

APR/MAY-2022



GOVERNMENT OF KARNATAKA
DEPARTMENT OF PRE - UNIVERSITY EDUCATION
II YEAR P.U.C. ANNUAL EXAMINATION

Answer Book Sl. No.

1272916

MAY/JUNE - 2021

MAIN ANSWER BOOK

Please read the instructions overleaf before filling in

Register No. of the Candidate

407156

Subject Code :

34

Subject :

CHEMISTRY

Enter the Serial Number of
Map / Graph sheet

No. of pages used in

Main Answer Book

19

Additional Answer Book

Total No. of
pages used

19.

Certified that the entries made by the Candidate are found to be correct

Signature of the Invigilator with date

FOR THE USE OF EXAMINERS ONLY

Part / Question No.	Marks awarded										Total Marks
	1	2	3	4	5	6	7	8	9	10	
A	1	—	0	—	1	—	—	1	1	1	05
	11	12	13	14	15	16	17	18	19	20	02
	1	0	1	0	0	—	—	—	—	—	—
B	16	17	18	19	20	21	22	23	24	25	10
	2	1	—	2	—	—	2	—	2	2	13
	26	27	28	29	30	31	32	33	34	35	15
C	—	1	—	—	—	3	3	3	3	3	19
	36	37	38	39	40	41	42	43	44	45	—
	5	—	3	5	5	—	—	—	—	—	—
D-IV	46	47	48	49	50	51	52	53	54	55	—
	—	5	5	—	—	—	—	—	—	—	—
	61	62	63	64	65	66	67	68	69	70	—
D-V	—	—	—	—	—	—	—	—	—	—	—
	71	72	73	74	75	76	77	78	79	80	—
	—	—	—	—	—	—	—	—	—	—	—
Grand Total in Figures											62

Grand Total
in words

Sixty four only



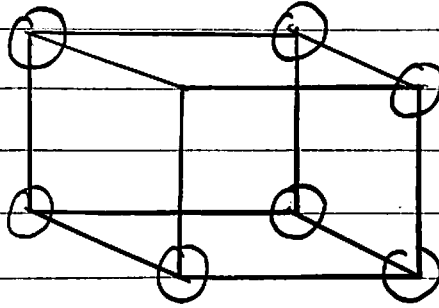
INSTRUCTIONS TO CANDIDATES

1. Write your register number Correctly on the space provided on the Facing Sheet of the Answer book and the top left side of Additional Answer book if any. Over writing should be attested by the Room Invigilator.
2. Write answers in both sides of the sheet using BLUE/BLACK ink or ball point pen.
3. Obtain Additional Booklets, Graph sheets, Mathematical table from the Invigilator if required. Enter the serial numbers of all the Additional Booklets used.
4. Intimate disorders if any, in the Main Answer book/ Additional Booklet to the invigilator.
5. Indicate the Correct question number in the margin.
6. Obtain the permission of the Invigilator for change of PEN / INK.
7. All rough work should be made on a particular page with the heading ROUGH WORK and cross it.
8. Do not write in the margin and leave any page UNUSED except at the end of answers.
9. No Candidate is permitted to leave the examination hall within 30 minutes from the commencement of the examination. Any candidate who leaves after 30 minutes will not be allowed again to the examination hall.
10. If you want to make any request to the Room Invigilator, just stand up to attract his / her attention. Do not shout or leave your place. The invigilator will come to you.
11. During the examination if the candidate wants to go out, for urination etc., same may be informed to the invigilator. While going out, the Answer paper, Question paper etc., should be handed over to the room invigilator for safe custody.
12. After completion, just stand up & inform the same to the Room Invigilator who in turn will collect the papers and gets your signature on the diary maintained by the invigilator.
13. The following misdeeds will attract disciplinary action and criminal prosecution.
 - a) Breach of silence.
 - b) Use of books, notes, manuscripts, etc., pertaining to the subject in the examination hall.
 - c) Talking or signalling to other Candidate.
 - d) Candidates copying from the answer books of the other candidates or from other source.
 - e) Sending of answer books or additional Booklets or question paper out of the examination hall.
 - f) Impersonation.
 - g) Taking the answer books or additional Booklet received for writing the answers out of the examination hall during or after the examination.
 - h) Tearing or insertion to the answer books and the additional answer book if any.
 - i) Writing an appeal or request to the valuator in the answer book.
 - j) Mobile Phones, pagers are strictly prohibited in the Examination Hall.
 - k) Simple calculators can be used, Scientific calculators allowed only for Statistics paper.
14. After completion of writing, Count the No. of pages used and fill the columns provided on the facing sheet of the main answer book.
15. Candidates suffering from infectious diseases are not allowed to sit in the examination hall.
16. Candidate should strike off the subject which is not applicable.
17. Invigilator should put an END SEAL with his/her signature on the next page of the answer booklet where a student ends his/her writing.

