Marking Scheme

Strictly Confidential

(For Internal and Restricted use only)

Senior School Certificate Examination,2024

SUBJECT NAME **CHEMISTRY (Theory)**
(Q.P.CODE56_2_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.

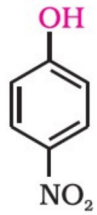
The Examiners should acquaint themselves with the guidelines given in the "**Guidelines for Spot Evaluation**" before starting the actual evaluation.

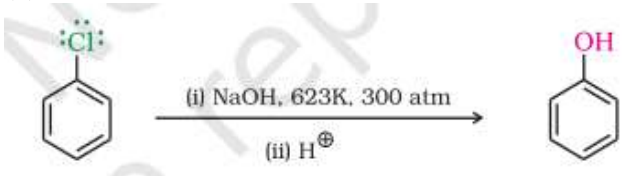
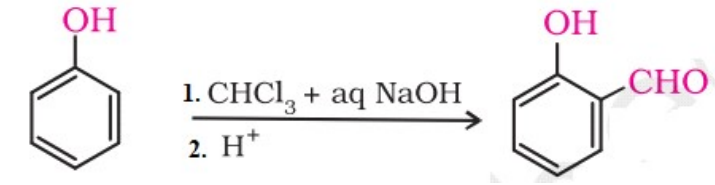
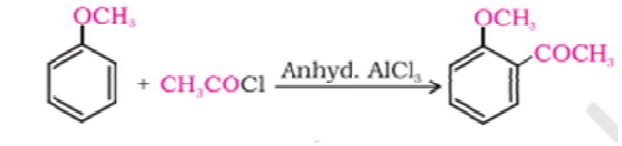
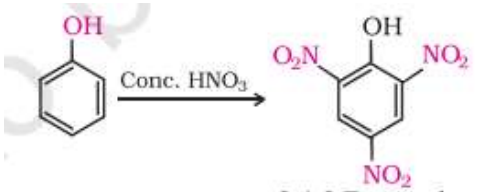
Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.

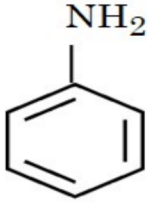
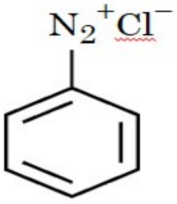
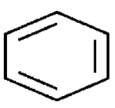
The candidates are entitled to obtain photocopy of the Answer Book on request on payment of the prescribed processing fee. All Examiners/Additional Head Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as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

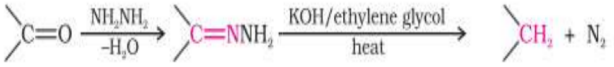
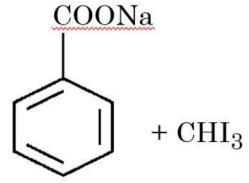
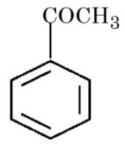
MARKING SCHEME 2023

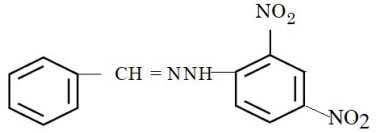
CHEMISTRY (Theory) - 043
QP CODE 56/2/3

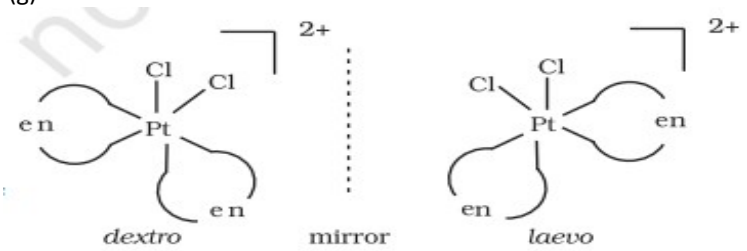
Q.No	Value points	Mark
	SECTION A	
1	**(C)**	**1**
2	**(B)**	**1**
3	**(D)**	**1**
4	**(A)**	**1**
5	**(D)**	**1**
6	**(B)**	**1**
7	**(C)**	**1**
8	**(A)**	**1**
9	**(C)**	**1**
10	**(A)**	**1**
11	**(D)**	**1**
12	**(D)**	**1**
13	**(B)**	**1**
14	**(A)**	**1**
15	**(C)**	**1**
16	**(C)**	**1**
	SECTION B	
17	(a) $CH_2 = CH - CH_2 - Cl$ because $CH_2 = CH - CH^{\oplus}$ is resonance stabilized. (b)  	1 1
18	The steady decrease in atomic or ionic radii with increase in atomic number due to poor shielding effect of 4f subshell. Because shielding effect of 5f subshell is poorer as compared to that of 4f subshell.	1 1
	OR	
18	(b)Because of large number of unpaired electrons in their atoms they have stronger interatomic interaction and hence stronger bonding between atoms. Zinc / Zn	1 1
19	a) A linkage which joins two amino acidsthrough –CONH-bond. / The amide linkage(-CO-NH) which is formed when amino group of one alpha amino acid combines with carboxylic group of another amino acid. (b) Amino acids which cannot be synthesised in the body and must be obtained through diet.	1 1
20	$k = \frac{2{\cdot}303}{t} \log \frac{[R]_o}{[R]}$ $1{\cdot}25 \times 10^{-3} = \frac{2{\cdot}303}{t} \log \left(\frac{5}{2{\cdot}5}\right)$	½

