Marking Scheme

Strictly Confidential

(For Internal and Restricted use only)

Senior School Certificate Examination,2024

SUBJECT NAME **CHEMISTRY (Theory)**
(Q.P.CODE56_3_1,2,3)

General Instructions: -

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.

“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.”

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-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, due marks should be awarded.**

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.

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 delibration 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.

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.**

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.

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.

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"**.

No marks to be deducted for the cumulative effect of an error. It should be penalized only once.

A full scale of marks __________(example 0 to 80/70/60/50/40/30 marks as given in Question Paper) has to be used. Please do not hesitate to award full marks if the answer deserves it.

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).This is in view of the reduced syllabus and number of questions in question paper.

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 an answer.
- 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/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.

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.

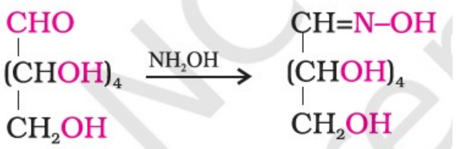
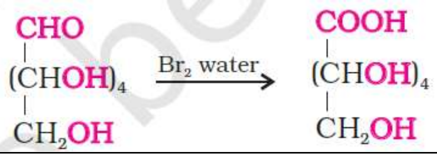
Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the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

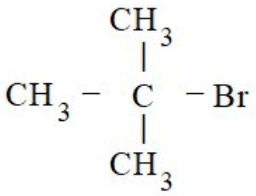
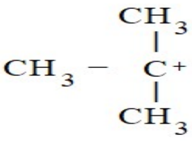
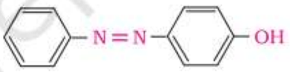
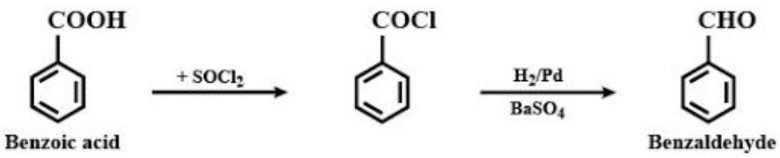
The Examiners should acquaint themselves with the guidelines given in the "**Guidelines for Spot Evaluation**" before starting the actual evaluation.

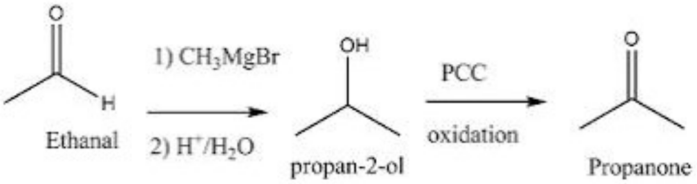
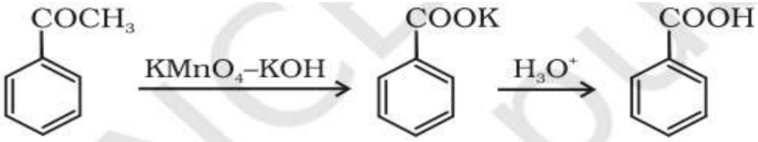
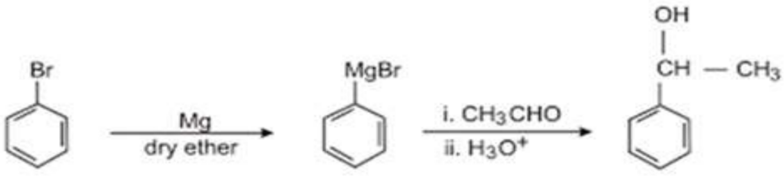
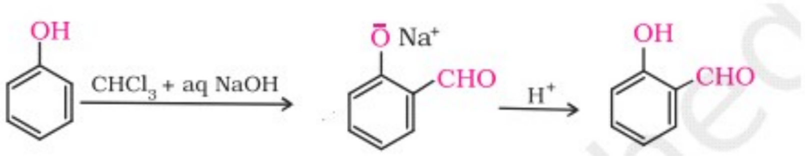
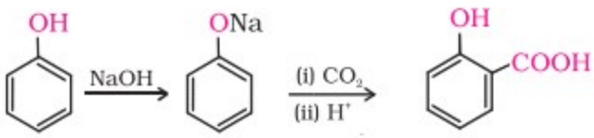
Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.

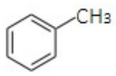
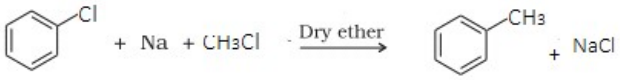
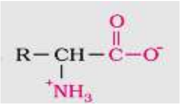
The candidates are entitled to obtain photocopy of the Answer Book on request on payment of the prescribed processing fee. All Examiners/Additional Head Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.