PART-D

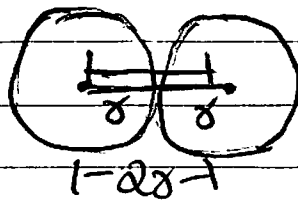
iv.

36] (a)



From the figure, let
'a' be the edge length of the unit cell.
'x' be the radius of the sphere.

We know that in simple cubic crystal lattice the atoms are present on the corners of the cube and will be touching each other.



\therefore edge length
 $a = 2x$

* Volume of the sphere = $\frac{4}{3}\pi x^3$

total no. of spheres = 1

total volume of spheres = $\frac{4}{3}\pi x^3$

* Volume of the cubic structure = a^3

$= (2x)^3 = 8x^3$

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$$\therefore \text{packing efficiency} = \frac{\text{Volume of the spheres}}{\text{total volume of cube}} \times 100$$

$$= \frac{\frac{4}{3} \pi r^3}{8r^3} \times 100$$

$$= \frac{\pi}{6} \times 100 \Rightarrow \frac{3.14}{6} \times 100$$

$$\Rightarrow \boxed{52.4\%}$$

\therefore The packing efficiency in simple cubic crystal is 52.4%.

Ans

(b)

In Body centered cubic crystal lattice, the atoms are present not only at the corners but also on the centre of the cubic lattice.

$$\therefore \text{Numbers of particle} = \frac{1}{8} \times (\text{no. of atoms present in the corners}) + (\text{no of atoms present in the centre})$$

$$= \frac{1}{8} \times 8 + 1$$

$$= \underline{1+1} \Rightarrow \boxed{2}$$

\therefore The number of particles (atoms) per unit cell in BCC is 2.

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39] (a)

Ans

consider a zero-order reaction

Reactants \longrightarrow products.

\rightarrow Let the initial concentration of the
* reactants be $[R]_0$ * reactants

\rightarrow the reaction has occurred for $[t]$ seconds

\rightarrow The concentration of the reactants
after $[t]$ seconds will be $[R]$

according to law of mass action (LMA)

$$-\frac{d[R]}{dt} \propto [R]^0 \quad \text{[Zero order reaction]}$$

$$-\frac{d[R]}{dt} = k[R]^0 \quad \text{[where } k \text{ is rate constant]}$$

$$\Rightarrow d[R] = -k dt$$

integrating on both sides we get

$$\int d[R] = -\int k dt \quad \rightarrow \textcircled{1}$$
$$\Rightarrow [R] = -kt + I$$

where I is the constant of integration

$$\text{When } t = 0 \text{ seconds } \rightarrow [R] = [R_0]$$

$$\text{i.e., } [R]_0 = I \quad \rightarrow \textcircled{2}$$



Substituting (2) in (1) we get.

$$[R] = -kt + [R_0]$$

$$-kt = [R] - [R_0]$$

$$kt = [R_0] - [R]$$

$$\therefore k = \frac{[R_0] - [R]}{t}$$

$\Rightarrow k = \frac{[R_0] - [R]}{t}$ is therefore, the required integrated rate equation for the rate constant of a zero-order reaction.

(b) Factors that affect the rate of a chemical reaction:

- (i) Molar concentrations of the reactants
- (ii) Temperature: Increases the rate by 2 or 3 times due to 10° rise in temperature.
- (iii) Catalyst: Increases the rate of the reactants by decreasing the activation energy.
- (iv) Nature of reactants.
- (v) Concentration of the reactants



40] ~~(a) Effective collision is the total number of properly oriented collisions.~~

~~Factors responsible~~

(a) Effective collision is defined as the properly oriented collisions during a chemical reaction.

Factors responsible for effective collision are:

* Collision frequency: The total number of effective collisions per second per unit volume.

* Threshold ^{energy} frequency: It is the minimum amount of energy required by the reactant molecules to undergo effective collisions. is threshold energy

* Activation energy: It is minimum extra amount of energy required by the reactant molecules to undergo effective collisions.