	$t = \frac{2 \cdot 303}{1 \cdot 25 \times 10^{-3}} \log 2$ $t = \frac{2 \cdot 303 \times 0 \cdot 301}{1 \cdot 25 \times 10^{-3}}$ t = 554·5 s or 5.54×10^2 s	1 ½
21	$\pi_1 = \pi_2$ $\frac{W_1}{M_1} = \frac{W_2}{M_2}$ $\frac{3}{180} = \frac{2 \cdot 5}{M_2}$ $M_2 = \frac{2 \cdot 5 \times 180}{3} = 150\ g\ mol^{-1}$	½ 1 ½
	SECTION C	
22	(a)  (b)  (c)  (d)  (Any three)	1 × 3
23	(a)Because of the stabilisation of intermediate carbocation through resonance. / Through resonance, chlorine tends to stabilize the carbocation and the effect is more pronounced at ortho- and para- positions. (b)Because mixture contains two enantiomers in equal proportions resulting in Zero Optical Rotation. / Due to the external compensation of equal percentage of (+) and (-) forms resulting in Zero Optical Rotation. (c)Because of the resonance stabilization of allyl carbocation.	1 1 1
24	$\frac{p^\circ - p_s}{p^\circ} = i \times \chi$ $AB \longrightarrow A^+ + B^-$ i=2	½ ½

	$\frac{100-P_S}{100} = 2 \times \frac{n_{AB}}{n_{solvent}}$ (For dilute solution) $\frac{100 - P_s}{100} = 2\frac{1}{50}$ $100 - P_s = 4$ P_S = 96 mm Hg (Deduct ½ mark for incorrect or no units.)	1 1
25	$\log \frac{k_2}{k_1} = \frac{E_a}{2{\cdot}303R}\left[\frac{1}{T_1} - \frac{1}{T_2}\right]$ or $\frac{E_a}{2{\cdot}303R}\left[\frac{T2-T1}{T_1T2}\right]$ $\log \frac{3k_1}{k_1} = \frac{E_a}{19{\cdot}15}\left[\frac{1}{290} - \frac{1}{300}\right]$ $0{\cdot}48 = \frac{E_a}{19{\cdot}15}\left[\frac{10}{290\times300}\right]$ $E_a = \frac{0{\cdot}48\times19{\cdot}15\times290\times300}{10}$ E_a= 79970 $Jmol^{-1}$ or 79.970 $KJmol^{-1}$ (Deduct ½ mark for incorrect or no units.)	1 1 1
26	$E_{Cell} = (E^o{}_c - E^o{}_a) - \frac{0{\cdot}059}{2} log \left[\frac{Zn^{2+}}{Sn^{2+}}\right]$ $= [(-0 \cdot 14) - (-0 \cdot 76)] - \frac{0{\cdot}059}{2} \log [\frac{0{\cdot}1}{0{\cdot}001}]$ $= +0{\cdot}62 - \frac{0 \cdot 059}{2} \times 2$ $= (0 \cdot 62 - 0 \cdot 059)V$ = 0·561V (Deduct ½ mark for incorrect or no units.)	1 1 1
27	(a) A = CH_3CH_2CN B = $CH_3CH_2CONH_2$ C = $CH_3CH_2NH_2$ (b) A =  B =  C = 	½ ×3 ½ ×3

