Strictly Confidential: (For Internal and Restricted use only)
Secondary School Examination September-2020
Marking Scheme – CHEMISTRY(043)
(PAPER CODE –56/C/1,2,3)

General Instructions: -

1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.
2. **"Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, Evaluation done and several other aspects. Its' leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in News Paper/Website etc may invite action under IPC."**
3. 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. **However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and marks be awarded to them. In class-X, while evaluating two competency based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, marks should be awarded.**
4. The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
5. Evaluators will mark(√) wherever answer is correct. For wrong answer 'X"be marked. Evaluators will not put right kind of mark while evaluating which gives an impression that answer is correct and no marks are awarded. **This is most common mistake which evaluators are committing.**
6. If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.
7. If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.
8. If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer 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 70 has to be used. Please do not hesitate to award full marks if the answer deserves it.
11. Every examiner has to necessarily do evaluation work for full working hours i.e. 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines).
12. Ensure that you do not make the following common types of errors committed by the Examiner in the past:-
    - Leaving answer or part thereof unassessed in an answer book.
    - Giving more marks for an answer than assigned to it.
    - Wrong totaling of marks awarded on a reply.
    - Wrong transfer of marks from the inside pages of the answer book to the title page.
    - Wrong question wise totaling on the title page.
    - Wrong totaling of marks of the two columns on the title page.
    - Wrong grand total.

- Marks in words and figures not tallying.
- Wrong transfer of marks from the answer book to online award list.
- Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.)
- Half or a part of answer marked correct and the rest as wrong, but no marks awarded.

13. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0)Marks.

14. Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.

15. The Examiners should acquaint themselves with the guidelines given in the Guidelines for spot Evaluation before starting the actual evaluation.

16. Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.

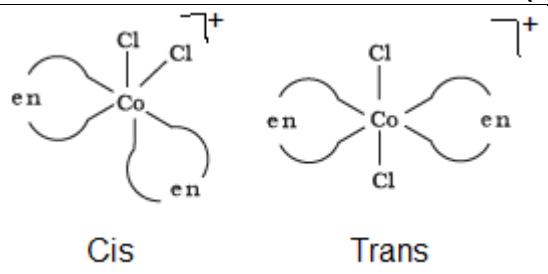
17. The Board permits candidates to obtain photocopy of the Answer Book on request in an RTI application and also separately as a part of the re-evaluation process on payment of the processing charges.

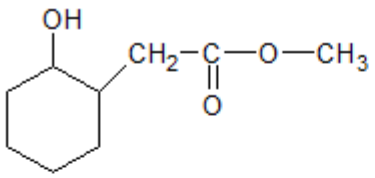
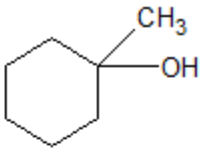
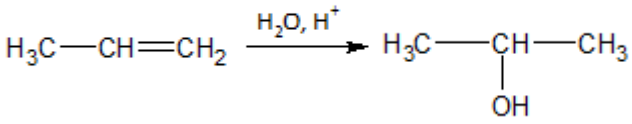
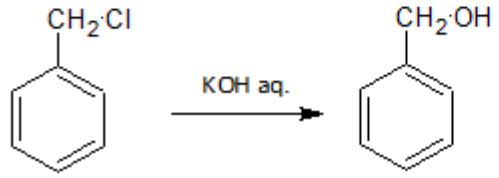
Marking scheme – 2020

CHEMISTRY (043) / CLASS XII

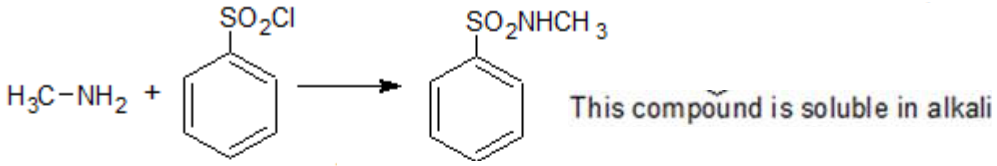
56/C/1

Q. No	Expected Answer / Value Points	Marks
	SECTION A	
1	Starch/ cellulose/ proteins / nucleic acids / natural rubber **(or any other suitable example)**	1
2	 Neoprene	1
3	Homoplolymer	1
4	Teflon / PTFE	1
5	PHBV / Nylon-2-nylon-6 / any natural polymer **(or any other suitable example)**	1
6	Nucleoside	1
7	Smoke/dust **(or any other suitable example)**	1
8	Alitame	1
9	Molar conductivity increases.	1
10	Kraft Temperature	1
11	(D)	1
12	(C) or (D)	1
13	(A)	1
14	(D)	1
15	(D)	1
16	(i)	1
17	(i)	1