(b) During half life of the first order reaction

$$\boxed{\text{time } (t) = t_{1/2}} \quad \text{and} \quad \boxed{[R] = \frac{[R]_0}{2}}$$



We know that, in a first order reaction

$$K = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$$

During half-life, we get

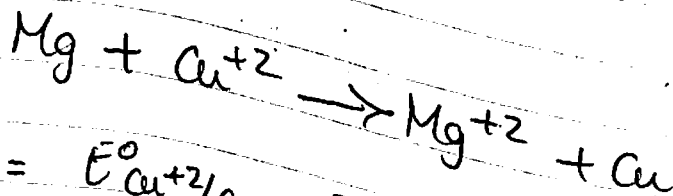
$$K = \frac{2.303}{t_{1/2}} \log \frac{[R]_0}{[R]_0}$$

$$K = \frac{2.303 \times 0.3010}{t_{1/2}}$$

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

\therefore Half life of a first order reaction is independent of initial concentration of the reacting species.

38] (a)



$$E^\circ_{\text{cell}} = E^\circ_{\text{Cu}^{+2}/\text{Cu}} - E^\circ_{\text{Mg}^{+2}/\text{Mg}}$$

$$E^\circ_{\text{cell}} = 0.34 - (-2.37)$$

$$E^\circ_{\text{cell}} = 2.61 \text{ V}$$

ΔG° at 298 K

$$\Delta G^\circ = -nFE^\circ$$

P.T.O.



$$\Delta G^\circ = -2 \times 96500 \times 2.61$$

$$\Delta G^\circ = -5.03 \times 10^5 \text{ VC}$$

(b) Corrosion of metals can be prevented by

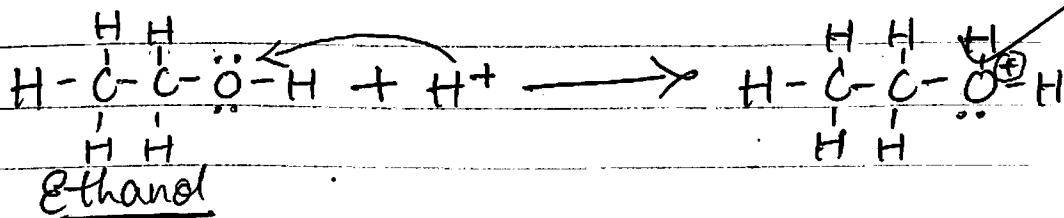
(i) creating a barrier between surface of the metal and atmosphere like painting, applying grease. (barrier method)

(ii) Alloying it with other metals. (Alloying)

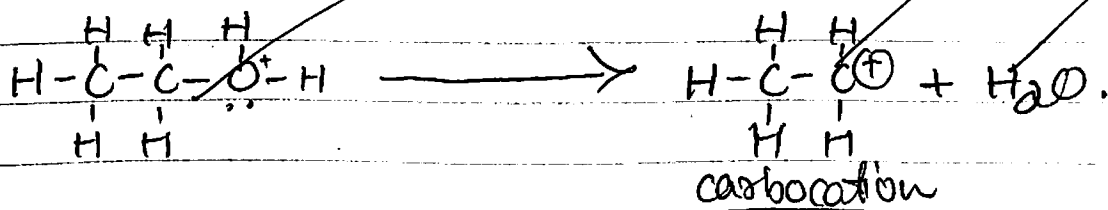
Q.

43] (a)

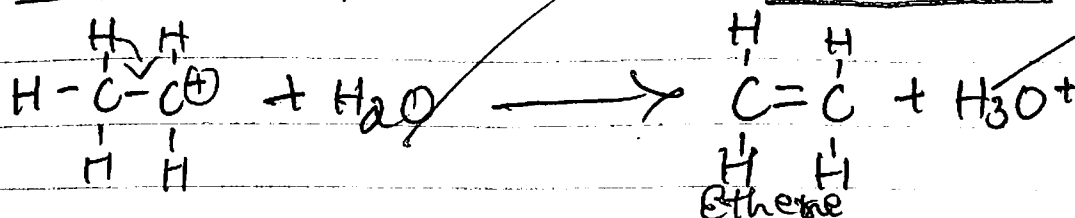
→ Step 1 - protonation of alcohol (ethanol)



