

Senior School Certificate Examination

March -2010

Marking Scheme— Chemistry (outside) 56/1, 56/2, 56/3

General Instructions

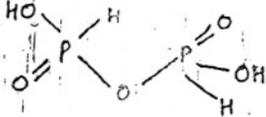
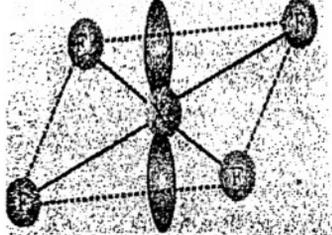
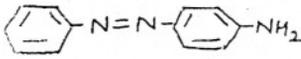
1. The Marking Scheme provides general guidelines to reduce subjectivity in the marking. The answers given in the Marking Scheme are suggested answers. The content is thus indicative. If a student has given any other answer which is different from the one given in the Marking Scheme, but conveys the same meaning, such answers should be given full weightage.
2. The Marking Scheme carries only suggested value point for the answers. These are only guidelines and do not constitute the complete answers. The students can have their own expression and if the expression is correct the marks will be awarded accordingly.
3. Some of the questions may relate to higher order thinking ability. These questions have been indicated by the mark* and the students understanding/analytical ability may be judged. These questions are to be evaluated carefully.
4. The Head-Examiners have to go through the first five answer-scripts evaluated by each evaluator to ensure that the evaluation has been carried out as per the instruction given in the marking scheme. The remaining answer scripts meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
5. Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration - Marking Scheme should be strictly adhered to and religiously followed.
6. If a question has parts, please award marks in the right hand side for each part. Marks awarded for different parts of the question should then be totalled up and written in the left hand margin and circled.
7. If a question does not have any parts, marks be awarded in the left-hand margin.
8. If a candidate has attempted an extra question, marks obtained in the question attempted first should be retained and the other answer should be scored out.
9. No Marks to be deducted for the cumulative effect of an error. It should be penalized only once.
10. A full scale of marks 0-70 has to be used. Please do not hesitate to award full marks if the answer deserves it.
11. Separate marking schemes for all the three sets have been provided.

Marking Scheme (outside Delhi)

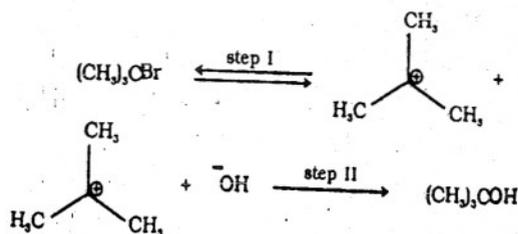
Chemistry (2010)
SET-56/1,56/2,56/3

I II III

1			Dipole _s - Dipole interaction	1
2	3		It is molar conductivity at infinite dilution or approaching zero concentration	1
3		2	Because Fluorine is the most electronegative element.	1
4	5	6	4-bromo-3-methyl pent-2-ene	1
5	4	4	$C_6H_5-CH_2-CH(OH)-CH_3$	1
6	7	5	Ammoniacal solution of silver nitrate is called Tollen's reagent. It is used as an oxidizing reagent / test for -CHO group.	$\frac{1}{2} + \frac{1}{2}$
7			Carbohydrates which reduce Tollen's reagent or Fehling solution are called reducing sugars which have free aldehydic group.	1
8		7	6,6 means the number of carbon atoms in the monomers of Nylon-6,6	1
9	10	11	The flow of solvent from solution of low concentration to higher concentration through semipermeable membrane is called osmosis. The hydrostatic pressure that has to be applied on the solution to prevent the entry of the solvent into the solution through the semipermeable membrane is called the Osmotic Pressure. Advantage: Unlike other colligative properties, osmotic pressure is used to determine the Molar mass of macromolecules/polymers like protein / or any other advantage	$\frac{1}{2}$ $\frac{1}{2}$ 1
10	11	10	$k = 1/R (l/A)$ Where k is conductivity, R is resistance and l/A is cell constant $\Lambda_m = k/C$ Where Λ_m is molar conductivity C is concentration	1 1
11	9	9	$Ag^+ / Ag < Cu^{2+} / Cu < Fe^{2+} / Fe < Cr^{3+} / Cr < Mg^{2+} / Mg < K^+ / K$ OR Redox Reaction $2MnO_4^- + 5Sn^{2+} + 16H^+ \longrightarrow 2Mn^{2+} + 5Sn^{4+} + 8H_2O$ $E^\circ_{cell} = E^\circ_C - E^\circ_A$ $= (+1.51 - 0.15)V = +1.36V$ As E°_{cell} is positive, the reaction is product favoured	2 1 $\frac{1}{2}$ $\frac{1}{2}$
12		14	Tyndall Effect:- The scattering of light by the colloidal particles present in a colloidal sol is called Tyndall effect Shape Selective Catalysis:- The catalytic reaction that depends upon the pore structure of the catalyst and the size of the reactant and product molecules is called shape-selective catalysis.	1 + 1
13	12	13	Coagulation is a process of aggregating together the colloidal particles so as to change them into large particles which ultimately settle as a precipitate. By electrophoresis, coagulation of lyophobic Sols can be carried out / or any other method.	1 1

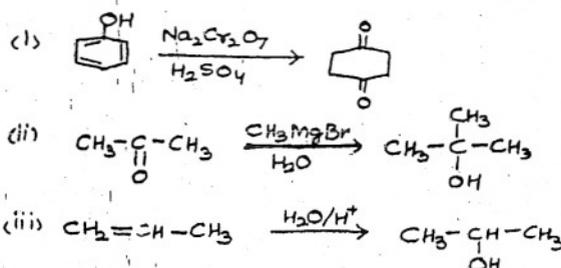
14		12	<p>(i) $I_2 + 10HNO_3 \longrightarrow 2HIO_3 + 10NO_2 + 4H_2O$</p> <p>(ii) $3HgCl_2 + PH_3 \longrightarrow Hg_3P_2 + 6HCl$</p> <p>Note: Assign marks for correct products.</p>	1+1
15	14	16	<p>(i)</p>  <p>(ii)</p> 	1+1
16		17	<p>Ethylamine and aniline Aniline forms an azo-dye with benzenediazoniumchloride through coupling reaction whereas ethylamine does not form an azo-dye.</p> <p>Aniline and benzylamine Aniline forms an azo-dye with benzenediazoniumchloride through coupling reaction whereas benzylamine does not form an azo-dye.</p> <p style="text-align: center;">(or any other suitable test)</p>	1 1
17	16	15	<p>(i) A = CH_3-CH_2-CN B = $CH_3CH_2CH_2NH_2$</p> <p>(ii) A = $C_6H_5N_2^+Cl^-$ B = </p> <p>(iii)</p>	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$
18		18	<p>(i) $CH_2=CH-Cl$</p> <p>(ii) $CF_2=CF_2$</p>	1+1
19			$d = \frac{z \times M}{a^3 \times N_A}$ <p>Assuming fcc lattice for copper</p> $a = 2\sqrt{2} r$ $a^3 = (2\sqrt{2} r)^3 = 8 \times 2 \times 2 (1.27 \times 10^{-8} \text{ cm})^3$ $= 4.723 \times 10^{-23} \text{ cm}^3$ $d = \frac{4 \times 63.54 \text{ g mol}^{-1}}{4.723 \times 10^{-23} \text{ cm}^3 \times 6.02 \times 10^{23} \text{ mol}^{-1}}$ $= 8.94 \text{ g cm}^{-3}$ <p>Note: If any other lattice is assumed, comparing the density or z-value with the given one, may be accepted as the right procedure.</p>	1 1 1