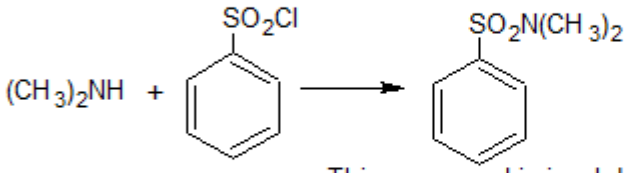
18	(iii)	1
19	(iii)	1
20	(iv)	1
	SECTION B	
21	a) At Anode: $2H_2O_{(l)} \longrightarrow 4H^+_{(aq)} + 4e^- + O_2$ At Cathode: $Cu^{2+}_{(aq)} + 2\ e^- \longrightarrow Cu_{(s)}$. / Copper is deposited at cathode and Oxygen gas is liberated at anode. b) At Anode: $2H_2O_{(l)} \longrightarrow 4H^+_{(aq)} + 4e^- + O_2$ At Cathode: $Ag^+_{(aq)} + e^- \longrightarrow Ag_{(s)}$. / Silver is deposited at cathode and oxygen gas is liberated at anode. **OR** $Fe^{3+} + e^- \longrightarrow Fe^{2+}$, so 1 mol of Fe^{3+} requires 1 F 3 moles of Fe^{3+} require 3 F Q = I x t t = 3 x 96500 / 2 t = 144750 sec	½ +½ ½ +½ ½ ½ ½ ½
22	Vitamins are certain organic compounds, required in small amounts in our diet but their deficiency causes specific diseases / organic compounds required in the diet in small amounts to perform specific biological functions for normal maintenance of optimum growth and health of the organism. Vitamins are classified into two groups depending upon their solubility in water or fat. (i) Fat soluble vitamins (ii) Water soluble vitamins. **OR** Proteins are polymers of α-amino acids. (or any other correct answer) They are classified as Fibrous and Globular proteins on the basis of their shape.	1 ½+½ 1 ½+½
23	Antiseptics the chemicals which either kill or prevent the growth of microorganisms but are applied to the living tissues such as wounds, cuts, ulcers and diseased skin surfaces. Examples are furacine, soframicine, etc. Disinfectants are also the chemicals which either kill or prevent the growth of microorganisms but applied to inanimate objects such as floors, drainage system, instruments, etc. e.g. Concentrated acids, Phenol (above 1% conc.) **(OR any other suitable point of difference and example)**	½+½ ½+½
24.	 Cis Trans	1+1
25.	It is the rate of reaction when concentration of each reactant is taken as unity. / It is the proportionality constant in the rate law expression or in the rate of reaction. $K = 0.693 / t_{1/2}$	1 1
26.	a) Electrolytic refining -The more basic metal remains in the solution and the less basic ones go to the anode mud. / Anode is impure metal and pure metal strip is cathode while aqueous solution of the metal salt acts as the electrolyte. b) Zone refining - Impurities are more soluble in the melt than in the solid state of the metal.	1 1
27.	Mn^{3+} = 4 unpaired electrons Cr^{3+} = 3 unpaired electrons Cr^{3+} is more stable due to half filled t_{2g}^3 configuration	½ ½ ½+½
	SECTION C	
28	$\Lambda_m = \frac{k}{c}\ x\ 1000$ $= \frac{8\ x\ 10^{-5}}{0.002}\ x\ 1000$ = 40 Scm^2mol^{-1}	½ 1

	$\alpha = \frac{\Lambda_m^c}{\Lambda_m^o}$ = 40/390.5 =0.102	½ 1
29	$K = \frac{2.303}{t} log \frac{[Ro]}{[R]}$ $4.9 \times 10^{-3} = \frac{2.303}{t} log \frac{4}{3}$ $t = \frac{2.303}{4.9\ x\ 10^{-3}} \log (0.6020 - 0.4771)$ = 58.7 sec **OR** a) Molecularity =2 or bimolecular. b) Order =1 or pseudo first order. c) Rate = $\frac{-\Delta[C_{12}H_{22}O_{11}]}{\Delta t} = + \frac{\Delta[C_6H_{12}O_6]}{\Delta t} = + \frac{\Delta[C_6H_{12}O_6]}{\Delta t}$	½ 1 1 ½ 1 1 1
30	a) Electrophoresis / coagulation /neutralisation of dispersed phase particles/ movement of colloidal particles towards oppositely charged electrode / precipitation. b) Demulsification / coagulation / separation of components of emulsion/ breaking down of emulsion. c) Coagulation /mutual coagulation /precipitation.	1 1 1
31	$4\ FeCr_2O_4 + 8\ Na_2CO_3 + 7\ O_2 \rightarrow 8\ Na_2CrO_4 + 2\ Fe_2O_3 + 8\ CO_2$ $2Na_2CrO_4 + 2\ H^+ \rightarrow Na_2Cr_2O_7 + 2\ Na^+ + H_2O$ $Na_2Cr_2O_7 + 2\ KCl \rightarrow K_2Cr_2O_7 + 2\ NaCl$ **(Ignore balancing)**	1 1 1
32	a) It reacts with moisture readily / It is highly reactive with any source of proton/ it forms hydrocarbons or alkanes / Grignard's reagent gets hydrolysed easily / RMgX + $H_2O \rightarrow$ RH + Mg(OH)X. b) They can't form hydrogen bonds with water / water can't compensate for the intermolecular forces of alkyl halides / interactions between water molecules and alkyl halides molecules are not strong / less energy is released when alkyl halide and water are mixed. c) Chloroform gets oxidised in air and sunlight / poisonous gas or phosgene is formed / $CHCl_3 + ½\ O_2 \rightarrow COCl_2 + HCl$. **(or any other correct reason)**	1 1 1
33	a)  b) CH_3CH_2OH c)  **OR** a) i)  ii)  b) 4-Methylphenol < phenol < 4-Nitrophenol / 4-Methylphenol , phenol , 4-Nitrophenol	1 x3 1 1 1
34	Hinsberg Test: Methyl amine or 1° amine reacts with Hinsberg's reagent or Benzene Sulphonyl Chloride to give a product which is soluble in alkali, Dimethyl amine or 2° amine reacts with Hinsberg's reagent or Benzene Sulphonyl Chloride to give	½ ½

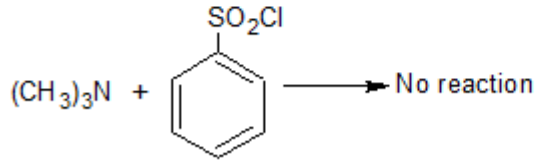
a product which is insoluble in alkali while
Trimethylamine or 3° amine doesn't react with Hinsberg's reagent or Benzene Sulphonyl Chloride. ½



This compound is soluble in alkali ½



This compound is insoluble in alkali ½



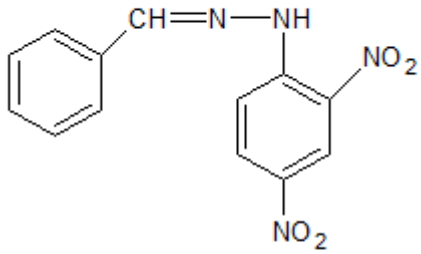
½

(Or any other suitable chemical test to identify different degree methyl amines)

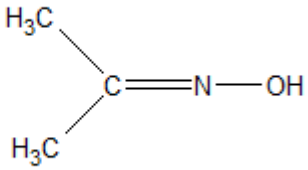
SECTION D

35

a) i)

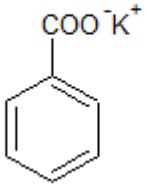


ii)

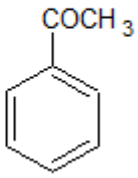


1+1

b) i)



ii)