→ Step 2 - Removal of water molecules to form (cation) carbocation



→ Step 3 → deprotonation of carbocation



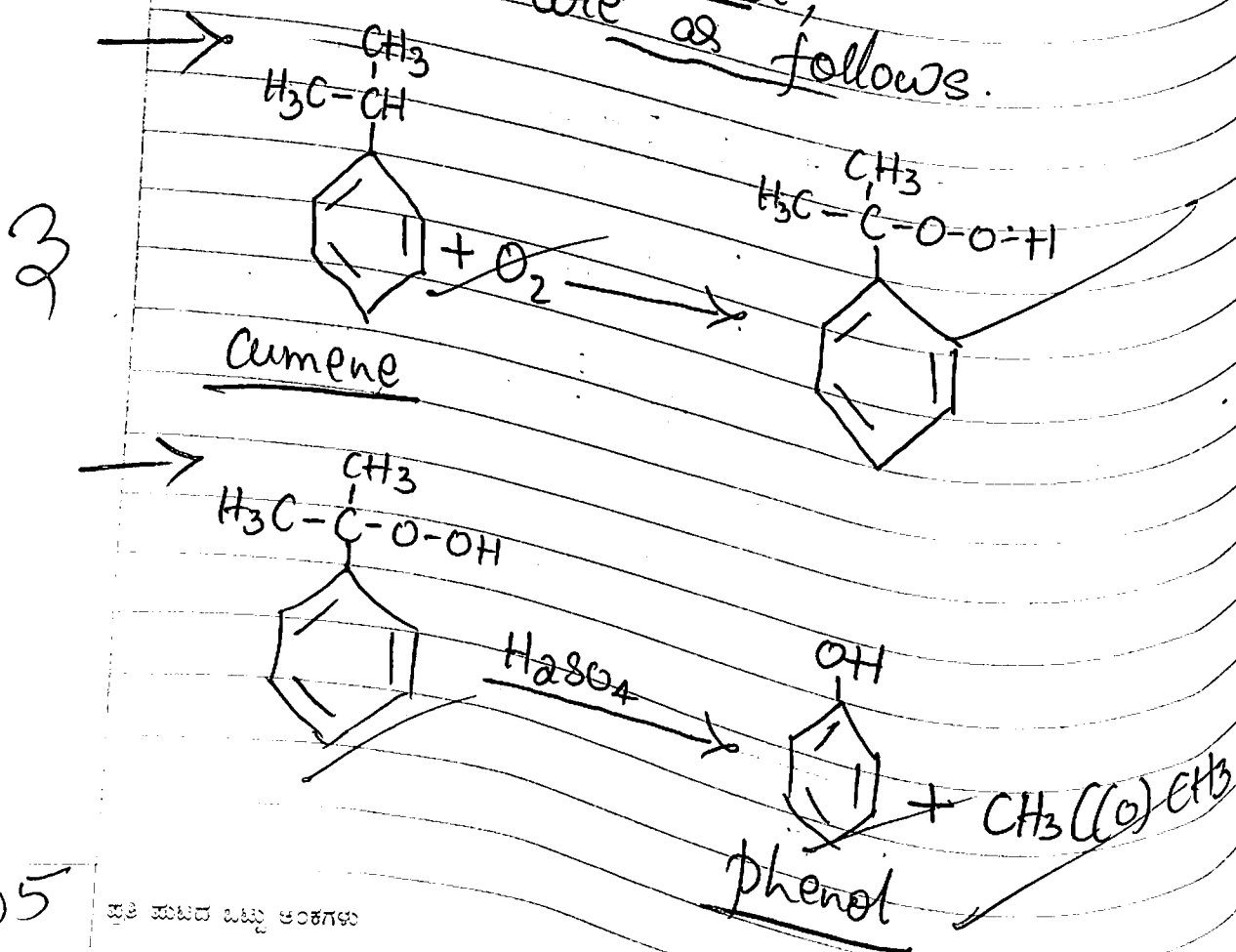


Ans

(b) Lucas Reagent is the mixture of cone. HCl and anhydrous $ZnCl_2$ which is used to distinguish between primary, secondary and tertiary alcohols.

2 * primary alcohols do not produce turbidity with it at room temperature.