S_N1 eg.



Chemistry 2024

24 25 23



1x3 = 3

25 24

- (i) Because (a) bond dissociation enthalpy of F₂ is lower than that of Cl₂ and (b) small size of F form stronger bond with N.
- (ii) Because it has sp³d hybridization with 3 lone pairs.
- (iii) Because of (a) lower bond dissociation enthalpy of F₂ and (b) high hydration enthalpy of F

1x3 = 3

26 26

Acidic amino acids contain more number of carboxyl groups than amino groups. Basic amino acids contain more number of amino groups than carboxyl groups. Neutral amino acids contain equal number of amino acids and carboxyl groups. (or any other suggestive answer)

These amino acids which must be supplied to our diet are called essential amino acids and those which can be made by our bodies and not required in our diet are called non-essential amino acids.

Essential amino acids: Valine, leucine, isoleucine, arginine (any one)

Non Essential amino acids: Glycine, alanine (any one)

1

1

1

27

- (i) Food preservatives: are the compounds which prevent spoilage of food due to microbial growth. eg: sodium benzoate, vinegar (any one example)
- (ii) Enzymes are the biological catalysts which increase the rate of metabolism. Eg: Invertase, Zymase, (or any other one example)
- (iii) Detergents are sodium salts of long chain alkyl sulphonates or benzene sulphonates. eg: Sodium Lauryl sulphate.

½ + ½

½ + ½

½ + ½

28 29 29

- (a)
- (i) Rate of a reaction- Change of concentration of reactant or product in any time is called rate of reaction
- (ii) Activation Energy – Minimum energy which the reacting molecules should acquire so that they react to give product is called activation energy.

or

1+1

The energy required for the formation of intermediate activated complex

$$(b) (i) t_{1/2} = \frac{0.693}{k}$$

$$k = \frac{0.693}{37.9} \text{ s}^{-1}$$

$$k = 0.0183 \text{ s}^{-1}$$

$$t = \frac{2.303}{0.183 \text{ s}^{-1}} \log \frac{[A_0]}{[A]}$$

$$t = \frac{2.303}{0.183 \text{ s}^{-1}} \log \frac{1}{1/4}$$

$$t = 75.84 \text{ s}$$

$$(ii) k = \frac{2.303}{60 \text{ s}} \log \frac{[A_0]}{[A]}$$

$$\log \frac{[A_0]}{[A]} = \frac{k \times 60}{2.303}$$

$$= \frac{0.0183 \times 60}{2.303}$$

$$\log \frac{[A_0]}{[A]} = 0.4762$$

(Full credit may be given upto this stage)

$$\frac{[A_0]}{[A]} = 2.999$$

$$\text{Therefore, } \frac{[A]}{[A_0]} = 0.33$$

OR

(a) (i) The sum of powers of the concentration of the reactants in the rate law expression is called the order of that chemical reaction.

(ii) Molecularity – No. of molecules taking part in a reaction is called molecularity

$$(b) \log \frac{k_2}{k_1} = \frac{E_a}{2.303 R} \left[\frac{T_2 - T_1}{T_1 T_2} \right]$$

$$\log 4 = \frac{E_a}{2.303 \times 8.314 \text{ JK}^{-1} \text{ mol}^{-1}} \left[\frac{320 - 300}{300 \times 320} \right] \text{ K}^{-1}$$

$$0.6020 = \frac{E_a}{2.303 \times 8.314 \text{ JK}^{-1} \text{ mol}^{-1}} \frac{20 \text{ K}^{-1}}{96 \times 10^3}$$

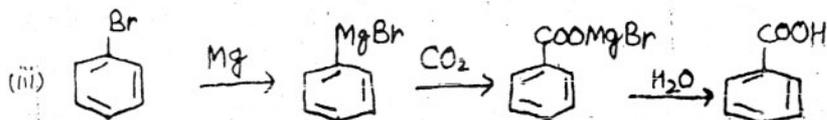
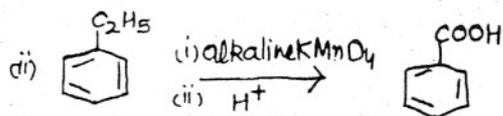
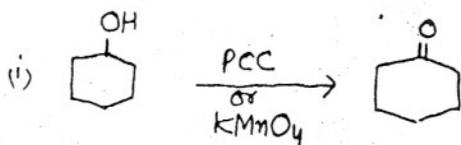
$$E_a = 55336.7 \text{ J mol}^{-1}$$

