Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Senior Secondary School Supplementary Examination, July-2024
SUBJECT NAME: CHEMISTRY SUBJECT CODE:043 PAPER CODE: 56/S/2

General Instructions: -

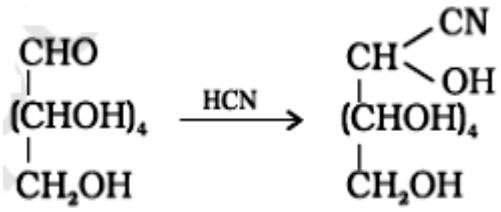
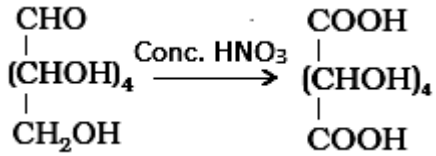
1	You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested 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 various rules of the Board and 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 due marks be awarded to them. In class-XII, 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, due marks should be awarded.**
4	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly.
5	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. If there is any variation, the same should be zero after deliberation and discussion. 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.
6	Evaluators will mark(√) wherever answer is correct. For wrong answer CROSS 'X" be marked. Evaluators will not put right (✓) while evaluating which gives an impression that answer is correct and no marks are awarded. **This is most common mistake which evaluators are committing.**
7	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 totalled up and written in the left-hand margin and encircled. This may be followed strictly.
8	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.
9	If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a note **"Extra Question"**.
10	No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
11	A full scale of marks 70 has to be used. Please do not hesitate to award full marks if the answer deserves it.

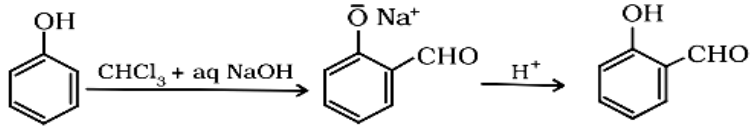
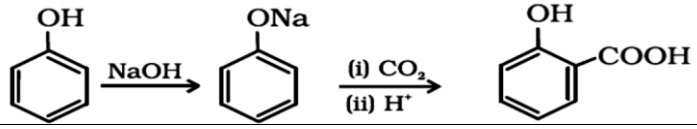
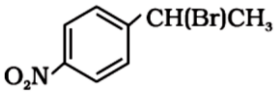
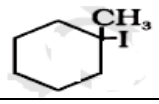
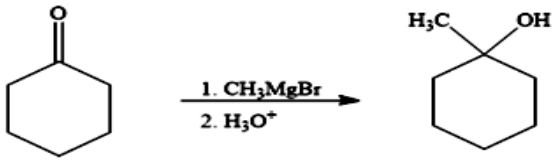
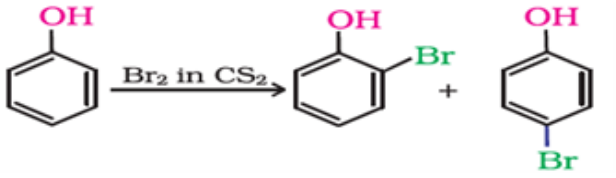
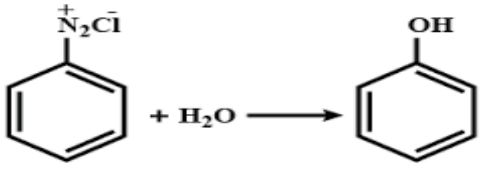
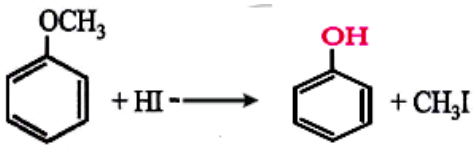
12	Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines).
13	Ensure that you do not make the following common types of errors committed by the Examiner in the past: - Giving more marks for an answer than assigned to it. ● Wrong totalling of marks awarded on an answer. ● Wrong transfer of marks from the inside pages of the answer book to the title page. Wrong question wise totalling on the title page. ● Leaving answer or part thereof unassessed in an answer book. ● Wrong totalling of marks of the two columns on the title page. ● Wrong grand total. ● Marks in words and figures not tallying/not same. ● 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.
14	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.
15	Any un assessed portion, non-carrying over of marks to the title page, or totalling 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.
16	The Examiners should acquaint themselves with the guidelines given in the "**Guidelines for spot Evaluation**" before starting the actual evaluation.
17	Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totalled and written in figures and words.
18	The candidates are entitled to obtain photocopy of the Answer Book on request on payment of the prescribed processing fee. All Examiners/Additional Head Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.