MARKING SCHEME 2023
CHEMISTRY (Theory)- 043
QP CODE 56/3/2

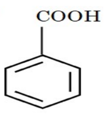
Q.No	Value points	Mark
	SECTION A	
1	**(C)**	1
2	**(A)**	1
3	**(D)**	1
4	**(B)**	1
5	**(C)**	1
6	**(B)**	1
7	**(B)**	1
8	**(A)**	1
9	**(D)**	1
10	**(B)**	1
11	**(A)**	1
12	**(B)**	1
13	**(D)**	1
14	**(A)**	1
15	**(C)**	1
16	**(D)**	1
	SECTION B	
17	(a)  $CHO-(CHOH)_4-CH_2OH \xrightarrow{NH_2OH} CH=N-OH-(CHOH)_4-CH_2OH$ (b)  $CHO-(CHOH)_4-CH_2OH \xrightarrow{Br_2\ water} COOH-(CHOH)_4-CH_2OH$	1 1
18	(a) $2\,KMnO_4 \xrightarrow{heat} K_2MnO_4 + MnO_2 + O_2$ (b) $2\,MnO_4^{-} + 5\,C_2O_4^{2-} + 16\,H^{+} \longrightarrow 2\,Mn^{2+} + 10\,CO_2 + 8\,H_2O$	1 1
19	(a)Molal depression constant is the depression in freezing point observed in 1 molal solution./ The depression in freezing point when	1

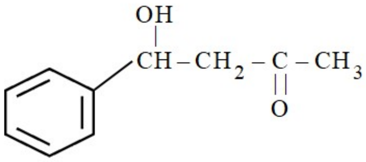
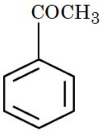
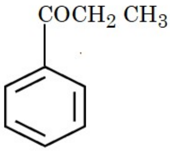
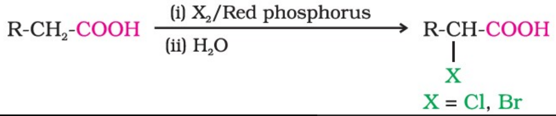
	one mole of non-volatile solute is dissolved in 1 kg or 1000g of the solvent. $$K_f = \frac{R \times M_{solvent} \times T_f^0}{1000 \times \Delta_{fus}H^0}$$	1
	OR	
19	(b) Positive deviation.Because ethanol – acetone interaction is weaker than pure ethanol and pure acetone molecular interactions. Minimum boiling azeotropes	½ , ½ 1
20	(a)  $CH_3-C(CH_3)_2-Br$  $CH_3-\overset{+}{C}(CH_3)_2$ Due to stability of tertiary carbocation/due to stable (b) Due to C-Cl bond in chlorobenzene is sp^2hybridised whereas in cyclohexyl chloride C-Cl bond is sp^3 hybridised .	½ ½ 1
21	$$\text{(a)Rate} = k[X]^p$$ $$27\ \text{Rate} = k[3X]^p$$ $$(3)^3 = 3^p$$ $$\boxed{p = 3}\quad \text{Third order}$$ **/ Third order** **(b)**When one of the reactants is in excess. **Example** : Hydrolysis of ester / sucrose (Or any other correct example)	1 ½ ½
	SECTION C	
22	(a) **A:** CH_3CH_2CN **B:** $CH_3CH_2CH_2NH_2$ **C:** $CH_3CH_2CH_2OH$ (b) **A:** $C_6H_5NH_2$ **B:** $C_6H_5N_2Cl$**C :** 	½ x3 ½ x3
23	(a)  (or any other suitable method)	1 x 3

	(b)  (c)  (d)  **(Any Three)**	
24	(a)(i)  (ii)  (b) Br_2 water	1 1 1
25	$k = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$ $k = \frac{2.303}{40min} \log \frac{4}{3}$ $k = \frac{2.303}{40min} \times 0.12$ $= 0.0069\ min^{-1}$ For 80% completion, time required is, $t = \frac{2.303}{0.0069} \log 5$ $= \frac{2.303 \times 0.69}{0.0069}$ = 230.3 min	½ ½ ½ ½ ½ ½
26	a)S_N1 Due to the formation of planar carbocation which can be attacked by a nucleophile from both sides./S_N1 reactions are accompanied by racemization. b)Toluene is formed /	1 1

	 or 	1
27	$\Lambda_m = k/C$	
	$\Lambda_m = \frac{k \times 1000}{M}$	½
	$= \frac{1000\ cm^3 / L \times 2.48 \times 10^{-2}\ Scm^{-1}}{0.2\ mol\ L^{-1}}$	½
	$= 124\ S\ cm^2\ mol^{-1}$	½
	$\Lambda^\circ_m = \lambda^\circ_+ + \lambda^\circ_-$	
	$=(73.5 + 76.5)\ S\ cm^2\ mol^{-1}$	
	$=150\ S\ cm^2\ mol^{-1}$	½
	$\alpha = \Lambda_m / \Lambda^\circ_m$	
	$= \frac{124\ S\ cm^2\ mol^{-1}}{150\ S\ cm^2\ mol^{-1}}$	½
	$= 0.826$ (approx.)	½
28	$\frac{p_1^0 - p_1}{p_1^0} = \frac{w_2 \times M_1}{M_2 \times w_1}$	1
	$\frac{(32 - 31{\cdot}84)}{32} = \frac{5g}{M_2} \times \frac{18}{200g}$	1
	M_2= 90 g/ mol	1
	(Deduct half mark for no or incorrect unit)	
	SECTION D	
29	(a)Amino acids which cannot be synthesised in the body and must be obtained through diet.	1
	(b) Dipolar ion formation /Ion having both anionic and cationic parts /  $R-\underset{{}^{+}NH_3}{CH}-\overset{O}{\overset{\Vert}{C}}-O^-$	1
	(c)(i) Keratin, myosin (any one) – Fibrous Albumin, Insulin (any one) – Globular	½+½