$$= 55.33 \text{ kJ mol}^{-1}$$

29	30	28	<p>(a) (i) $\text{Cr}_2\text{O}_7^{2-} + 3\text{H}_2\text{S} + 8\text{H}^+ \longrightarrow 2\text{Cr}^{3+} + 7\text{H}_2\text{O} + 3\text{S}$</p> <p>(ii) $2\text{Cu}^{2+} + 4\text{I}^- \longrightarrow \text{Cu}_2\text{I}_2 + \text{I}_2$</p> <p>(b) (i) It is due to increasing stability of lower species to which they are reduced. (ii) Because removing 3rd e⁻ from extra stable 3d⁵ configuration is difficult in case of Mn (iii) Because d³ of Cr²⁺ is more stable than d⁵ of Fe³⁺</p> <p>(i) $8\text{MnO}_4^- + 3\text{S}_2\text{O}_3^{2-} + \text{H}_2\text{O} \xrightarrow{\text{OR}} 8\text{MnO}_2 + 6\text{SO}_4^{2-} + 2\text{OH}^-$</p> <p>(ii) $\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{Fe}^{2+} \longrightarrow 2\text{Cr}^{3+} + 6\text{Fe}^{3+} + 7\text{H}_2\text{O}$</p> <p>(b) (i) In La³⁺, there is no f electrons while in Lu³⁺, there is presence of f¹⁴ / absence of unpaired electron / due to d-d transition. (ii) Mn²⁺ has 3d⁵ configuration having 5 unpaired electrons (iii) Cu⁺ undergo disproportionation in aqueous solution.</p> <p>$2\text{Cu}^+ \xrightarrow{\text{or}} \text{Cu}^{2+} + \text{Cu}$</p>	<p>1+1</p> <p>1x3 = 3</p> <p>1+1</p> <p>1x3 = 3</p>
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30	28	30	<p>(a) (i) Clemmensen reduction</p> $\text{>C=O} \xrightarrow[\text{HCl}]{\text{Zn-Hg}} \text{>CH}_2 + \text{H}_2\text{O}$ <p>(a) (ii) <u>Cannizzaro reaction:</u></p> $\begin{array}{c} \text{H} \\ \diagdown \\ \text{C}=\text{O} \\ \diagup \\ \text{H} \end{array} + \begin{array}{c} \text{H} \\ \diagdown \\ \text{C}=\text{O} \\ \diagup \\ \text{H} \end{array} + \text{KOH (conc.)}$ <p>formaldehyde</p> $\longrightarrow \begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{OH} \\ \\ \text{H} \end{array} + \begin{array}{c} \text{O} \\ \\ \text{H}-\text{C} \\ \\ \text{OK} \end{array}$ <p>methanol sodium formate</p>	
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(b)(i)

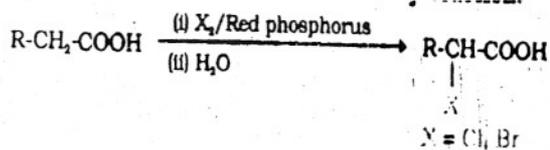


1x3 =
3

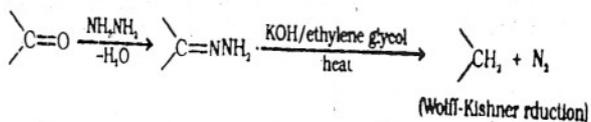
(or by any other suitable method)

OR

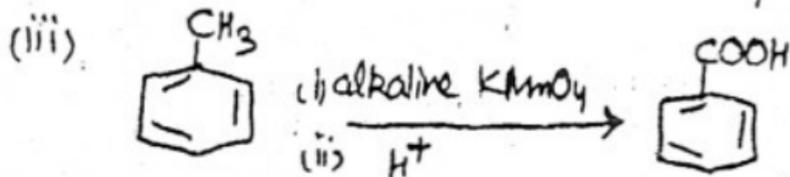
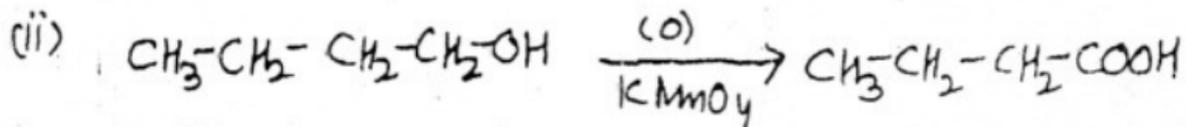
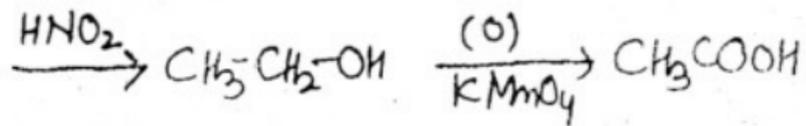
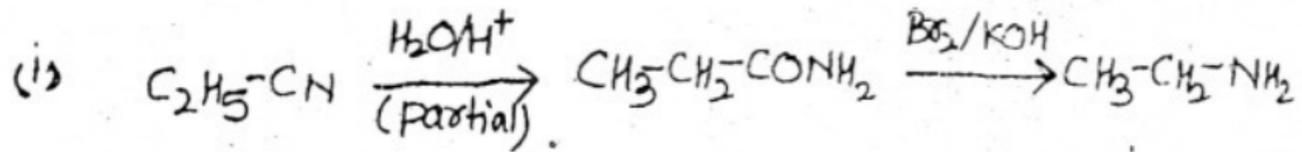
(i) Hell-Volhard-Zelinsky reaction



(ii) Wolf-kishner reduction



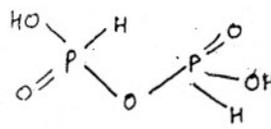
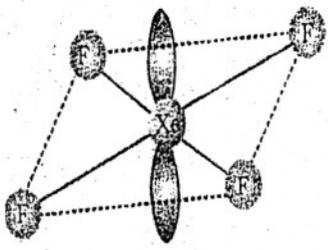
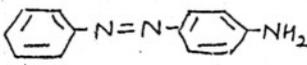
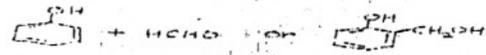
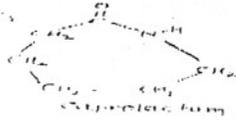
(b)



1x3 =
3

OUSIDE DELHI
SET 56/2

Q.no.	Answers	Marks
1	n-type semiconductors	1
2	Due to presence of triple bond or very high bond enthalpy	1
3	It is molar conductivity at infinite dilution or approaching zero concentration	1
4	$C_6H_5-CH_2-CH(OH)-CH_3$	1
5	4-bromo-3-methyl pent-2-ene	1
6	Simplest carbohydrates which cannot be hydrolysed further into simpler compound.	1
7	Ammoniacal solution of silver nitrate is called Tollen's reagent. It is used as an oxidizing reagent / test for -CHO group.	1
8	The process of making polymers by polymerisation from two different monomers is known as copolymerisation.	1
9	$Ag^+ / Ag < Cu^{2+} / Cu < Fe^{2+} / Fe < Cr^{3+} / Cr < Mg^{2+} / Mg < K^+ / K$ OR Redox Reaction $2MnO_4^- + 5Sn^{2+} + 16H^+ \longrightarrow 2Mn^{2+} + 5Sn^{4+} + 8H_2O$ $E^\circ_{cell} = E^\circ_C - E^\circ_A$ $= (+1.51 - 0.15)V = +1.36V$ As E°_{cell} is positive, the reaction is product favoured	2 1 $\frac{1}{2}$ $\frac{1}{2}$
10	The flow of solvent from solution of low concentration to higher concentration through semipermeable membrane is called osmosis. The hydrostatic pressure that has to be applied on the solution to prevent the entry of the solvent into the solution through the semipermeable membrane is called the Osmotic Pressure. Advantage: Unlike other colligative properties, osmotic pressure is used to determine the Molar mass of macromolecules/polymers like protein / or any other advantage	$\frac{1}{2}$ $\frac{1}{2}$ 1
11	$k = 1/R (l/A)$ Where k is conductivity, R is resistance and l/A is cell constant $\Lambda_m = k/C$ Where Λ_m is molar conductivity C is concentration	1 1
12	Coagulation is a process of aggregating together the colloidal particles so as to change them into large particles which ultimately settle as a precipitate. By electrophoresis, coagulation of lyophobic Sols can be carried out / or any other method.	1 1
13	(i) Peptization – Process of converting a freshly prepared ppt. into colloidal form by addition of a suitable electrolyte. (ii) Reversible sols – Sol in which dispersion medium is separated from the dispersed phase and it can be reconstituted easily.	1 1