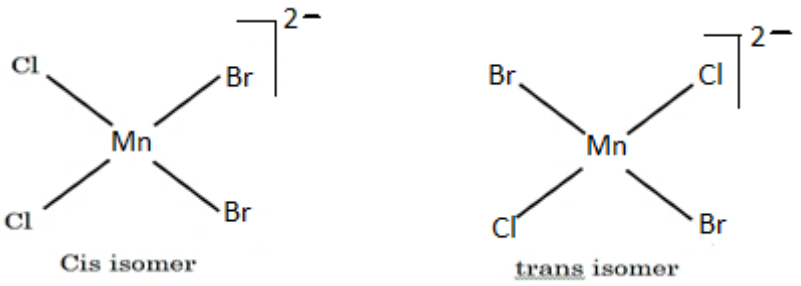
MARKING SCHEME 2024

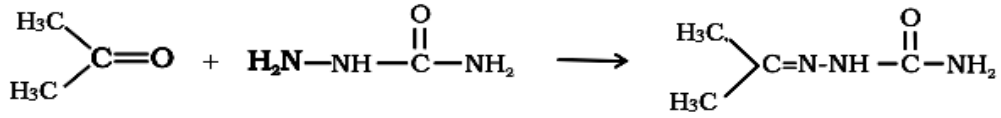
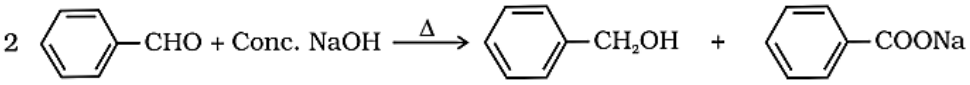
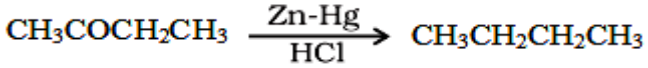
CHEMISTRY (Theory)- 043

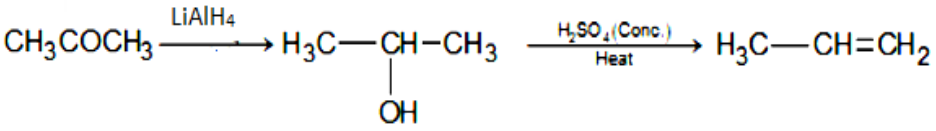
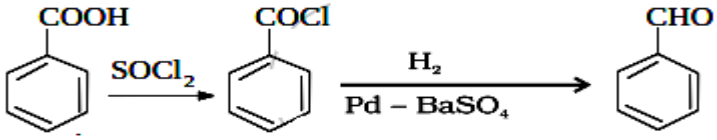
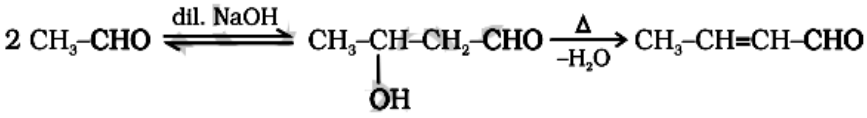
QP CODE 56/S/2

Q.No.	Value points	Mark
	SECTION A	
1.	(D)	1
2.	(A)	1
3.	(D)	1
4.	(A)	1
5.	(C)	1
6.	(C)	1
7.	(D)	1
8.	(A)	1
9.	(B)	1
10.	(D)	1
11.	(C)	1
12.	(D)	1
13.	(A)	1
14.	(A)	1
15.	(B)	1
16.	(A)	1
	SECTION B	
17.	(a)  (b)  	1 1
18.	(a) (i) In CH_3CHO carbonyl carbon is more electrophilic and has less steric hinderance than CH_3COCH_3. (ii) Due to intermolecular hydrogen bonding in carboxylic acids / due to dimer formation.	1 1
	OR	
	(b) (i) Add NaOH + I_2 to both the compounds separately and heat. Propanone will form yellow precipitate of CHI_3 whereas propanal will not. (ii) Add $NaHCO_3$ to both the compounds separately. Benzoic acid will give the brisk effervescence of CO_2 while benzaldehyde does not. (Or any other suitable chemical test)	1 1