	(ii) Peptide linkage / structure **OR** (c)(i)Free aldehydic or ketonic group/ Aldehydic (or carbonyl) group is not involved in glycosidic linkage. (ii)In nucleotide, phosphate group is attached to 5′-position of sugar moiety while phosphate group is absent in nucleoside **/** Nucleoside consist of a molecule of sugar linked to nitrogenous base Nucleotide consist of a molecule of sugar ,nitrogenous base and phosphoric acid	1 1 1
30	(a)Due to their ability to show multiple oxidation states and to form complexes / provide large surface area. (b)Due topoor shielding effect of *4f* orbital. (c) The overall decrease in atomic and ionic radii from La to Lu is known as lanthanoid contraction. Atomic radii of second and third transition series are very similar. **OR** (c) Cr^{2+} is stronger reducing agent than Fe^{2+} Reason: $d^4 \rightarrow d^3$ occurs in case of Cr^{2+} to Cr^{3+} But $d^6 \rightarrow d^5$ occurs in case of Fe^{2+} to Fe^{3+} In a medium (like water) d^3 is more stable as compared to d^5	1 1 1,1 1,1
	SECTION E	
31	(a) Aquacyanidobis(ethane-1,2-diamine)cobalt(III) ion (b) Because of same relative positions of the unidentate ligands attached to the central metal atom. (c) $[CoF_6]^{3-} < [Co(NH_3)_6]^{3+} < [Co(CN)_6]^{3-}$ (d) sp^3, diamagnetic (e) (i) $[Co(C_2O_4)_3]^{3-}$ (ii) $[CoF_6]^{3-}$ (f) An ambidentate ligand is one which can ligate through either of the two different donor atoms while bidentate ligand is bound to metal through two donor atoms. (g) (i) $t_{2g}^5\ e_g^0$ (ii) $t_{2g}^3\ e_g^2$ **(Any Five)**	1x5
32	(a)(i) E^ocell = E^ocathode -E^oanode = -0.40-(-0.76)V = 0.36V	½

	$E_{cell} = E^oCell - \frac{0.059}{2}\log\frac{[Zn^{2+}]}{[Cd^{2+}]}$	½
	$= 0.36 \frac{-0.059}{2}\log\frac{[0.001]}{[0.1]}$	1
	$= 0.36 \frac{-0.059}{2}\log 10^{-2}$	
	$= 0.36 + 0.059$ $= 0.419\ V$	½
	(ii) When same amount of electricity is passed through the electrolytic solutions connected in series, weight of substance deposited or liberated at each electrode is directly proportional to its chemical equivalent weights.	½ 1
	pH of solution will increase	1
	OR	
32	(b)(i) $E^ocell= E^ocathode- E^oanode$	
	$= 0.80V- (-0.44V)$ $= 1.24\ V$	½
	$\Delta G^o = -nFE^o_{cell}$	½
	$= -2 \times 96500 \times 1.24\ J\ mol^{-1}$	
	$= -239320\ J\ mol^{-1}$	½
	$\log k_c = \frac{nE^o_{cell}}{0.059}$	½
	$= \frac{2 \times 1.24\ V}{0.059}$	½
	$= 42.0$	½
	(ii) More efficiency and Pollution free (Any other two correct advantages)	½ , ½
	(iii) 2F / $2H_2O \longrightarrow O_2 + 4H^+ + 4e^-$	1
	$1\ mole = 2e^- \ \therefore \boxed{2\ F}$	
33	(a)(i) (1) 	1

	(2)  (3)  (ii) (1)  On heating with NaOH and I_2 forms yellow ppt. of CHI_3  whereas it does not give yellow ppt with NaOH and I_2 . (2) On heating with Tollens' reagent Pentanal forms silver mirror whereas pentan-3-one does not.(or any other suitable test**)**	1 1 1 1
	OR	
33	(b)(i) (1) Because one – NH_2 group adjacent to carbonyl group is involved in resonance with it . (2) Steric and electronic reasons / In acetone two alkyl groups reduce the electrophilicity of the carbonyl carbon more effectively than in acetaldehyde. (ii) (1) $O_2N-CH_2COOH > HCOOH > CH_3COOH$ (2) DIBAL H / H_2O (iii)  $R\text{-}CH_2\text{-}COOH \xrightarrow[\text{(ii) } H_2O]{\text{(i) } X_2\text{/Red phosphorus}} R\text{-}\underset{\underset{X}{\vert}}{CH}\text{-}COOH$ X = Cl, Br	1 1 1 1 1