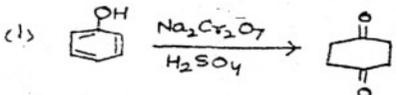
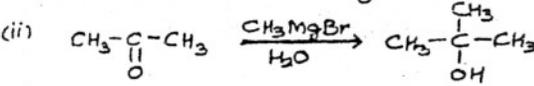
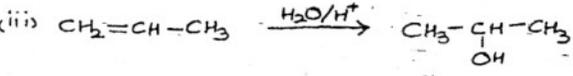
14	<p>(i)</p>  <p>(ii)</p> 	1+1
15	<p>(i) $2\text{NaOH} + \text{Cl}_2 \longrightarrow \text{NaCl} + \text{NaOCl} + \text{H}_2\text{O}$</p> <p>(ii) $\text{XeF}_6 + 3\text{H}_2\text{O} \longrightarrow \text{XeO}_3 + 6\text{HF}$</p>	1 1
16	<p>(i) A = $\text{CH}_3\text{CH}_2\text{CN}$ B = $\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$</p> <p>(ii) A = $\text{C}_6\text{H}_5\text{N}_2^+\text{Cl}^-$ B = </p> <p>(iii)</p>	$\frac{1}{2} +$ $\frac{1}{2}$ $\frac{1}{2} +$ $\frac{1}{2}$
17	<p>(i) Methylamine gives offensive smell of carbylamine when treated with alcoholic solution of KOH and CHCl_3. Dimethylamine does not give above test. <i>(Or any other relevant test)</i></p> <p>(ii) Aniline gives carbylamine test while N-methylaniline does not give above test. <i>(Or any other relevant test)</i></p>	1 1
18	<p>(i) </p> <p>(ii) </p>	1+1
19	<p>For f.c.c lattice $4r = \sqrt{2}a$ $4r = 1.414 \times 409\text{pm}$ $r = 144.625\text{pm}$</p>	1 1 1

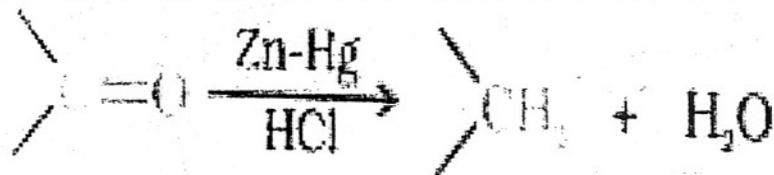
20	$\Delta T_f = [0 - (-10)]^\circ\text{C} = 10^\circ\text{C}$ $\Delta T_f = K_f m$ $10^\circ\text{C} = 1.86^\circ\text{C kg mol}^{-1} \times \frac{w}{62\text{g mol}^{-1}} \times \frac{1}{5.50\text{kg}}$ $w = 1833.3\text{g}$	1 1 1
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21	(i) Because two inner d-orbitals are not available in Ni. (ii) Because only d-electrons can be involved in π -complex. (iii) Because crystal field splitting energy is more than compensated for the third ionisation enthalpy.	1x3=3
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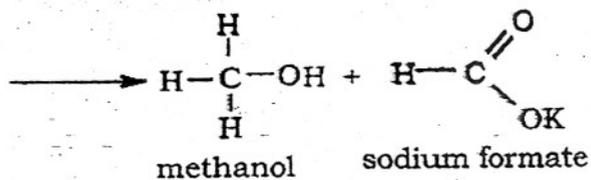
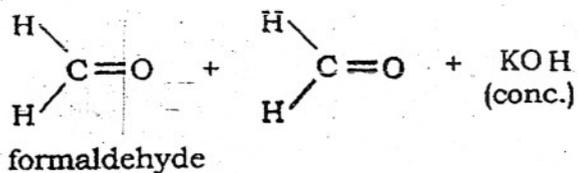
22	<p>In S_N1 it occurs in two steps and the reaction is of first order whereas in S_N2 it occurs in one step and the reaction is of second order.</p> <p style="text-align: center;">or</p> <p>In S_N1 reaction, retention of configuration takes place whereas in S_N2 inversion of configuration occurs.</p> <p>S_N2 eg.</p> <p>S_N1 eg.</p> <p>Chemistry 2024</p>	1 1 1 1 1
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23	(i) Role of NaCN in the extraction of silver is to do the leaching of silver ore in the presence of air from which the silver is obtained later by replacement. <p style="text-align: center;">or</p> $4\text{Ag(s)} + 8\text{CN}^-(\text{aq}) + 2\text{H}_2\text{O} + \text{O}_2(\text{g}) \longrightarrow 4[\text{Ag}(\text{CN})_2]^- + 4\text{OH}^-$	1
	(ii) Iodine is heated with titanium to form a volatile compound which on further heating decompose to give pure titanium as shown: <p style="text-align: center;">or</p> $\text{Ti}(\text{impure}) + 2\text{I}_2 \longrightarrow \text{TiI}_4$ $\text{TiI}_4 \longrightarrow \text{Ti}(\text{pure}) + 2\text{I}_2$	1
	(iii) Cryolite lowers the melting point of mixture of alumina in the extraction of aluminium / increase the conductivity of mixture. <p style="text-align: center;">OR</p>	1