19.	(a)  (b)  	1 1
20.	$k = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$ $t = \frac{2.303}{k} \log \frac{[R]_0}{[R]_0/4}$ $t = \frac{2.303}{2.3\ X\ 10^{-3}} \log 4$ $t = \frac{2.303}{2.3\ X\ 10^{-3}} \log 0.6021$ $t = 602$ s	½ ½ ½ ½
21.	(a)  (b)  	1 1`
	SECTION C	
22.	**(a)**  **/ 1-Methylcyclohexanol is formed.** **(b)**  **/o and p-bromophenol is formed.** **(c)**  **/ Phenol / Benzenol is formed.** **(d)**  **/ Phenol and iodomethane /Phenol and Methyl iodide is formed. (Any three)**	1 x 3

23.	(a) Rate = k $[C_{12}H_{22}O_{11}]$ (b) Molecularity = 2 and order = 1 (c) Pseudo first order reaction.	1 ½ +½ 1
24.	(a) n-butyl bromide has larger surface area hence stronger van der Waal forces as compared to t-butyl bromide. (b) Less energy is released when new attractions are set up between the alkyl halide and the water molecules as these are not as strong as the original hydrogen bonds in water / Alkyl halides are unable to form hydrogen bond with water. (c) Cyclohexyl chloride has higher dipole moment due –I effect only while chlorobenzene has both –I and +R effect that results in lower dipole moment / sp^3hybridised carbon in cyclohexyl chloride is less electronegative and C-Cl bond length is longer resulting into a higher dipole moment as comparedto chlorobenzene having sp^2 hybridised carbon and shorter C-Cl bond length.	1 1 1
25.	(a) Due to resonance stabilisation of diazonium salts of aromatic amines. (b) Aniline forms salt with Lewis acid anhydrous $AlCl_3$. (c) Due to the formation of anilinium ion which is deactivating.	1 1 1
26.	$\Delta T_b = iK_b\, m$ i = 2 $\Delta T_b = 2 \times 0.52 \times \frac{2}{120} X \frac{1000}{100}$ $= 0.17$ K $T_b = 373.15 + 0.17 / 373 + 0.17$ $= 373.32$ K / 373.17 K	½ 1 ½ 1
27.	$R = \rho \frac{l}{A}$ **Resistivity:** $\rho = R \frac{A}{l}$ $\rho = \frac{5.4\ X\ 10^3}{60}$ $\rho = 0.09 \times 10^3$ Ω cm or 90 Ω cm **Conductivity:** $k = 1/\rho$ = 1/ 90 k= 0.011 Ω^{-1} cm^{-1} or 0.011 S cm^{-1} **Molar Conductivity** $\Lambda_m = \frac{k}{c} X\ 1000$ $= \frac{0.011}{0.05} X\ 1000$ = 220 $\Omega^{-1}cm^2\ mol^{-1}$or 220 S cm^2mol^{-1}	½ ½ ½ ½ ½ ½
28.	(a)  (b) $t_{2g}^3\ e_g^1$	½ , ½ 1

