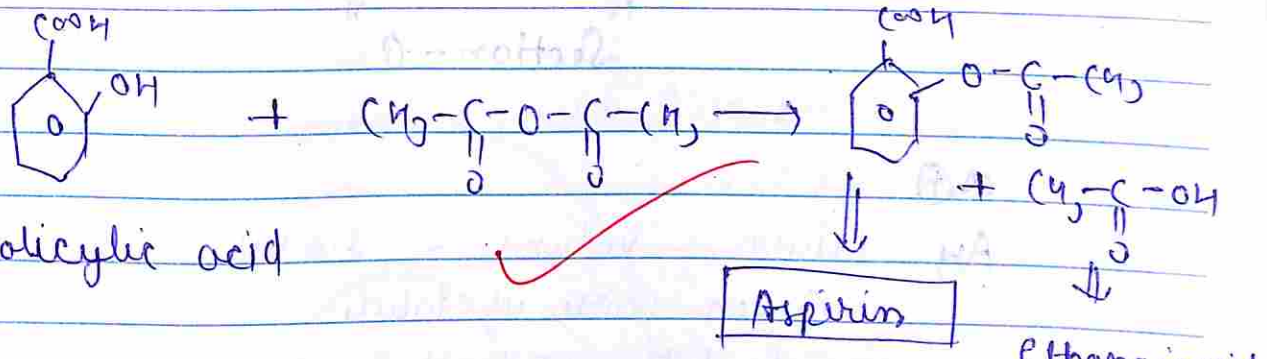
Grignard reagent ⇒ methyl magnesium chloride
Ex. $CH_3-Mg-Cl + HCHO \xrightarrow{H_2O} CH_3-CH_2-OH$.

(vi) Fittig reaction →



(vii) The compound obtained from the acetylation of salicylic acid is Aspirin (2 Acetoxy Benzoic acid).

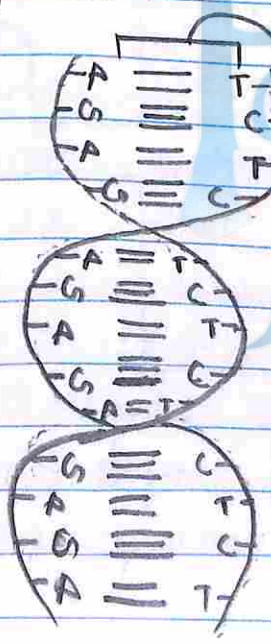
परीक्षक द्वारा प्रदत्त अंक | प्रश्न संख्या | परीक्षार्थी उत्तर



(viii) Increasing order of their basic strength ⇒
$NH_3 < C_2H_5NH_2 < (C_2H_5)_3N < (C_2H_5)_2NH$

(ix) Two example of fibrous protein ⇒
(a) Keratin (present in hair)
(b) Myosin (present in muscle)

(x) Diagram of double strand helix structure of DNA :-



10×1 = 10

परीक्षक द्वारा प्रदत्त अंक | प्रश्न संख्या | परीक्षार्थी उत्तर

"Section - B"

Q(4)

Ans Given volume = 500 ml = 0.5 Ltr

Given mass of solute = 4.0 g

Calculate molarity = ?

Molar mass of NaOH = 40 g

$$M = \frac{\text{Moles of solute}}{\text{volume of soln (in Ltr)}}$$

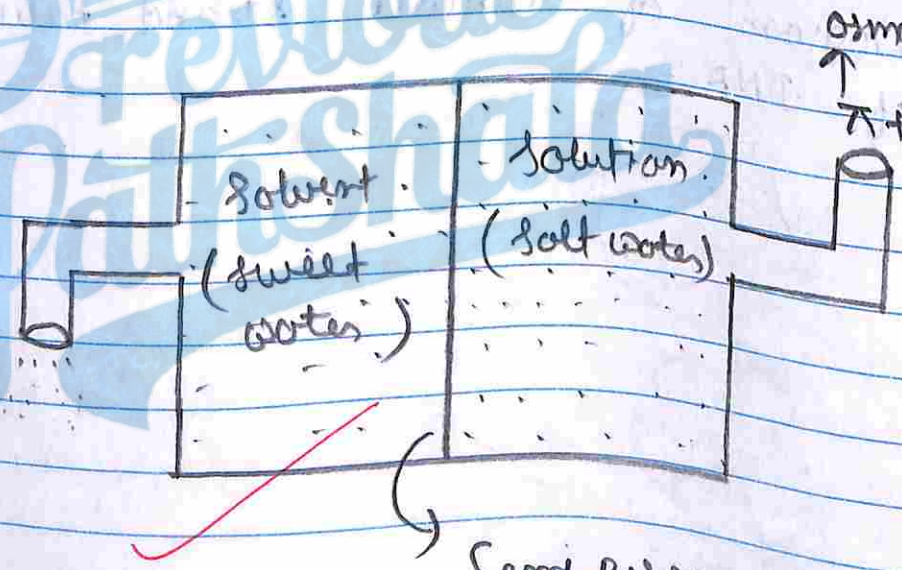
$$M = \frac{4 \times 1}{40 \times 5} = 0.2 \frac{\text{mol}}{\text{Ltr}}$$