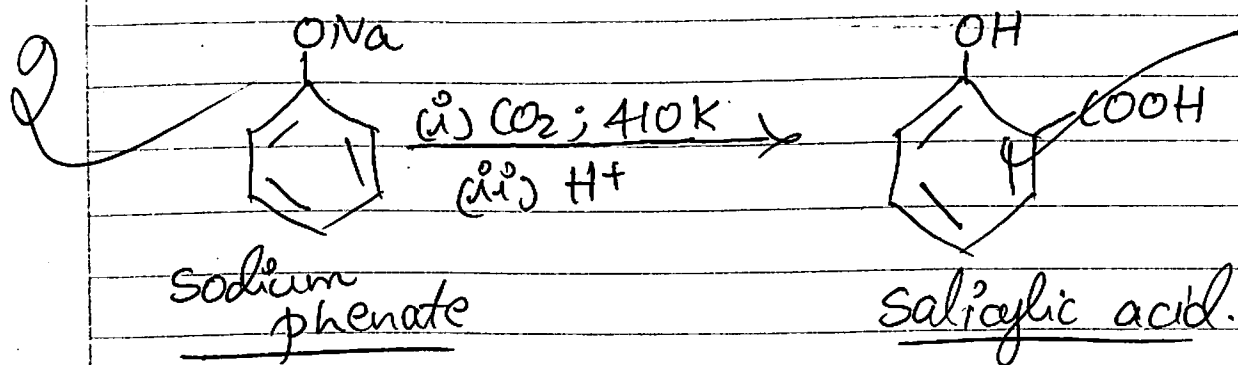
44] (a) Cumene is heated with oxygen to form an intermediate which on further acidifying with an acid gives phenol.
Reactions are as follows.



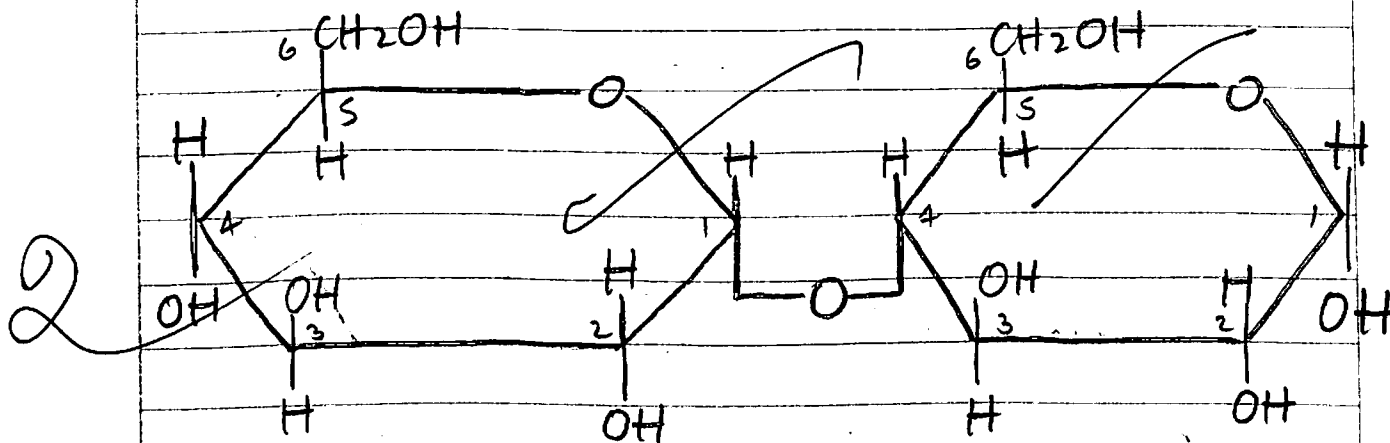


(b) dry sodium phenate is heated with CO_2 at 410K and $6-7$ bar pressure to form sodium salicylate, which on further acidification gives salicylic acid.

This is known as Kolbe's Reaction



48] (a). Haworth structure of Maltose.



1

(b) The carbohydrates which gives more (> 3) number of monosaccharide units when dissolved in water are called polysaccharides.
Eg: starch, cellulose.



(c) Vitamin that is stored in adipose tissue is Vitamin D

49) (a) The thread like insoluble in water proteins which are fibrous proteins are called as

* Keratin is the fibrous protein that is present in hair.

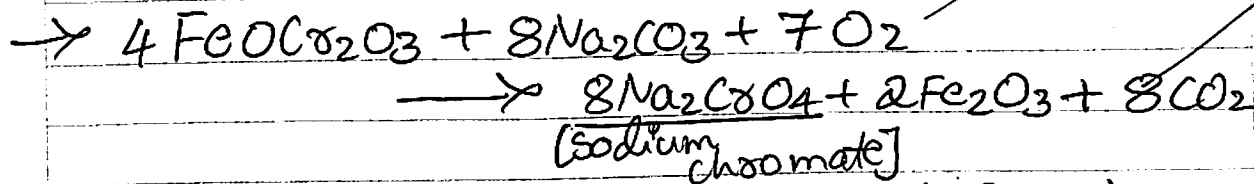
(b) Insulin
Glucagon

(c) Thymine is present only in DNA, but not in RNA.