1+1

c) Carboxylate ion is more stabilised than phenoxide ion / conjugate base of carboxylic acid is more stable than that of phenol / carboxylate ion has two equivalent resonating structures while the structures are non equivalent in phenoxide ion/ negative charge in carboxylate ion is delocalised over more electronegative two Oxygen atoms while in phenoxide ion negative charge is delocalised over one Oxygen atom and less electronegative Phenyl ring (or C-atoms). /Carboxylic acid reacts with $NaHCO_3$ to give brisk effervescence of CO_2 while phenol doesn't or reaction given by the student. 1

35

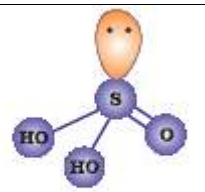
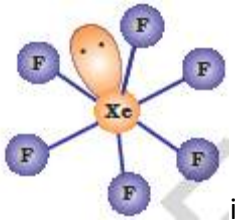
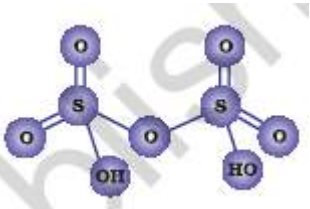
OR

a) $\underset{A}{CH_3COOCH_2CH_3} \xrightarrow{H_2SO_{4\ dil}} \underset{B}{CH_3COOH} + \underset{C}{CH_3CH_2OH}$ ½ x 3

$CH_3CH_2OH \xrightarrow{oxidation} CH_3COOH$

$CH_3CH_2OH \xrightarrow{dehydration} CH_2{=}CH_2$

A = Ethyl acetate ($CH_3COOCH_2CH_3$) , B = Acetic or Ethanoic acid (CH_3COOH), C = Ethanol (CH_3CH_2OH) ½ x 3

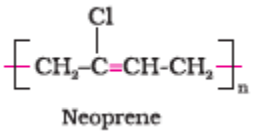
	b) i) $CH_3CHO \xrightarrow{LiAlH_4,\ dry\ ether} CH_3CH_2OH$ ii) $CH_3CHO \xrightarrow[Or\ NH_2NH_2\ with]{Zn/Hg\ in\ HCl_{conc.}} CH_3CH_3$ **(or any other suitable reagent for the above reactions or any other correct method for conversion)**	1 1
36	 Sulphurous acid (H_2SO_3) a) i) There are two -O-H bonds or groups / ii) Due to lower bond dissociation enthalpy of Te-H than H-O/ due to large size of Te / longer bond length of Te-H than H-O. iii) Due to highest electronegativity / due to absence of vacant d-orbitals / It can show only one oxidation state / it can't show higher positive oxidation state. b) i) $2XeF_6 + 2H_2O \longrightarrow XeO_2F_2 + 4HF$ (ignore balancing) ii) $I_2 + 3Cl_2 \longrightarrow 2ICl_3$ (ignore balancing) **OR**	1 1 1 1 1
36	a) i) $I_2 < F_2 < Br_2 < Cl_2$ ii) HF< HCl < HBr < HI iii) $H_2O > H_2S > H_2Se > H_2Te$  b) i)  ii)	1 1 1 1+1
37	a) Henry's law : The law states that at a constant temperature, **the solubility (mole fraction) of a gas in a liquid is directly proportional to the partial pressure of the gas present above the surface of liquid or solution.** Applications: To avoid bends, in the condition of anoxia and to fill CO_2 in cold drink bottles (any of the two applications) b) $\frac{Po-P}{Po} = X_2$ $\frac{Po-P}{Po} = \frac{n2}{n1+n2} \approx \frac{n2}{n1}$ $\frac{760-745}{760} = \frac{w2}{M2} x \frac{M1}{w1}$ = $\frac{15}{760} = \frac{5}{M2} x \frac{18}{95}$ $M_2 = \frac{760\ x\ 5\ x18}{95\ x\ 15} = 48 g mol^{-1}$ or u	1 ½+½ 1 1 1

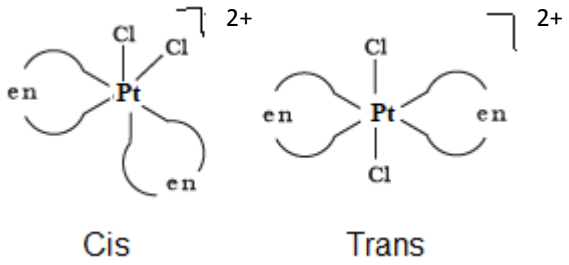
37	**OR** **a)** **Ideal Solution** | **Non-Ideal solution** It obeys Raoult's law over the entire range of concentration. | It doesn't obey Raoult's law over the entire range of concentration. $\Delta V_{mixing} = 0$ and $\Delta H_{mixing} = 0$ | $\Delta V_{mixing} \neq 0$ and $\Delta H_{mixing} \neq 0$. **(Any other two points of difference between the two).** b) $\Delta T_f = iK_f m$, for NaCl, i=2, $2 = 2x\ K_f \frac{Wb\ x\ 1000}{Mb\ x\ Wa}$ $1 = 1.86\ x\ \frac{w\ x\ 1000}{58.5\ x\ 100}$ w = 3.147 g **(1/2 mark to be deducted for incorrect or no units)** **(or by any other correct method)**	½ x 4 ½ ½ ½ ½ 1