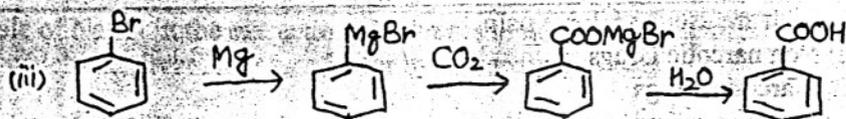
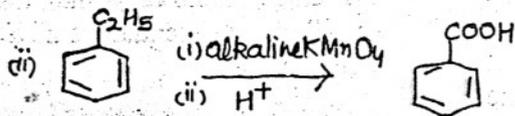
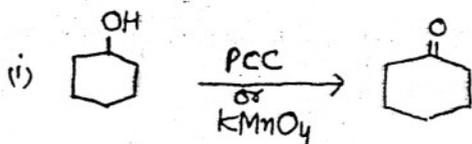
	<p>(i) Froth Floatation method:- The mineral particles become wet by oils while the gangue particles by water.</p> <p>(ii) Electrolytic refining: Crude metal is made as anode and pure metal as cathode. When current is passed through electrolyte of same metal ions then pure metal gets deposited at cathode and impurities settle at bottom of anode.</p> <p>(iii) Zone Refining:- The impurities are more soluble in the melt than in the solid state of the metal.</p>	1x3 = 3
24	<p>(i) Because (a) bond dissociation enthalpy of F₂ is lower than that of Cl₂ and (b) small size of F form stronger bond with N.</p> <p>(ii) Because it has sp³d hybridization with 3 lone pairs.</p> <p>(iii) Because of (a) lower bond dissociation enthalpy of F₂ and (b) high hydration enthalpy of F</p>	1x3= 3
25	<p>(i) </p> <p>(ii) </p> <p>(iii) </p>	1x3= 3
26	<p>Acidic amino acids contain more number of carboxyl groups than amino groups. Basic amino acids contain more number of amino groups than carboxyl groups. Neutral amino acids contain equal number of amino acids and carboxyl groups. (or any other suggestive answer)</p> <p>These amino acids which must be supplied to our diet are called essential amino acids and those which can be made by our bodies and not required in our diet are called non-essential amino acids.</p> <p>Essential amino acids: Valine leucine, isoleucine, argenine (any one)</p> <p>Non Essential amino acids: Glycine, alanine (any one)</p>	1 1 1
27	<p>The chemical substances which are used to relieve pain. These are of two types: (i) Non narcotic Drugs (ii) Narcotic Drugs</p> <p>Non Narcotic Drugs are effective in relieving skeletal pain / preventing heart attack / viral inflammation, etc.</p> <p>Narcotic Drugs are recommended for the relief in postoperative pains / Cardiac pain / terminal cancer.</p>	1 1 ½ ½
28	(a) (i) Clemmensen reduction	



(a) (ii) Cannizzaro reaction:



(b)



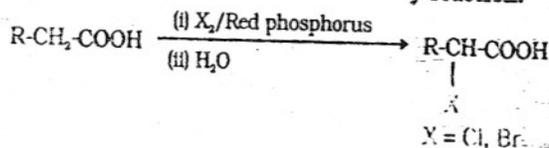
(or by any other suitable method)

OR

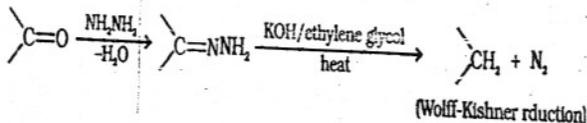
1x3=
3

(a)

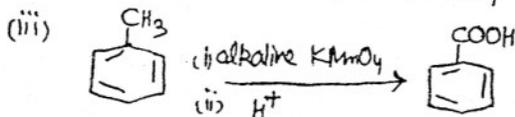
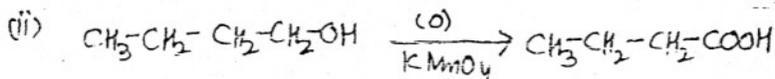
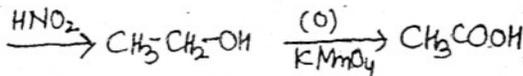
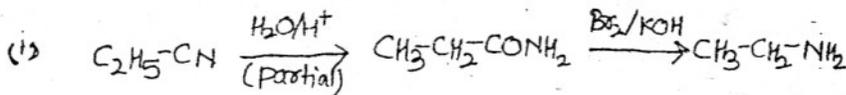
(i) Heli-Volhard-Zelinsky reaction



(ii) Wolf-kishner reduction



(b)



1x3=
3

29

(a)

(i) Rate of a reaction- Change of concentration of reactant or product in any time is called rate of reaction

(ii) Activation Energy – Minimum energy which the reacting molecules should acquire so that they react to give product is called activation energy.

OR

The energy required for the formation of intermediate activated complex

$$\text{(b) (i) } t_{1/2} = \frac{0.693}{k}$$

$$k = \frac{0.693}{37.9} \text{ s}^{-1}$$

$$k = 0.0183 \text{ s}^{-1}$$

1+1

1/2

1/2

$$t = \frac{2.303}{0.183\text{s}^{-1}} \log \frac{[A_0]}{[A]}$$

$$t = \frac{2.303}{0.183\text{s}^{-1}} \log \frac{1}{1/4}$$

$$t = 75.84\text{s}$$

$$(ii) k = \frac{2.303}{60\text{s}} \log \frac{[A_0]}{[A]}$$

$$\begin{aligned} \log \frac{[A_0]}{[A]} &= \frac{k \times 60}{2.303} \\ &= \frac{0.0183 \times 60}{2.303} \end{aligned}$$

$$\log \frac{[A_0]}{[A]} = 0.4762$$

(Full credit may be given upto this stage)

$$\frac{[A_0]}{[A]} = 2.999$$

$$[A]$$

$$\text{Therefore, } \frac{[A]}{[A_0]} = 0.33$$

$$[A_0]$$

OR

(a) (i) The sum of powers of the concentration of the reactants in the rate law expression is called the order of that chemical reaction.