PART-C

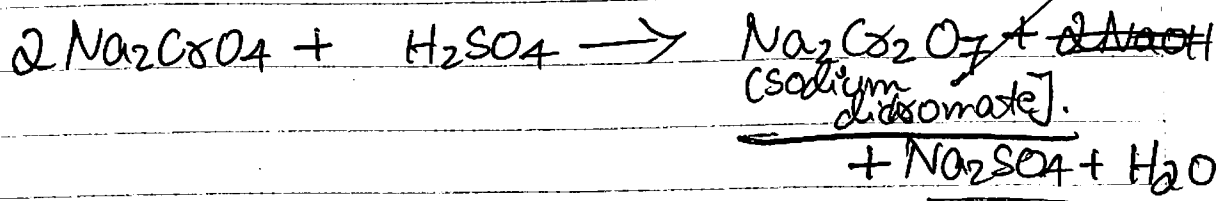
31) * Chromite ore [$\text{FeO} \cdot \text{Cr}_2\text{O}_3$] is powdered and concentrated through levigation.

* $\text{FeO} \cdot \text{Cr}_2\text{O}_3$ is treated with Na_2CO_3 and excess of CaO in the presence of air to form sodium chromate.
 $3\text{FeO} \cdot \text{Cr}_2\text{O}_3 + \dots \rightarrow \dots$
 $[\text{Na}_2\text{CrO}_4]$.

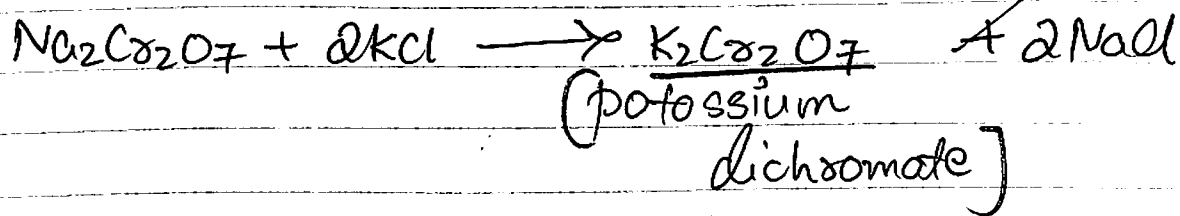


* Sodium chromate is extracted using water.

It is treated with H_2SO_4 to form sodium dichromate.



3 * Sodium dichromate is treated with calculated amount of KCl to obtain potassium dichromate.



This is how potassium dichromate is obtained.

32] * Lanthanoid contraction: The steady decrease in the atomic radii and ionic radii with increase in the atomic number in lanthanoids is called Lanthanoid contraction.



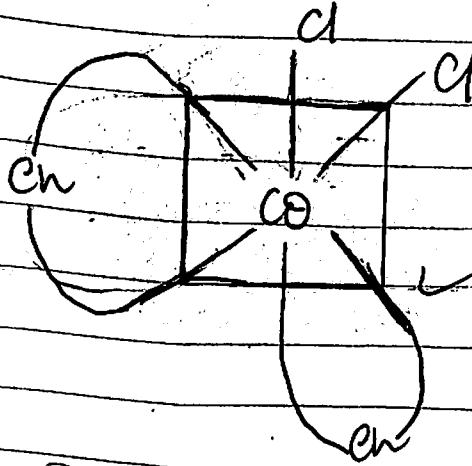
Consequences of lanthanoid contraction.

→ The atomic radii and ionic radii of 4d and 5d elements is almost same. Series

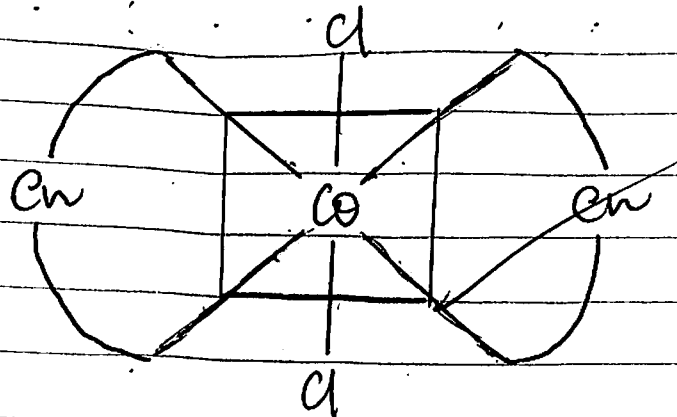
→ The electron density increases, due to lanthanoid contraction.