So Molarity is equal to 0.2 Molar

(1/2)

Q(5)

Ans Diagram of reverse osmosis :-

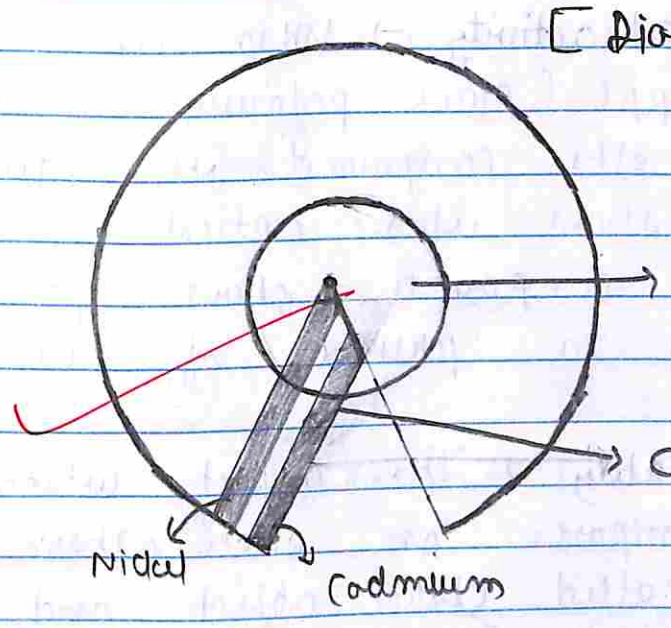


(1/2)

परीक्षक द्वारा प्रदत्त अंक | प्रश्न संख्या | परीक्षार्थी उत्तर

Q(6)

Ans. [Diagram of nickel cadmium cell].



1½

Q(7)

Ans. Spin only magnetic moment for Fe^{2+} (aq.) ion

$M.M = \sqrt{n(n+2)}$ B.M

In Fe^{2+} no. of unpaired electron are ⇒ 4

$M.M = \sqrt{4(6)} = \sqrt{24} \Rightarrow 4.96$ B.M

1½

Q(8)

Ans. Lanthanoid contraction ⇒ When the number of electrons fills in the 4f orbit the force due to nucleus also increase, so due to the poor shielding of 4f orbital the length (atomic radius) of the lanthanoid metals readily decrease, this effect is known as lanthanoid contraction.

⇒ Due to this the size of 2nd & 3rd transition series are almost same.

1½

परीक्षक द्वारा प्रदत्त अंक | प्रश्न संख्या | परीक्षार्थी उत्तर

Q9

Ans (a) Optical activity → When the compound rotate the ppl (plane polarised light) that means that the compound is optical active and show it's optical activity. A optically active compound show optical isomerism having a presence of chiral carbon.

3/4

(b) Chirality → The object which does not superimpose on each other mirror image are called chiral object and this property of that object is known as chirality.

3/4

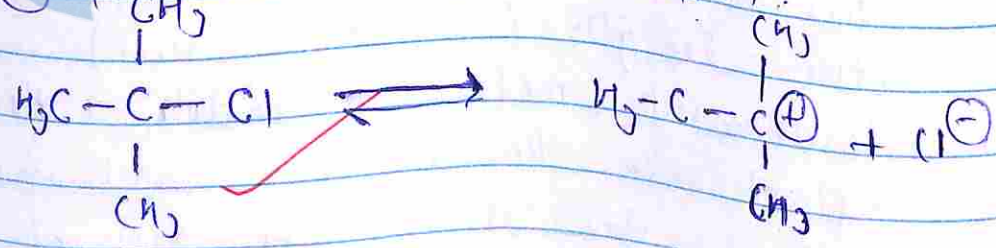
1/2

Q10

Ans: Mechanism of unimolecular substitution S_N1:

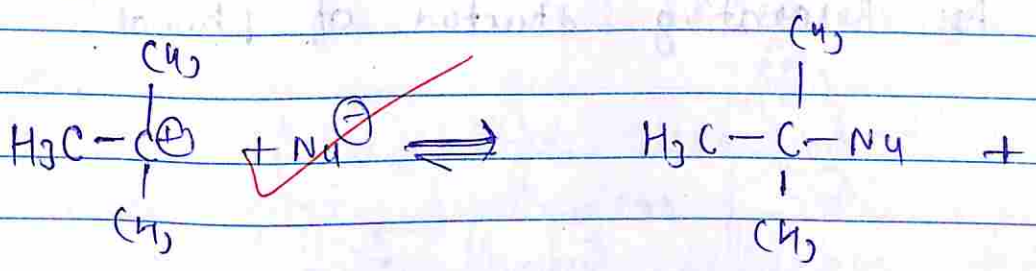
⇒ Unimolecular substitution S_N1 is also known as S_N1 reaction which finish into 2 steps, and in this reaction R.O.R depends upon the concentration of alkyl halide.

Step (I) Formation of carbocation:



परीक्षक द्वारा प्रदत्त अंक | प्रश्न संख्या | परीक्षार्थी उत्तर

Step (II) Nucleophilic attack of a nucleophile :-



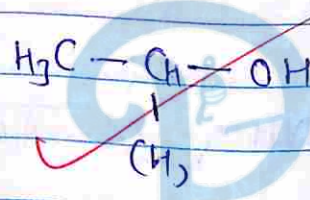
1/2

⇒ Here racemic mixture is formed.
⇒ Retention of configuration takes place
⇒ Reactivity order $3^\circ > 2^\circ > 1^\circ >$ None.

(ii)

Any Structural formula of the following compounds-

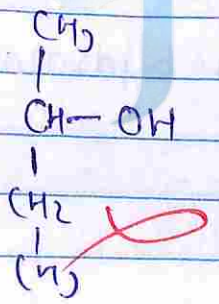
(a) Isopropyl alcohol :-



3/4

IUPAC name is Propan-2-ol.

(b) Secbutyl alcohol :-



+0

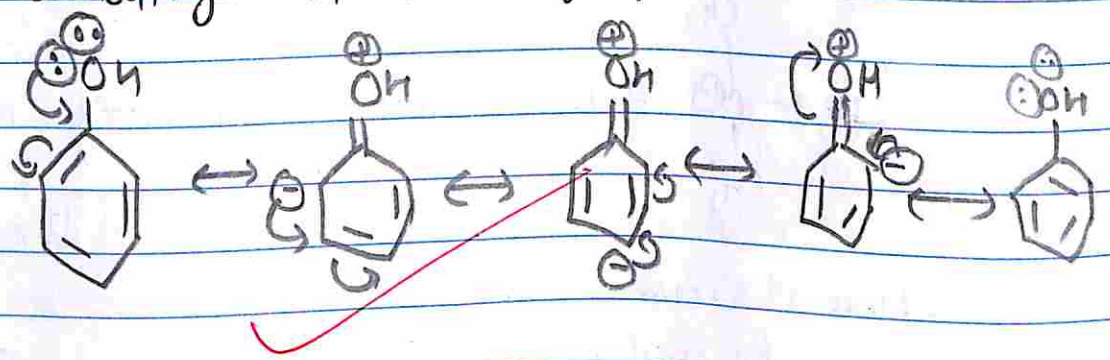
IUPAC name is Butan-2-ol.

2 (3/4)

परीक्षक द्वारा प्रदत्त अंक	प्रश्न संख्या	परीक्षार्थी उत्तर

Q(12)

Ans. Resonating structure of phenol :-

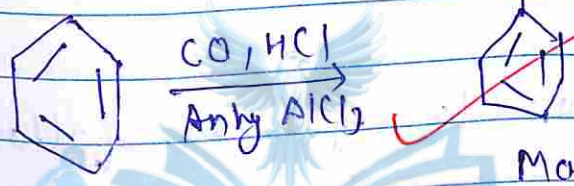


(1½)

Q(13)

Ans

(a)

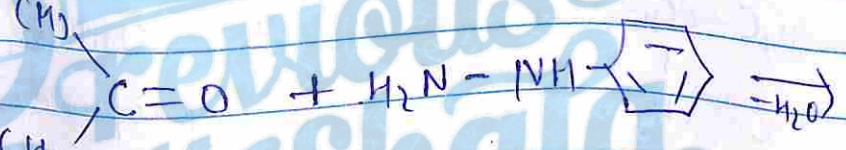


(Benzene carboldehyde)

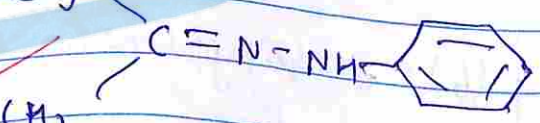
Main product.