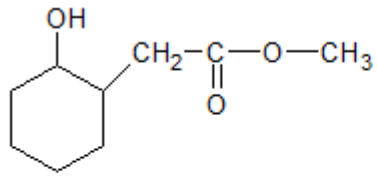
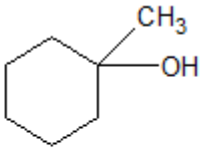
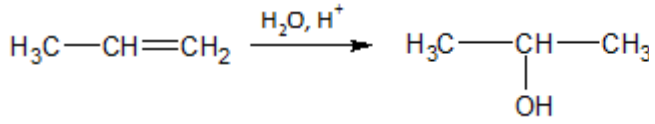
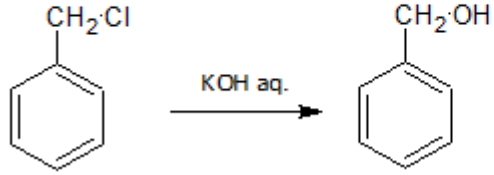
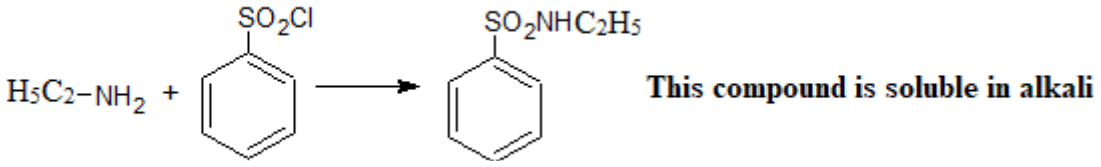
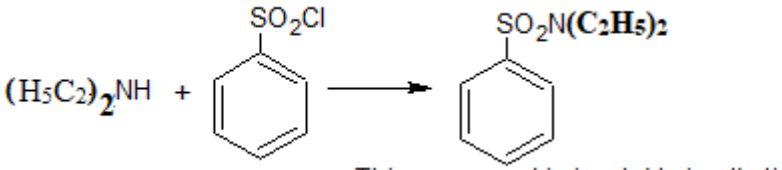
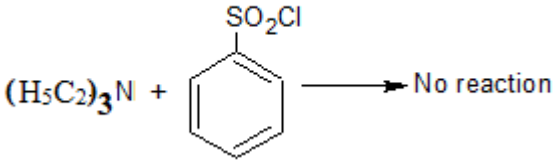
Marking scheme – 2020

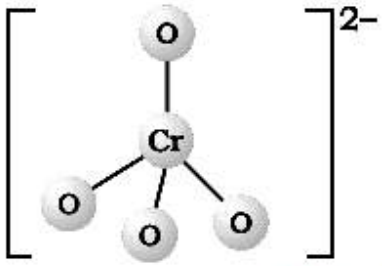
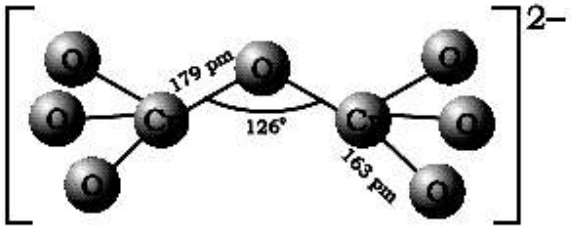
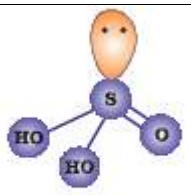
CHEMISTRY (043) / CLASS XII

56/C/2

Q.No	Expected Answer / Value Points	Marks
	SECTION A	
1	PHBV / Nylon-2-nylon-6 / any natural polymer (or any other suitable example).	1
2	Starch/ cellulose/ proteins / nucleic acids / natural rubber (or any other suitable example).	1
3	Teflon / PTFE	1
4		1
5	Homoplolymer	1
6	Kraft Temperature	1
7	Molar conductivity decreases.	1
8	Nucleoside	1
9	Smoke/dust (or any other suitable example)	1
10	Alitame	1
11	(D)	1
12	(A)	1
13	(D)	1
14	(C) or (D)	1
15	(C)	1
16	(iv)	1
17	(iii)	1
18	(i)	1

19	(i)	1
20	(iii)	1
	SECTION B	
21	 Cis Trans	1+ 1
22.	(a) Zone refining- Impurities are more soluble in the melt than in the solid state of the metal. (b) Electrolytic refining - The more basic metal remains in the solution and the less basic ones go to the anode mud. / Anode is impure metal and pure metal strip is cathode while aqueous solution of the metal salt acts as the electrolyte. / Distillation- Impure metals with low boiling point can be easily heated and condensed back as distillate leaving the impurities behind.	1 1
23	$_{Ti}{}^{3+}$ = 1 unpaired electron. Cr^{3+} = 3 unpaired electrons Cr^{3+} is more stable due to half-filled $t_{2g}{}^3$ configuration	½ ½ ½+½
24.	a) At Anode: $2H_2O_{(l)} \longrightarrow 4H^+_{(aq)} + 4e^- + O_2$ At Cathode: $Cu^{2+}_{(aq)} + 2e^- \longrightarrow Cu_{(s)}$. / Copper is deposited at cathode and Oxygen gas is liberated at anode. b) At Anode: $2H_2O_{(l)} \longrightarrow 4H^+_{(aq)} + 4e^- + O_2$ At Cathode: $Ag^+_{(aq)} + e^- \longrightarrow Ag_{(s)}$. / Silver is deposited at cathode and oxygen gas is liberated at anode. **OR** $Fe^{3+} + e^- \longrightarrow Fe^{2+}$, so 1 mol of Fe^{3+} requires 1 F 3 moles of Fe^{3+} require 3 F Q = I x t t = 3 x 96500 / 2 t = 144750 sec	½ +½ ½ +½ ½ ½ ½ ½
25.	Antiseptics the chemicals which either kill or prevent the growth of microorganisms but are applied to the living tissues such as wounds, cuts, ulcers and diseased skin surfaces. Examples are furacine, soframicine, etc. Disinfectants are also the chemicals which either kill or prevent the growth of microorganisms but applied to inanimate objects such as floors, drainage system, instruments, etc. e.g. Concentrated acids, Phenol (above 1% conc.) **(OR any other suitable point of difference and example)**	1 1
26.	It is the rate of reaction when concentration of each reactant is taken as unity. / It is the proportionality constant in the rate law expression or in differential rate equation or in the rate of reaction. K = 0.693 / $t_{1/2}$	1 1
27.	Vitamins are certain organic compounds, required in small amounts in our diet but their deficiency causes specific diseases / organic compounds required in the diet in small amounts to perform specific biological functions for normal maintenance of optimum growth and health of the organism. Vitamins are classified into two groups depending upon their solubility in water or fat. (i) Fat soluble vitamins (ii) Water soluble vitamins. **OR** Proteins are polymers of α-amino acids. **(or any other suitable definition)** They are classified as Fibrous and Globular proteins on the basis of their shape.	1 ½+½ 1 ½+½
	SECTION C	