→ The ionization enthalpy of lanthanoids increases with increase in atomic number.

33] $[\text{Co}(\text{en})_2\text{Cl}_2]$ complex



Cis-isomer



Trans-isomer





- * The complex ion is paramagnetic due to presence of unpaired electrons.
- * The complex ion is octahedral.

35] (a) The complexes which have different ligands forming co-ordinate bonds with central metal atom or ion is called heterodentate complexes

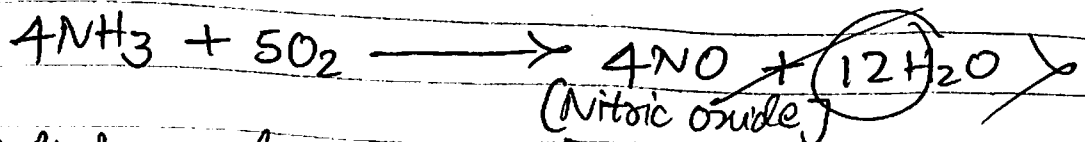
* Example: [Co(en)Cl₂]

(b) -

27] Ostwald's process:

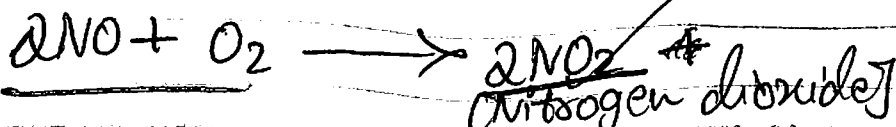
* Nitric acid is prepared by catalytic oxidation of ammonia (NH₃) with excess of air.

* NH₃ and air mixture is passed to heated Pt-Rh gauze at 473K.



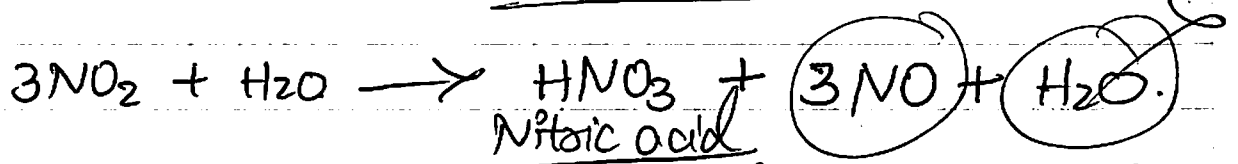
Nitric oxide is formed

* Nitric oxide is treated with oxygen to form nitrogen dioxide.





* Nitrogen dioxide is treated with water to form nitric acid (HNO_3).



\Rightarrow The nitric oxide formed is recycled.
 \Rightarrow The Nitric acid is concentrated upto 98% by dissolving it with sulphuric acid.

PART-B

16]

given that

$$a = 556 \text{ pm} \Rightarrow 556 \times 10^{-12} \text{ m.}$$

$$\Rightarrow 556 \times 10^{-10} \text{ cm.}$$

$N_A = 6.022 \times 10^{23}$; density = 1.55 g cm^{-3}
 since FCC lattice; $z = 4$

$$\text{W.K.T density} = \frac{M \times z}{N_A \times a^3}$$

$$1.55 \text{ g cm}^{-3} = \frac{M \times 4}{6.022 \times 10^{23} \times (556 \times 10^{-10})^3}$$

$$M = \frac{1.55 \times 6.022 \times 10^{23} \times 171.8 \times 10^{-24}}{4}$$

$$M = \frac{1.55 \times 6.022 \times 17.18}{4} \Rightarrow \boxed{40.08 \text{ g}}$$