(ii) Molecularity – No. of molecules taking part in a reaction is called molecularity

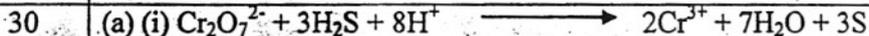
$$(b) \log \frac{k_2}{k_1} = \frac{E_a}{2.303 R} \left[\frac{T_2 - T_1}{T_1 T_2} \right]$$

$$\log 4 = \frac{E_a}{2.303 \times 8.314 \text{ JK}^{-1} \text{ mol}^{-1}} \left[\frac{320 - 300}{300 \times 320} \right] \text{ K}^{-1}$$

$$0.6020 = \frac{E_a}{2.303 \times 8.314 \text{ JK}^{-1} \text{ mol}^{-1}} \frac{20 \text{ K}^{-1}}{96 \times 10^3}$$

$$E_a = 55336.7 \text{ J mol}^{-1}$$

$$= 55.33 \text{ kJ mol}^{-1}$$

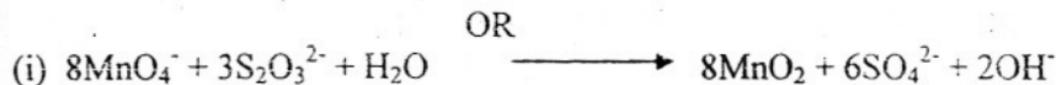


1+1

(b) (i) It is due to increasing stability of lower species to which they are reduced.

(ii) Because removing 3rd e⁻ from extra stable 3d⁵ configuration is difficult in case of Mn

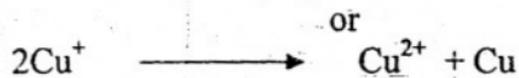
(iii) Because d³ of Cr²⁺ is more stable than d⁵ of Fe³⁺



(b) (i) In La³⁺, there is no f electrons while in Lu³⁺, there is presence of f¹⁴ / absence of unpaired electron / due to d-d transition.

(ii) Mn²⁺ has 3d⁵ configuration having 5 unpaired electrons

(iii) Cu⁺ undergo disproportionation in aqueous solution.



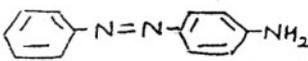
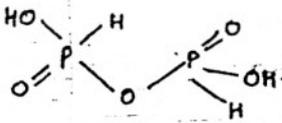
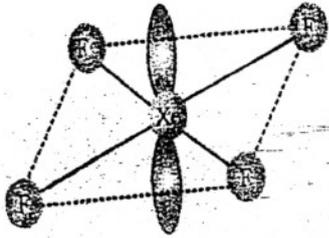
1x3
= 3

1+1

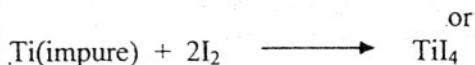
1x3
= 3

OUSIDE DELHI
SET 56/3

Q.no		
1	Conduction in the solid state	1
2	Because Fluorine is the most electronegative element	1
3	Molarity is temperature dependent while molality is temperature independent / Molarity is number of moles of solute per litre of solution whereas molality is number of moles of solute per kg. of solvent.	1
4	$C_6H_5-CH_2-CH(OH)-CH_3$	1
5	Ammoniacal solution of silver nitrate is called Tollen's reagent. It is used as an oxidizing reagent / test for $-CHO$ group	1
6	4-bromo-3-methyl pent-2-ene	1
7	6,6 means the number of carbon atoms in the monomers of Nylon-6,6	1
8	Glucose and Fructose	1
9	$Ag^+ / Ag < Cu^{2+} / Cu < Fe^{2+} / Fe < Cr^{3+} / Cr < Mg^{2+} / Mg < K^+ / K$ OR Redox Reaction $2MnO_4^- + 5Sn^{2+} + 16H^+ \longrightarrow 2Mn^{2+} + 5Sn^{4+} + 8H_2O$ $E^{\circ}_{cell} = E^{\circ}_C - E^{\circ}_A$ $= (+1.51 - 0.15)V = +1.36V$ As E°_{cell} is positive, the reaction is product favoured	2 1 $\frac{1}{2}$ $\frac{1}{2}$
10	$k = 1/R (l/A)$ Where k is conductivity, R is resistance and l/A is cell constant $\Lambda_m = k/C$ Where Λ_m is molar conductivity C is concentration	1 1
11	The flow of solvent from solution of low concentration to higher concentration through semipermeable membrane is called osmosis. The hydrostatic pressure that has to be applied on the solution to prevent the entry of the solvent into the solution through the semipermeable membrane is called the Osmotic Pressure. Advantage: Unlike other colligative properties, osmotic pressure is used to determine the Molar mass of macromolecules/polymers like protein / or any other advantage	$\frac{1}{2}$ $\frac{1}{2}$ 1
12	(i) $I_2 + 10HNO_3 \longrightarrow 2HIO_3 + 10NO_2 + 4H_2O$ (ii) $3HgCl_2 + PH_3 \longrightarrow Hg_3P_2 + 6HCl$ Note: Assign marks for correct products.	 1+1
13	Coagulation is a process of aggregating together the colloidal particles so as to change them into large particles which ultimately settle as a precipitate. By electrophoresis, coagulation of lyophobic Sols can be carried out / or any other method.	1 1
14	Tyndall Effect:- The scattering of light by the colloidal particles present in a colloidal sol is called Tyndall effect Shape Selective Catalysis:- The catalytic reaction that depends upon the pore structure of	1

	the catalyst and the size of the reactant and product molecules is called shape-selective catalysis.	1
15	<p>(i) $A = \text{CH}_3\text{CH}_2\text{CN}$ $B = \text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$</p> <p>(ii) $A = \text{C}_6\text{H}_5\text{N}_2^+\text{Cl}^-$ $B =$ </p> <p>(iii)</p>	1+1
16	<p>(i) </p> <p>(ii) </p>	1+1
17	<p>Ethylamine and aniline Aniline forms an azo-dye with benzenediazoniumchloride through coupling reaction whereas ethylamine does not form an azo-dye.</p> <p>Aniline and benzylamine Aniline forms an azo-dye with benzenediazoniumchloride through coupling reaction whereas benzylamine does not form an azo-dye.</p> <p>(or any other suitable test)</p>	1 1
18	<p>(i) $\text{CH}_2=\text{CH}-\text{Cl}$</p> <p>(ii) $\text{CF}_2=\text{CF}_2$</p>	1+1
19	<p>$d = \frac{z \times M}{a^3 \times N_A}$</p> <p>For fcc lattice $z = 4$</p> $10.5 \text{ g cm}^{-3} = \frac{4 \times M}{(4.07 \times 10^{-8} \text{ cm})^3 \times 6.02 \times 10^{23} \text{ mol}^{-1}}$ $M \approx 107 \text{ g mol}^{-1}$	1 1 1
20	<p>$\Delta T_f = [0 - (-0.34)]^\circ\text{C} = 0.34^\circ\text{C}$</p> <p>$\Delta T_f = K_f m$</p> $0.34^\circ\text{C} = 1.86^\circ\text{C kg mol}^{-1} \times \frac{15\text{g}}{M} \times \frac{1000}{450\text{kg}}$ $M = 182.35 \text{ g mol}^{-1}$	1 1 1
21	<p>(i) Role of NaCN in the extraction of silver is to do the leaching of silver ore in the presence of air from which the silver is obtained later by replacement.</p> <p>or</p> $4\text{Ag(s)} + 8\text{CN}^-(\text{aq}) + 2\text{H}_2\text{O} + \text{O}_2(\text{g}) \longrightarrow 4[\text{Ag}(\text{CN})_2]^- + 4\text{OH}^-$	1

(ii) Iodine is heated with titanium to form a volatile compound which on further heating decompose to give pure titanium as shown:



(iii) Cryolite lowers the melting point of mixture of alumina in the extraction of aluminium / increase the conductivity of mixture:

OR

(iii) Froth Floatation method:- The mineral particles become wet by oils while the gangue particles by water.