28	a)  b) CH_3CH_2OH c)  **OR** a) i)  ii)  b) 4-Methylphenol < phenol < 4-Nitrophenol / 4-Methylphenol , phenol , 4-Nitrophenol	1 x3 1 1 1
29	Hinsberg Test: Ethyl amine or 1° amine reacts with Hinsberg's reagent or Benzene Sulphonyl Chloride to give a product which is soluble in alkali, Diethyl amine or 2° amine reacts with Hinsberg's reagent or Benzene Sulphonyl Chloride to give a product which is insoluble in alkali while Triethylamine or 3° amine doesn't react with Hinsberg's reagent or Benzene Sulphonyl Chloride.  **This compound is soluble in alkali**  This compound is insoluble in alkali  No reaction (**Or any other suitable chemical test to identify different degree methyl amines)**	½ ½ ½ ½ ½ ½
30	$\Lambda_m = \frac{k}{c} \; x \; 1000$ $= \frac{8 \; x \; 10^{-5}}{0.002} \; x \; 1000$ = 40 Scm^2mol^{-1} $\alpha = \frac{\Lambda_m^c}{\Lambda_m^o}$ = 40/390.5 =0.102	½ 1 ½ 1

31	$K = \frac{2.303}{t} log \frac{[Ro]}{[R]}$ $4.9 \times 10^{-3} = \frac{2.303}{t} log \frac{4}{3}$ $t = \frac{2.303}{4.9\,x\,10^{-3}} \log (0.6020 - 0.4771)$ = 58.7 sec **OR** d) Molecularity =2 or bimolecular. e) Order =1 or pseudo first order. f) Rate = $\frac{-\Delta[C_{12}H_{22}O_{11}]}{\Delta t} = + \frac{\Delta[C_6H_{12}O_6]}{\Delta t} = + \frac{\Delta[C_6H_{12}O_6]}{\Delta t}$	½ 1 1 ½ 1 1 1
32	d) Electro-osmosis. e) Coagulation / precipitation / mutual coagulation / hardening of leather. f) Coagulation /precipitation / artificial rain	1 1 1
33	In basic medium or at high pH, $Cr_2O_7^{2-}$ (dichromate ion) changes to CrO_4^{2-} (chromate ion) / orange coloured solution changes to yellow coloured solution / Reaction: $Cr_2O_7^{2-} + 2\,OH^- \rightarrow 2\,CrO_4^{2-} + H_2O$  Chromate ion (Yellow Colour)  Dichromate ion (Orange colour) (½ marks each to be awarded for the colour and structure of each ion).	1 ½ x 2 ½ x 2
34	d) Grignard's reagent gets hydrolysed easily / It reacts with moisture readily / It is highly reactive with any source of proton/ it forms hydrocarbons or alkanes / $RMgX + H_2O \rightarrow RH + Mg(OH)X$. e) Due to resonance, C-Cl get partial double bond character/ sp^{2-}hybrid C-atom in chlorobenzene has greater s-character or is more electronegative / Instability of phenyl **cation /** Due to repulsion, it is less likely for the electron rich nucleophile to approach electron rich arenes. f) **Symmetrical structure can easily fit into the lattice**. So, due to higher packing efficiency large energy is required to melt. **(or any other correct reason)**	1 1 1
	SECTION D	
35	 Sulphurous acid (H_2SO_3) c) i) There are two -O-H bonds or groups / ii) Due to lower bond dissociation enthalpy of Te-H than H-O/ due to large size of Te / longer bond length of Te-H than H-O. iii) Due to highest electronegativity / due to absence of vacant d-orbitals / It can show only one oxidation state / it can't show higher positive oxidation state. d) i) $2XeF_6 + 2H_2O \longrightarrow XeO_2F_2 + 4HF$ (ignore balancing) ii) $I_2 + 3Cl_2 \longrightarrow 2ICl_3$ (ignore balancing)	1 1 1 1 1

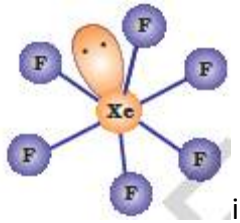
OR

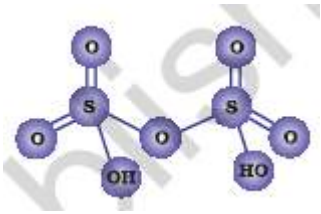
35

c) i) $I_2 < F_2 < Br_2 < Cl_2$ — 1

iv) HF< HCl < HBr < HI — 1

v) $H_2O > H_2S > H_2Se > H_2Te$ — 1

d) i) 

ii) 

1+1

36

c) Henry's law : The law states that at a constant temperature, **the solubility (mole fraction) of a gas in a liquid is directly proportional to the partial pressure of the gas present above the surface of liquid or solution.** — 1

Applications: To avoid bends, in the condition of anoxia and to fill CO_2 in cold drink bottles (any of the two applications) — ½+½

d) $\frac{Po-P}{Po} = X_2$ — 1

$\frac{Po-P}{Po} = \frac{n2}{n1+n2} \approx \frac{n2}{n1}$

$\frac{760-745}{760} = \frac{w2}{M2} x \frac{M1}{w1}$ = $\frac{15}{760} = \frac{5}{M2} x \frac{18}{95}$ — 1

$M_2 = \frac{760\ x\ 5\ x18}{95\ x\ 15} = 48 g mol^{-1}$ or u — 1

OR

36

a)

Ideal Solution	**Non-Ideal solution**
It obeys Raoult's law over the entire range of concentration.	It doesn't obey Raoult's law over the entire range of concentration.
$\Delta V_{mixing} = 0$ and $\Delta H_{mixing} = 0$	$\Delta V_{mixing} \neq 0$ and $\Delta H_{mixing} \neq 0$.