3/4

(b)



+ 3/4



Phenyl hydrozone of acetone

= (1½)

परीक्षक द्वारा प्रदत्त अंक | प्रश्न संख्या | परीक्षार्थी उत्तर

"Section- C"

Q(14)

Ans (I) (a) Faraday's first law of electrolysis →

The faraday's first law of electrolysis state that the amount of substance deposited or released during electrolysis is directly proportional to the charge.

$W \propto Q$

$W = ZQ$ → Z = equivalent constant

$W = \frac{MIT}{96487 \times n\text{-factor}}$

Here W = amount of substance deposited

M = Molar mass

I = Current (A) T = time (in sec)

96487 ⇒ Faraday constant.

(b) Given Conductivity $K \Rightarrow 0.00141\ S\,cm^{-1}$

Concentration = 0.01 M

Calculate molar conductivity ⇒ ?

$\lambda_m = \frac{K \times 1000}{M}$

$\lambda_m = \frac{0.00141 \times 1000 \times 100}{0.01 \times 10^2}$

$\lambda_m = 141\ S\,cm^{-1}\,mol^{-1}$ Ltr.

f2

=(3)

परीक्षक द्वारा प्रदत्त अंक | प्रश्न संख्या | परीक्षार्थी उत्तर

Q(15)

Ans(I) Explanation of $[FeF_6]^{3-}$ as per Valence bond theory:-

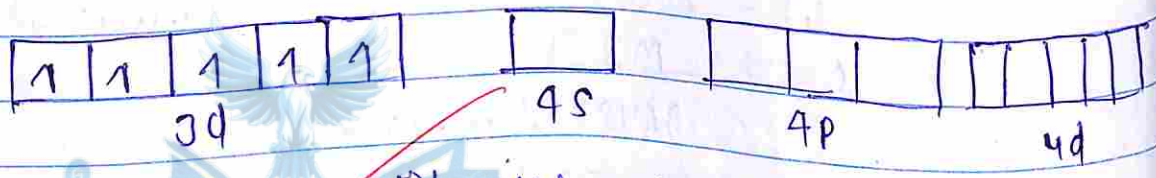
Electronic configuration of central metal

$Fe_{26} = [Ar]\ 4s^2\ 3d^6$

Oxidation state of central metal in the co-ordination complex :- $\Rightarrow +3$

$Fe^{+3} \Rightarrow [Ar]\ 3d^5$

So d-orbital arrangement :-



As we know Flourine is weak field ligand so pairing of electron does not take place.

so :-

This are the $e^{\ominus}$ pair of the ligands.

From this :-

Hybridisation $\Rightarrow sp^3d^2$ ✓

Geometry $\Rightarrow$ Octahedral. ✓

Magnetic nature $\Rightarrow$ Paramagnetic. ✓

Type of complex $\Rightarrow$ Outer spin complex.

+1

+1

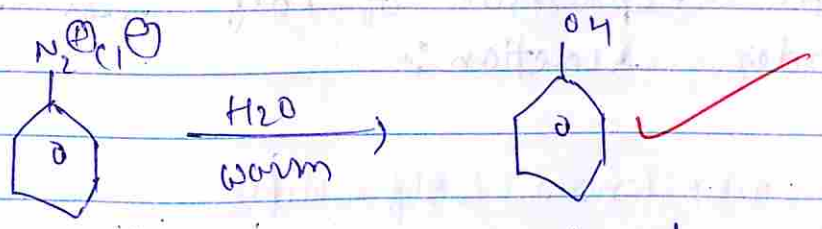
+1

= (3)