	(c) In $[CoF_6]^{3-}$ due to the presence of four unpaired electrons that undergoes d-d transition whereas in $[Ni(CN)_4]^{2-}$ there is no unpaired electrons.	1
	SECTION D	
29.	(a) Ethanol-water forms azeotropic mixture. (b) Due to the formation of hydrogen bond between chloroform and acetone. (c) (i) $\frac{P^0-P}{P^0} = x_2 = \frac{w_2}{M_2} \times \frac{M_1}{w_1}$ $\frac{1.25-1.237}{1.25} = \frac{1.2}{M_2} \times \frac{78}{60}$ $M_2 = \frac{1.2}{M_2} \times \frac{78}{60} \times \frac{1.25}{0.013}$ M_2 = 150 g mol^{-1} (Deduct ½ marks for incorrect or no unit) **OR** (c) (i) The elevation (ΔT_b) in the boiling point = 354.11 K – 353. 23 K = 0.88 K $M_2 = \frac{2.53\ K\ kg\ mol^{-1} \times 1.8\ g \times 1000\ g\ kg^{-1}}{0.88\ K \times 90\ g}$ M_2 = 57.5 g $mol^{-1} \approx$ 58 g mol^{-1}(Deduct ½ marks for incorrect or no unit)	1 1 ½ ½ 1 ½ 1 ½
30.	(a) To store information and to transfer traits from one generation to another (or any other suitable function). (b) Deoxyribose sugar, Adenine and phosphoric acid. (c) (i) The polymer of nucleotides which are responsible for heredity. Nucleoside is made up of nitrogenous bases and sugar whereas nucleotide is made up of nitrogenous bases, sugar and phosphoric acid. **OR** (c) (ii) **Similarity**: Both are nucleic acids and are found in the nucleus of the cell. **Difference**: DNA has a double strand while RNA is single stranded. (or any other suitable similarity and difference)	1 1 1+1 1+1
	SECTION E	
31.	(a) (i) (I)  (II)  (III)  (ii) (I) **$CH_3CH_2CH_2COOH$ < $BrCH_2CH_2CH_2COOH$ < $CH_3CH(Br)CH_2COOH$ < $CH_3CH_2CH(Br)COOH$** (II) 4-Methoxybenzoic acid < Benzoic acid<4-Nitrobenzoic acid < 3,4-Dinitrobenzoic acid	1 1 1 1 1
	OR	
	(b)	

	(i) A = **CH_3COOH / Ethanoic acid / Acetic acid** B = **CH_3COCl / Ethanoyl chloride / Acetyl chloride** C = **CH_3COCH_3 / Propanone / Acetone** **D = CH_3 CH_2CH_3 / Propane** (ii) (I)  (II)  (III)  (Or any other suitable method)	½ x 4 1 1 1
32.	(a) Cu^+ in aqueous solution undergoes disproportionation to Cu and Cu^{2+}. (b) Cr^{2+}; due to greater stability of t_{2g}^3 in aqueous state. (c) Due to relatively poor shielding effect of 5f electrons in actinoids than 4f electrons in lanthanoids. (d) $MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$ (e) Copper / Cu (f) Due to variable oxidation state / provide greater surface area / complex formation. (g) Due to incompletely filled d orbital in its ground state.	1 x 5
33.	(a) (i) Secondary cell /Battery At anode: $Pb(s) + SO_4^{2-}(aq) \longrightarrow PbSO_4(s) + 2e^-$ At cathode: $PbO_2(s) + SO_4^{2-}(aq) + 4H^+(aq) + 2e^- \longrightarrow PbSO_4(s) + 2H_2O(l)$ overall reaction $Pb(s) + PbO_2(s) + 2H_2SO_4(aq) \longrightarrow 2PbSO_4(s) + 2H_2O(l)$ (ii) Reaction at Cathode: Ag^+ (aq) + e^- ⟶ Ag (s) 108 g of Ag required = 96500 C 1.5 g of Ag required $= \frac{96500}{108} \times \frac{1.5}{1}$ = 1340. 27 C Time = $\frac{Q}{I} = \frac{1340.27}{1.5}$ = 893.51 s or 14.85 min.	1 ½ ½ 1 ½ ½ ½ ½
	OR	
	(b) (i) Limiting molar conductivity of an electrolyte can be represented as the sum of the individual contributions of the anion and cation of the electrolyte. $\Lambda^\circ_{NH_4OH} = \Lambda^\circ_{NH_4Cl} + \Lambda^\circ_{NaOH} - \Lambda^\circ_{NaCl}$ = 110 + 100 -105 S cm^2 mol^{-1} = 105 S cm^2 mol^{-1} / **(2 marks to be awarded for attempting the numerical part)** (ii) $E_{cell} = E^0_{cathode} - E^0_{anode}$	1 1 ½ ½ ½

	= 0.34 – (– 0.76 V) = 1.10 V $\Delta_r G^{\circ} = -nFE^{\circ}_{cell}$ = −2 x 96500 x 1.10 =−212,300 J mol^{-1}or –212. 3 kJ mol^{-1}	½ ½ ½