½ x 4

(Any other two points of difference between the two).

b) $\Delta T_f = iK_f m$,

for NaCl, i=2, — ½

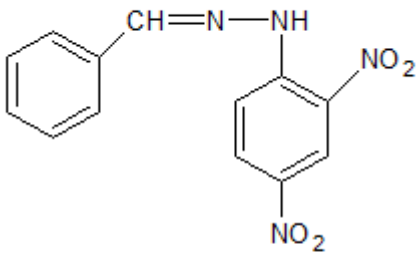
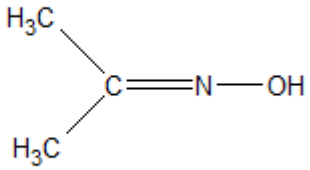
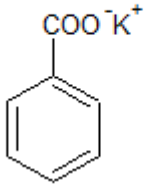
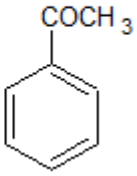
$2 = 2x\ K_f \frac{Wb\ x\ 1000}{Mb\ x\ Wa}$ — ½

$1 = 1.86\ x\ \frac{w\ x\ 1000}{58.5\ x\ 100}$ — ½

w = 3.147 g **(1/2 mark to be deducted for incorrect or no units)** — ½

1

(or by any other correct method)

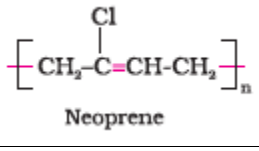
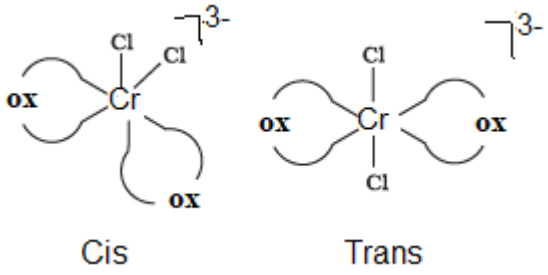
37	a) i)  ii) 	1+1
	b) i)  ii) 	1+1
	c) Carboxylate ion is more stablised than phenoxide ion / conjugate base of carboxylic acid is more stable than that of phenol / carboxylate ion has two equivalent resonating structures while the structures are non equivalent in phenoxide ion/ negative charge in carboxylate ion is delocalised over more electronegative two Oxygen atoms while in phenoxide ion negative charge is delocalised over one Oxygen atom and less electronegative Phenyl ring (or C atoms). /Carboxylic acid reacts with $NaHCO_3$ to give brisk effervescence of CO_2 while phenol doesn't or reaction given by the student.	1
37	**OR** a) $CH_3COOCH_2CH_3$ (A) $\xrightarrow{H_2SO_{4\ dil}}$ CH_3COOH (B) + CH_3CH_2OH (C) $CH_3CH_2OH \xrightarrow{oxidation} CH_3COOH$ $CH_3CH_2OH \xrightarrow{dehydration} CH_2{=}CH_2$	½ x 3
	A = Ethyl acetate ($CH_3COOCH_2CH_3$) , B = Acetic or Ethanoic acid (CH_3COOH), C = Ethanol (CH_3CH_2OH)	½ x 3
	b) i) $CH_3CHO \xrightarrow{LiAlH_{4,\ dry\ ether}} CH_3CH_2OH$	1
	ii) $CH_3CHO \xrightarrow[Or\ NH_2NH_2]{Zn/Hg\ in\ HCl} CH_3CH_3$	1
	(or any other suitable reagent for the above reactions or any other correct method for conversion)	

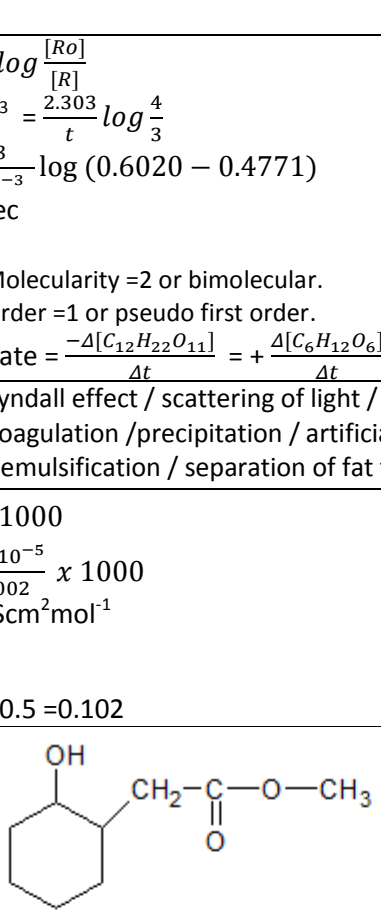
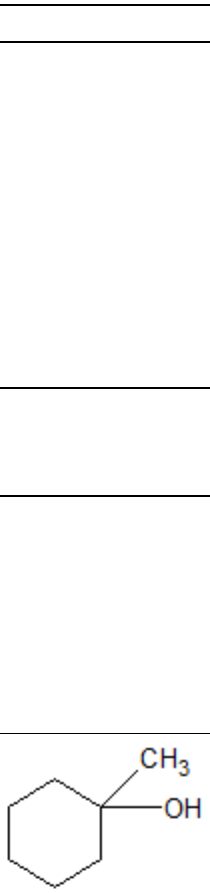
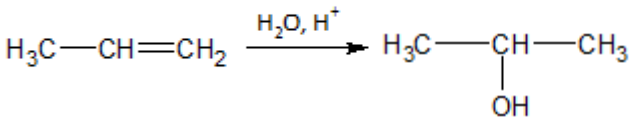
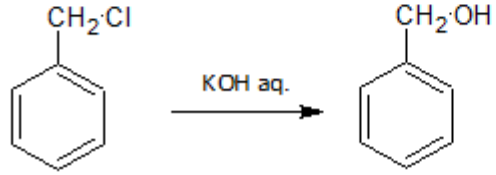
Marking scheme – 2020

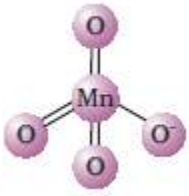
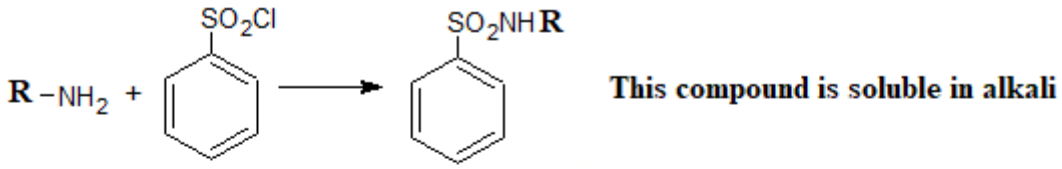
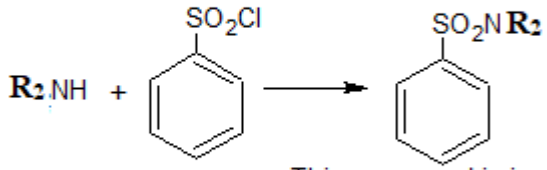
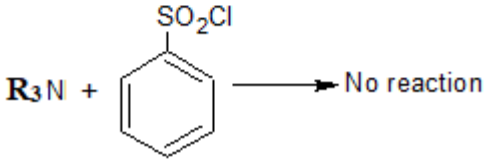
CHEMISTRY (043) / CLASS XII