(iv) Electrolytic refining: Crude metal is made as anode and pure metal as cathode. When current is passed through electrolyte of same metal ions then pure metal gets deposited at cathode and impurities settle at bottom of anode.

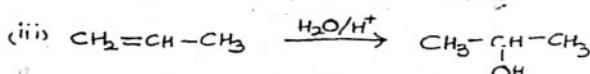
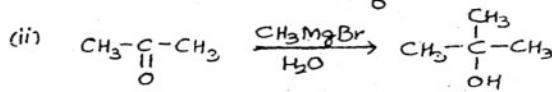
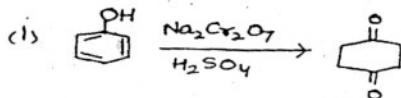
(iii) Zone Refining:- The impurities are more soluble in the melt than in the solid state of the metal.

1x3 =
3

- 22 (i) Due to smaller size of oxygen.
(ii) Because P-P bond is stronger than N-N bond.
(iii) Because of its highest electronegativity.

1x3=3

23



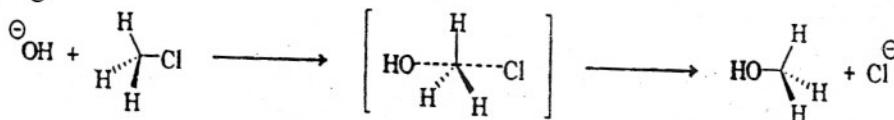
1x3=3

24 In S_N1 it occurs in two steps and the reaction is of first order whereas in S_N2 it occurs in one step and the reaction is of second order.

or

In S_N1 reaction, retention of configuration takes place whereas in S_N2 inversion of configuration occurs.

S_N2 eg.



1

	<p>S_N1 eg.</p> $ \begin{array}{c} \text{CH}_3 \\ \\ (\text{CH}_3)_3\text{CBr} \xrightleftharpoons{\text{step I}} \text{H}_3\text{C}-\text{C}^+-\text{CH}_3 + \text{Br}^- \\ \\ \text{CH}_3 \\ \\ \text{H}_3\text{C}-\text{C}^+-\text{CH}_3 + \text{OH}^- \xrightarrow{\text{step II}} (\text{CH}_3)_3\text{COH} \end{array} $ <p>Chemistrv 2024</p>	1						
25	<p>(i) $[\text{CoCl}_4]^{2-}$:- Tetrachloridocobaltate (II) ion, sp^3, Tetrahedral, Paramagnetic</p> <p>(ii) $[\text{Ni}(\text{CN})_4]^{2-}$:- Tetracyanonickelate (II) ion dsp^2, square planar diamagnetic</p> <p>(iii) $[\text{Cr}(\text{H}_2\text{O})_2(\text{C}_2\text{O}_4)_2]^-$:- Diaquadioxalatochromate (III) ion d^2sp^3, octahedral Paramagnetic</p> <p>Note : $\frac{1}{2}$ mark for each name and $\frac{1}{2}$ mark for all the three correct properties.</p>	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$						
26	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center; padding: 5px;">Fibrous Proteins</th> <th style="text-align: center; padding: 5px;">Globular Proteins</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">1. Polypeptide chain run parallel and held together forming fibre like structure</td> <td style="padding: 5px;">1. Polypeptide chains are folded forming spherical shape</td> </tr> <tr> <td style="padding: 5px;">2. Insoluble in water</td> <td style="padding: 5px;">2. soluble in water</td> </tr> </tbody> </table> <p>Denaturation of proteins means change in physical and biological properties of proteins, when protein is subjected to change in temperature, change in pH, addition of solvent, etc.</p>	Fibrous Proteins	Globular Proteins	1. Polypeptide chain run parallel and held together forming fibre like structure	1. Polypeptide chains are folded forming spherical shape	2. Insoluble in water	2. soluble in water	1+1 1
Fibrous Proteins	Globular Proteins							
1. Polypeptide chain run parallel and held together forming fibre like structure	1. Polypeptide chains are folded forming spherical shape							
2. Insoluble in water	2. soluble in water							
27	<p>(i) Antibiotics – Those compounds which are produced by microorganism and are used to exhibit the growth and activities of other microorganisms eg Penicillin, Chloramphenicol</p> <p>(ii) Antiseptic – Those chemicals which kill or prevent the growth of microorganism and are safely used to living tissues. eg Bithional, Dettol</p> <p>(iii) Analgesics – These are drugs which reduce or abolish pain. eg Aspirin, Morphine.</p>	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$						