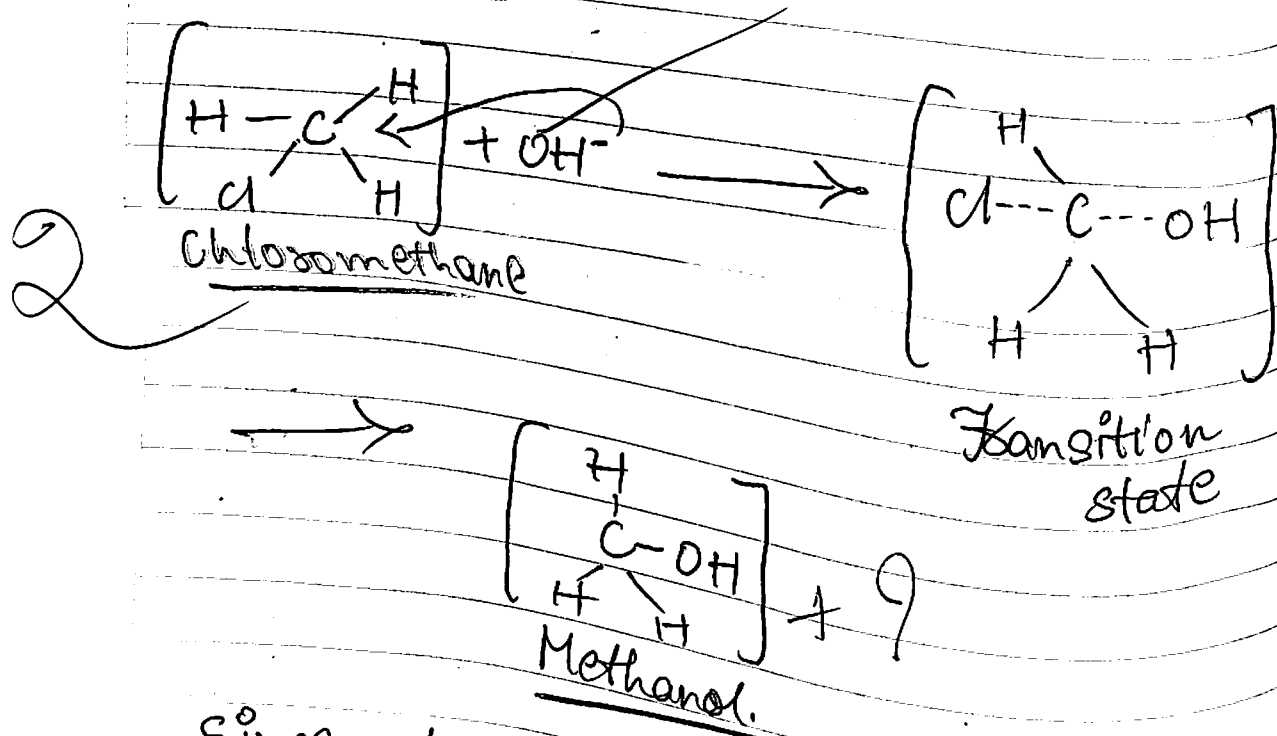
Register No. of the Candidate					
4	0	7	1	5	6

Q2] S_N2 mechanism for conversion of chloromethane to methanol.

The $[OH^-]$ of the alcoholic KOH attacks ~~chloromethane's~~ carbon of the side opposite to C-Cl bond to form a transition state.

The C-Cl bond weakens and C-OH becomes tightly intact.

\therefore chloromethane is converted to methanol.



Since two molecules ~~determine~~ determine the direction of reaction.

\therefore Rate = $K [CH_3Cl] [OH^-]$
the order is 2

\therefore bimolecular nucleophilic substitution rxn



24] The drugs which are used to relieve pain is called as analgesics.

2] * Narcotic analgesics:

Morphine, Heroin.

they reduce pain by inducing sleep.

25] Soap does not work in hard water because, hard water contains impurities like calcium and magnesium. When soap reacts with hard water, an insoluble precipitates of calcium and magnesium salts are obtained and no froth formation occurs.

19] Molar conductance is the conductivity of all the ions present in one mole of an solution electrolyte.

2] $\Lambda_m = \frac{\kappa}{C}$ is the required relation.

17] Molarity: Total number of moles of the solute dissolved in 1 litre of the solution.

* Molarity increases with increases in the temperature.

PART-A

- 1] Some solids, a crystalline solid is in an electrical insulator in solid state but conduct electricity in aqueous solution.
- 5] Order of the reaction
Rate = $k[A]^{-1}[B]^{5/3}$
Order = $-1 + 5/3$
Order = $\boxed{\frac{2}{3}}$
- 8] Froth floatation process.
- 9] Helium.
- 10] Copper.
- 12] N-Methyl Ethane.
- 13] Ketones have bulky alkyl groups attached on either sides of the carbon chain, and is very difficult for the nucleophile to act on the carbon, whereas aldehydes are more reactive than ketones towards nucleophilic addition reaction.



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- 15] Sodium benzoate acts as antioxidants.
- 17] Racemic mixture is the mixture containing the Dextro and Laero-rotatory isomers or optical isomers in equal quantities.
- 3] Different gases have different and separate values of IKH .
- 14] The sparticular part of a copo



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Signature of the Invigilator

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