56/C/3

Q.No	Expected Answer / Value Points	Marks
	SECTION A	
1	PHBV / Nylon-2-nylon-6 / any natural polymer (or any other suitable example).	1
2	Homoploymer	1
3	Starch/ cellulose/ proteins / nucleic acids / natural rubber (or any other suitable example).	1

4	 Neoprene	1
5	Teflon / PTFE	1
6	Molar conductivity increases.	1
7	Nucleoside	1
8	Kraft Temperature	1
9	Alitame	1
10	Cheese/Jellies (or any other suitable example)	1
11	(C) or (D)	1
12	(D)	1
13	(D)	1
14	(A)	1
15	(B)	1
16	(i)	1
17	(iii)	1
18	(i)	1
19	(i)	1
20	(iii)	1
	SECTION B	
21	Vitamins are certain organic compounds, required in small amounts in our diet but their deficiency causes specific diseases / organic compounds required in the diet in small amounts to perform specific biological functions for normal maintenance of optimum growth and health of the organism. Vitamins are classified into two groups depending upon their solubility in water or fat. (i) Fat soluble vitamins (ii) Water soluble vitamins. **OR** Proteins are polymers of α-amino acids. (or any other correct answer) They are classified as Fibrous and Globular proteins on the basis of their shape.	1 ½+½ 1 ½+½
22.	 Cis Trans	1 + 1
23	It is the rate of reaction when concentration of each reactant is taken as unity. / It is the proportionality constant in the rate law expression or in differential rate equation or in the rate of reaction. $K = 0.693 / t_{1/2}$	1 1
24.	a) At Anode: $2H_2O_{(l)} \longrightarrow 4H^+_{(aq)} + 4e^- + O_2$ At Cathode: $Cu^{2+}_{(aq)} + 2e^- \longrightarrow Cu_{(s)}$. / Copper is deposited at cathode and Oxygen gas is liberated at anode. b) At Anode: $2H_2O_{(l)} \longrightarrow 4H^+_{(aq)} + 4e^- + O_2$ At Cathode: $Ag^+_{(aq)} + e^- \longrightarrow Ag_{(s)}$. / Silver is deposited at cathode and oxygen gas is liberated at anode. **OR** $Fe^{3+} + e^- \longrightarrow Fe^{2+}$, so 1 mol of Fe^{3+} requires 1 F 3 moles of Fe^{3+} require 3 F $Q = I \times t$ $t = 3 \times 96500 / 2$ $t = 144750$ sec	½ +½ ½ +½ ½ ½ ½ ½

25.	a) Electrolytic refining -The more basic metal remains in the solution and the less basic ones go to the anode mud. / Anode is impure metal and pure metal strip is cathode while aqueous solution of the metal salt acts as the electrolyte. b) Zone refining - Impurities are more soluble in the melt than in the solid state of the metal.	1 1
26.	Cr^{3+} = 3 unpaired electrons V^{3+} = 2 unpaired electrons Cr^{3+} is more stable due to half filled t_{2g}^{3} configuration	½ ½ ½+½
27.	Antiseptics the chemicals which either kill or prevent the growth of microorganisms but are applied to the living tissues such as wounds, cuts, ulcers and diseased skin surfaces. Examples are furacine, soframicine, etc. Disinfectants are also the chemicals which either kill or prevent the growth of microorganisms but applied to inanimate objects such as floors, drainage system, instruments, etc. e.g. Concentrated acids, Phenol (above 1% conc.) **(OR any other suitable point of difference and example)**	1 1
	SECTION C	
28	K = $\frac{2.303}{t} log \frac{[Ro]}{[R]}$ 4.9 x 10^{-3} = $\frac{2.303}{t} log \frac{4}{3}$ t = $\frac{2.303}{4.9\ x\ 10^{-3}} \log (0.6020 - 0.4771)$ = 58.7 sec **OR** g) Molecularity =2 or bimolecular. h) Order =1 or pseudo first order. i) Rate = $\frac{-\Delta[C_{12}H_{22}O_{11}]}{\Delta t}$ = + $\frac{\Delta[C_6H_{12}O_6]}{\Delta t}$ = + $\frac{\Delta[C_6H_{12}O_6]}{\Delta t}$	½ 1 1 ½ 1 1 1
29	g) Tyndall effect / scattering of light / path of the light gets illuminated. h) Coagulation /precipitation / artificial rain. i) Demulsification / separation of fat from the milk / coagulation.	1 1 1
30	$\Lambda_m = \frac{k}{c}\ x\ 1000$ = $\frac{8\ x\ 10^{-5}}{0.002}\ x\ 1000$ = 40 Scm^2mol^{-1} $\alpha = \frac{\Lambda_m^c}{\Lambda_m^o}$ = 40/390.5 =0.102	½ 1 ½ 1
31	a)  b) CH_3CH_2OH c)  **OR** a) i)  ii)  b) 4-Methylphenol < phenol < 4-Nitrophenol / 4-Methylphenol , phenol , 4-Nitrophenol	1 x3 1 1 1