28	(a) 	1
	(b) $Ar/RCOONa + NaOH \xrightarrow{CaO,\ \Delta} Ar-H/R-H + Na_2CO_3$	1
	(c) $2HCHO \xrightarrow[\Delta]{Conc.NaOH} HCOO^-Na^+ + CH_3OH$ (Or any other correct reaction)	1
	SECTION D	
29	(a)Sugars which reduce Tollens' reagent or Fehling's solution. (b)Monosaccharides :- Fructose, Galactose Disaccharides :- Sucrose, lactose (c)Glycogen, because its structure is similar to amylopectin. OR (c)(i)Anomers/ α-D-Glucose and β-D-Glucose (ii)Aldehyde /-CHO group	1 ½ ½ 1+1 1 1
30	(a)Cu has incomplete d-orbital in +2 oxidation state whereas Zn has fully filled d- orbital in ground state as well as in +2 oxidation state. (b)Because both (n-1)d and ns subshell electrons take part in the bond formation due to their comparable energies/ due to the presence of unpaired electrons in d-orbitals. (c)(i)Because of irregular values of (Δ_iH_1+Δ_iH_2) and sublimation enthalpies. (ii)In transition metals, oxidation states differ by +1 whereas in non-transition metals differ by +2. OR (c) (i)Because Cr^{2+} will be converted to Cr^{3+} which has more stable half filled t_{2g} configuration while Mn^{3+} changes to Mn^{2+} which has more stable half-filled d^5 configuration. (ii) $2\,MnO_4^- + H_2O + I^- \longrightarrow 2\,MnO_2 + 2\,OH^- + IO_3^-$	1 1 1 1 1 1
	SECTION E	
31	(a)(i)(1)Because oxidation of aldehyde involves cleavage of C − H bond which is weaker than C − C bond of ketone. (2) Electron withdrawing nature of carbonyl group/ Due to resonance stabilization of the conjugate base. (ii)(1)  + CHI_3 (2)  (iii)On heating with NaOH + I_2, ethanal gives yellow ppt.Of CHI_3 whereas ethanoic acid does not. (Or any other suitable chemical test)	1 1 ½ , ½ 1 1
	OR	
31	(b)(i)	

		1
	(ii)$(CH_3)_3$ C – $COCH_3$ < CH_3COCH_3 < CH_3CHO	1
	(iii)$P\square M_gBr \xrightarrow{CO_2,dry\ et\square er} P\square COOM_gBr \xrightarrow{H_2O/H+} P\square COOH$	1
	(iv)On heating with NaOH and I_2, ethanal gives yellow ppt of CHI_3, whereas benzaldehyde does not. (Or any other correct chemical test.)	1
	(v) $CH_3 - \underset{\underset{OH}{|}}{CH} - CH_2 - COOC_2H_5$	1
32	(a)(i) $\kappa = \frac{1}{R}\left(\frac{l}{A}\right)$ or k= G*/R	½
	$k = \frac{1}{100}(0{\cdot}0354)$	
	$= 3{\cdot}54 \times 10^{-4}\Omega^{-1}\ cm^{-1}$	1
	$\Lambda_m = \frac{K}{M} \times 1000$	½
	$= \frac{3{\cdot}54 \times 10^{-4}}{0{\cdot}05} \times 1000$	
	=7· 08 Ω^{-1} cm^2 mol^{-1}or 7· 08 S cm^2 mol^{-1}	1
	(Deduct ½ mark for no or incorrect unit)	
	(ii)The amount of chemical reaction which occurs at any electrode during electrolysis by a current is proportional to the quantity of electricity passed through the electrolyte. / m=ZIt where m= mass of the substance deposited , Z= electrochemical equivalent, I= current, t= time.	1
	5F	1
	OR	
32	(b)(i) $\Lambda_m = \frac{K}{M} \times 1000$	½
	$\Lambda_m = \frac{5.25 \times 10^{-5}}{0.0025} \times 1000$	1
	= 21 S cm^2 mol^{-1}	½
	$\alpha = \frac{\Lambda_m}{\Lambda_m^\circ}$	
	$= \frac{21\ S\ cm^2\ mol^{-1}}{390\ S\ cm^2\ mol^{-1}}$	½
	=0.053	½
	(ii)Anode : Pb + $SO_4^{2-} \longrightarrow PbSO_4 + 2e-$	½
	Cathode :$PbO_2 + SO_4^{2-} + 4H^+ + 2e- \longrightarrow PbSO_4 + 2H_2O$	½
	Overall : Pb+ $PbO_2 + 2H_2SO_4 \longrightarrow 2PbSO_4 + 2H_2O$	1

33	(a) $\Delta_t = \left(\frac{4}{9}\right)\Delta_o$ (b) Dichloridobis(ethane −1, 2− diamine)platinum (IV) nitrate (c) sp^3, diamagnetic (d) Coordination isomerism (e) $t_{2g}^3\ e_g^1$, high spin (f) $\left[Co(NH_3)_4\ Cl_2\right]^+$, as the metal is bound to more than one donor group(ligand). (g)  (Any five)	1 × 5