28	<p>(a) (i) $\text{Cr}_2\text{O}_7^{2-} + 3\text{H}_2\text{S} + 8\text{H}^+ \longrightarrow 2\text{Cr}^{3+} + 7\text{H}_2\text{O} + 3\text{S}$</p> <p>(ii) $2\text{Cu}^{2+} + 4\text{I}^- \longrightarrow \text{Cu}_2\text{I}_2 + \text{I}_2$</p> <p>(c) (i) It is due to increasing stability of lower species to which they are reduced. (ii) Because removing 3rd e⁻ from extra stable 3d⁵ configuration is difficult in case of Mn (iii) Because d³ of Cr²⁺ is more stable than d⁵ of Fe³⁺</p> <p>(i) $8\text{MnO}_4^- + 3\text{S}_2\text{O}_3^{2-} + \text{H}_2\text{O} \xrightarrow{\text{OR}} 8\text{MnO}_2 + 6\text{SO}_4^{2-} + 2\text{OH}^-$</p> <p>(ii) $\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{Fe}^{2+} \longrightarrow 2\text{Cr}^{3+} + 6\text{Fe}^{3+} + 7\text{H}_2\text{O}$</p> <p>(b) (i) In La³⁺, there is no f electrons while in Lu³⁺, there is presence of f¹⁴ / absence of unpaired electron / due to d-d transition. (ii) Mn²⁺ has 3d⁵ configuration having 5 unpaired electrons (iv) Cu⁺ undergo disproportionation in aqueous solution.</p> $2\text{Cu}^+ \xrightarrow{\text{or}} \text{Cu}^{2+} + \text{Cu}$	1+1 1x3 = 3 1+1 1x3 =
29	<p>(a)</p> <ul style="list-style-type: none"> - (i) Rate of a reaction- Change of concentration of reactant or product in any time is called rate of reaction (ii) Activation Energy – Minimum energy which the reacting molecules should acquire so that they react to give product is called activation energy. <p style="text-align: center;">or</p> <p>The energy required for the formation of intermediate activated complex</p> <p>(b) (i) $t_{1/2} = \frac{0.693}{k}$</p> <p>$k = \frac{0.693}{37.9} \text{ s}^{-1}$</p> <p>$k = 0.0183\text{s}$</p> <p>$t = \frac{2.303}{0.183\text{s}^{-1}} \log \frac{[A_0]}{[A]}$</p> <p>$t = \frac{2.303}{0.183\text{s}^{-1}} \log \frac{1}{1/4}$</p> <p>$t = 75.84\text{s}$</p> <p>(ii) $k = \frac{2.303}{60\text{s}} \log \frac{[A_0]}{[A]}$</p> $\log \frac{[A_0]}{[A]} = \frac{k \times 60}{2.303}$ $= \frac{0.0183 \times 60}{2.303}$	1+1 1 1

$$\log \frac{[A_0]}{[A]} = 0.4762$$

(Full credit may be given upto this stage)

$$\frac{[A_0]}{[A]} = 2.999$$

$$\text{Therefore, } \frac{[A]}{[A_0]} = 0.33$$

OR

(d) (i) The sum of powers of the concentration of the reactants in the rate law expression is called the order of that chemical reaction.

(ii) Molecularity – No. of molecules taking part in a reaction is called molecularity

$$(b) \log \frac{k_2}{k_1} = \frac{E_a}{2.303 R} \left[\frac{T_2 - T_1}{T_1 T_2} \right]$$

$$\log 4 = \frac{E_a}{2.303 \times 8.314 \text{ JK}^{-1} \text{ mol}^{-1}} \left[\frac{320 - 300}{300 \times 320} \right] \text{K}^{-1}$$

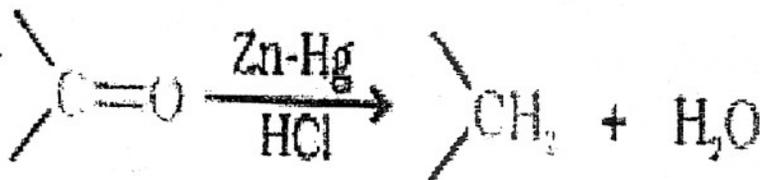
$$0.6020 = \frac{E_a}{2.303 \times 8.314 \text{ JK}^{-1} \text{ mol}^{-1}} \frac{20 \text{ K}^{-1}}{96 \times 10^3}$$

$$E_a = 55336.7 \text{ J mol}^{-1}$$

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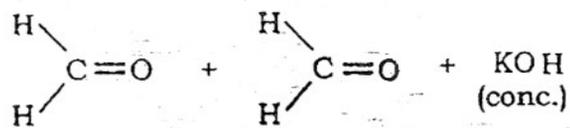
30

(a) (i) Clemmensen reduction

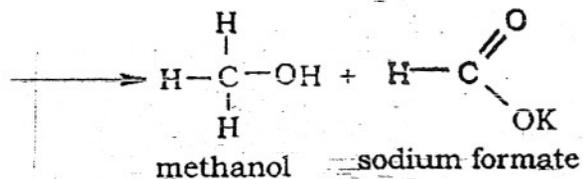


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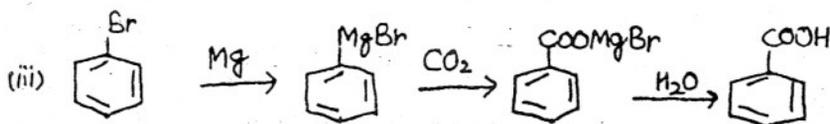
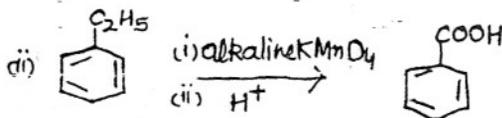
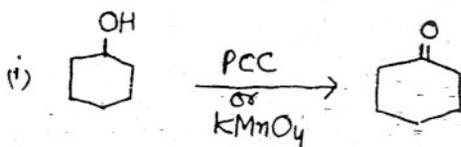
(ii) Cannizzaro reaction:



formaldehyde



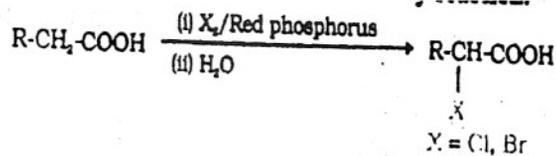
(b)



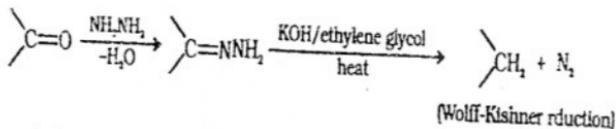
(or by any other suitable method)

OR

(i) Hell-Volhard-Zelinsky reaction

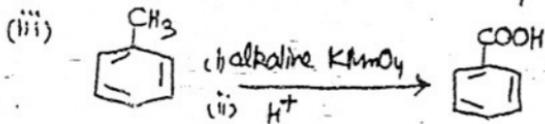
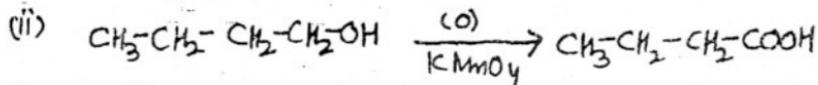
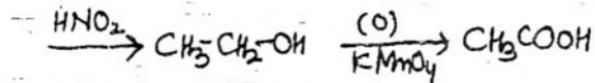
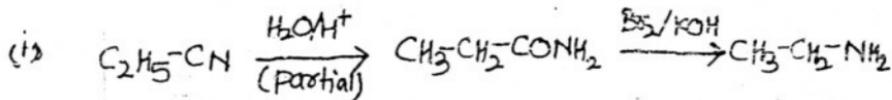


(ii) Wolf-kishner reduction



1

(b)



1x3=3