32	$2MnO_2 + 4KOH + O_2 \rightarrow 2K_2MnO_4 + 2H_2O$ $3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^- + MnO_2 + 2H_2O$ Commercially it is prepared by the alkaline oxidative fusion of MnO_2 followed by the electrolytic oxidation of manganate (VI). $MnO_2 \xrightarrow{\text{Fused with KOH, oxidised with air or } KNO_3} MnO_4^{2-}$: $MnO_4^{2-} \xrightarrow{\text{Electrolytic oxidation in alkaline solution}} MnO_4^-$ manganate ion — manganate — permanganate ion  (ignore balancing)	1 1 1
33	a) By products of the reaction, SO_2 and HCl being gases escape easily leaving behind pure alkyl chloride./ It is a good chlorinating agent. b) Due to higher molecular mass of alkyl halide than hydrocarbons / Due to polar nature of alkyl halides while hydrocarbons are non-polar / strong dipole-dipole forces / stronger van der Waal forces of attraction. c) Saytzeff's rule / more alkylated or substituted alkene, is more stable.	1 1 1
34	Hinsberg Test: 1^o amine reacts with Hinsberg's reagent or Benzene Sulphonyl Chloride to give a product which is soluble in alkali, 2^o amine reacts with Hinsberg's reagent or Benzene Sulphonyl Chloride to give a product which is insoluble in alkali while 3^o amine doesn't react with Hinsberg's reagent or Benzene Sulphonyl Chloride.  **This compound is soluble in alkali**  This compound is insoluble in alkali  (OR Any other suitable method for the separation of primary, secondary and tertiary amines).	½ ½ ½ ½ ½ ½
	SECTION D	
35	e) Henry's law : The law states that at a constant temperature, **the solubility (mole fraction) of a gas in a liquid is directly proportional to the partial pressure of the gas present above the surface of liquid or solution.** Applications: To avoid bends, in the condition of anoxia and to fill CO_2 in cold drink bottles (any of the two applications) f) $\frac{Po-P}{Po} = X_2$	1 ½+½ 1

$\frac{Po-P}{Po} = \frac{n2}{n1+n2} \approx \frac{n2}{n1}$ 1

$\frac{760-745}{760} = \frac{w2}{M2} x \frac{M1}{w1}$ = $\frac{15}{760} = \frac{5}{M2} x \frac{18}{95}$ 1

$M_2 = \frac{760 \; x \; 5 \; x 18}{95 \; x \; 15} = 48 g mol^{-1}$ or u

OR

35 **a)**

Ideal Solution	**Non-Ideal solution**
It obeys Raoult's law over the entire range of concentration.	It doesn't obey Raoult's law over the entire range of concentration.
ΔVmixing = 0 and $\Delta H_{mixing} = 0$	$\Delta V_{mixing} \neq 0$ and $\Delta H_{mixing} \neq 0$.

½ x 4

(Any other two points of difference between the two).

b) $\Delta T_f = iK_f m$, ½

for NaCl, i=2, ½

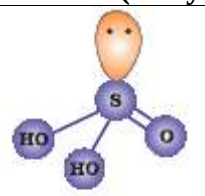
$2 = 2x \; K_f \frac{Wb \; x \; 1000}{Mb \; x \; Wa}$ ½

$1 = 1.86 \; x \; \frac{w \; x \; 1000}{58.5 \; x \; 100}$ ½

w = 3.147 g **(1/2 mark to be deducted for incorrect or no units)** 1

(or by any other correct method)

36



Sulphurous acid
(H_2SO_3)

e) i) There are two -O-H bonds or groups / 1

ii) Due to lower bond dissociation enthalpy of Te-H than H-O/ due to large size of Te / longer bond length of Te-H than H-O. 1

iii) Due to highest electronegativity / due to absence of vacant d-orbitals / It can show only one oxidation state / it can't show higher positive oxidation state. 1

36

f) i) $2XeF_6 + 2H_2O \longrightarrow XeO_2F_2 + 4HF$ (ignore balancing) 1

ii) $I_2 + 3Cl_2 \longrightarrow 2ICl_3$ (ignore balancing) 1

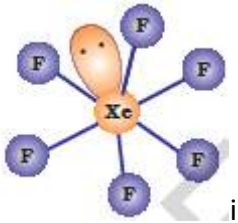
OR

e) i) $I_2 < F_2 < Br_2 < Cl_2$ 1

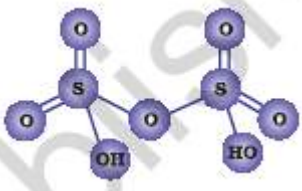
vi) HF< HCl < HBr < HI 1

vii) $H_2O > H_2S > H_2Se > H_2Te$ 1

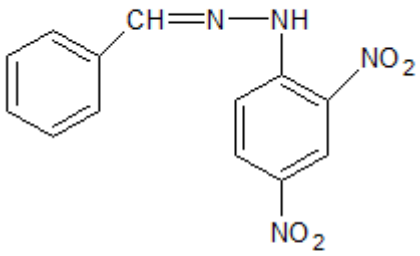
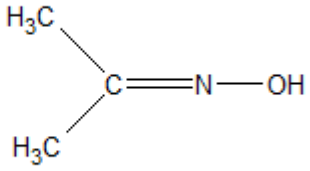
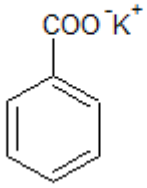
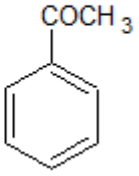
f) i)



ii)



1+1

37	a) i)  ii) 	1+1
37	b) i)  ii) 	1+1
	c) Carboxylate ion is more stablised than phenoxide ion / conjugate base of carboxylic acid is more stable than that of phenol / carboxylate ion has two equivalent resonating structures while the structures are non equivalent in phenoxide ion/ negative charge in carboxylate ion is delocalised over more electronegative two Oxygen atoms while in phenoxide ion negative charge is delocalised over one Oxygen atom and less electronegative Phenyl ring (or C atoms). /Carboxylic acid reacts with $NaHCO_3$ to give brisk effervescence of CO_2 while phenol doesn't or reaction given by the student.	1
	OR a) $CH_3COOCH_2CH_3 \xrightarrow{H_2SO_{4\ dil}} CH_3COOH + CH_3CH_2OH$ A B C $CH_3CH_2OH \xrightarrow{oxidation} CH_3COOH$ $CH_3CH_2OH \xrightarrow{dehydration} CH_2{=}CH_2$	½ x 3
	A = Ethyl acetate ($CH_3COOCH_2CH_3$) , B = Acetic or Ethanoic acid (CH_3COOH), C = Ethanol (CH_3CH_2OH)	½ x 3
	b) i) $CH_3CHO \xrightarrow{LiAlH_{4,\ dry\ ether}} CH_3CH_2OH$	1
	ii) $CH_3CHO \xrightarrow[Or\ NH_2NH_2]{Zn/Hg\ in\ HCl} CH_3CH_3$	1
	(or any other suitable reagent for the above reactions or any other correct method for conversion)	