परीक्षक द्वारा प्रदत्त अंक | प्रश्न संख्या | परीक्षार्थी उत्तर

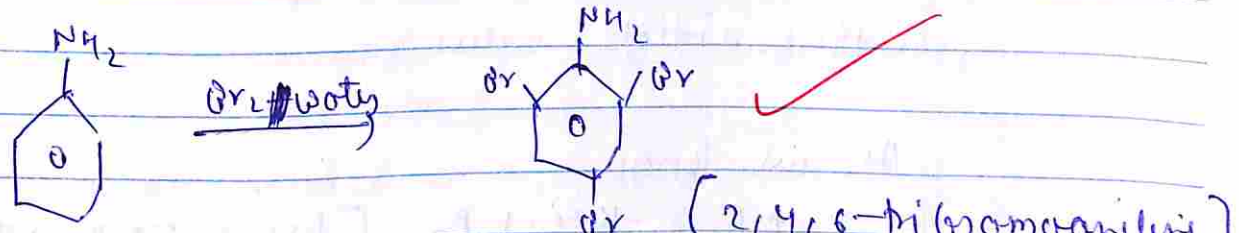
Q(16)

Ans (I) (a)



Benzenediazonium Chloride. — phenol

(b)



Aniline — (2,4,6-Tribromoaniline)

(c) $CH_3-\underset{\underset{O}{\|}}{C}-NH_2 + NaOH + Br_2 \xrightarrow{\Delta}$ CH_3-NH_2 + $2NaBr + Na_2CO_3$

ethanamide — methanamine

Section - D

Q(17)

Ans (I) (a) Molecularity of reaction → Molecularity of a reaction is defined as the no. of reacting specie taking part in the elementary reaction simultaneously is known as molecularity of a reaction.

It can never be zero or negative.

$2HI \rightarrow H_2 + I_2$

Molecularity of the reaction is (2)

परीक्षक द्वारा प्रदत्त अंक | प्रश्न संख्या | परीक्षार्थी उत्तर

(6) The expression of half life for zero order reaction :-

As we know half life of a reaction is the time required to reduced the initial concentration of reactant half of its initial value.

As we know

$$+R = -Kt + R_0 \quad \text{[From zero } x\text{]}$$

$$R_0 - R = Kt$$

For the zero order a reaction the half life is given as:

$$\frac{R_0}{2} \Rightarrow R \quad \text{[Put in the good eqn]}$$

$$K(t_{1/2}) \Rightarrow R_0 - \frac{R_0}{2}$$

$$K(t_{1/2}) \Rightarrow \frac{R_0}{2}$$

$$\boxed{t_{1/2} = \frac{R_0}{2K}}$$

this is the formula for half life of a zero order rxn.

परीक्षक द्वारा प्रदत्त अंक | प्रश्न संख्या | परीक्षार्थी उत्तर

(c) From the formula for 1st order rxn we can easily prove this statement :-

$$t = \frac{2.303}{K} \log \frac{(R_0)}{(R)}$$

R_0 is here initial concentration
R is here final concentration

Let $R_0 = 100\%$.

From question

$R = 100 - 99.9 \Rightarrow 0.1\%$.

So put this in formula

$$t \Rightarrow \frac{2.303}{K} \log \frac{[100]}{[0.1]}$$

$$\boxed{t \Rightarrow \frac{2.303}{K} \times 3 \log_e 10} \qquad \boxed{\log 10 = 1}$$

$$t \Rightarrow \frac{6.909}{K}$$

half life for first order rxn.

$$t_{1/2} \Rightarrow \frac{0.693}{K}$$ +2

Put the value of K from above eqn.

$$t_{1/2} = \frac{0.693}{6.909} \times t$$

$$\boxed{t \Rightarrow 10\, t_{1/2}} \quad (H.P)$$ =4

परीक्षक द्वारा प्रदत्त अंक	प्रश्न संख्या	परीक्षार्थी उत्तर
	Q18	
	Ans (ii)	
1	Or	(a) Acetic acid (Ethanoic acid) is the carboxylic acid used as vinegar in food industry.
+1		(b) IUPAC name of adipic acid is ⇒ Hexanedioic acid (Hexan 1,6 dioic acid)
+2		(c) Hell-Volhard Zelinsky → The carboxylic acid having α- hydrogen got halogenated at α-posn with the help of small amount of Red phosphorous such reaction is known as Hell volhard Zelinsky reaction.
		Ex: $CH_3-\underset{\overset{\parallel}{O}}{C}-OH \xrightarrow[X_2/Cl_2]{Red\ P} \underset{Cl}{CH_2}-\underset{\overset{\parallel}{O}}{C}-OH + HCl$
		2 Chloro ethanoic acid
= (4)		

* — * — * — * — *

Total = 55¼ = (56) 6447

Finish.

Tested 12/04/25