Marking Scheme

Strictly Confidential

(For Internal and Restricted use only)

Senior School Certificate Examination,2024

SUBJECT NAME **CHEMISTRY (Theory)**
(Q.P.CODE 56_1_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.
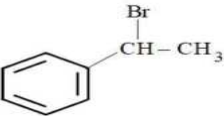
Evaluators will mark(√) wherever answer is correct. For wrong answer CROSS 'X" be marked. Evaluators will not put right (✓) while evaluating which gives an impression that answer is correct and no marks are awarded. **This is most common mistake which evaluators are committing.**
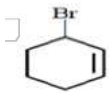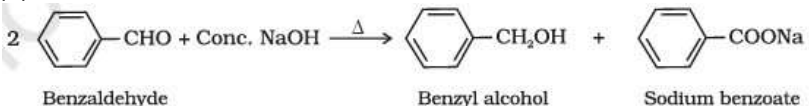
If a question has parts, please award marks on the right-hand side for each part. Marks awarded
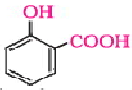
for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.

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.
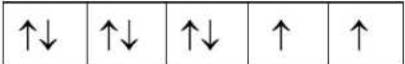
Q.No	Value points	Mark
	SECTION A	
1	B	1
2	D	1
3	B	1
4	D	1
5	A	1
6	A	1
7	C	1
8	A	1
9	D	1
10	C	1
11	A	1
12	B	1
13	B	1
14	A	1
15	D	1
16	D	1
	SECTION B	
17	$$E_{Fe^{2+}/Fe} = E^{o}_{Fe^{2+}/Fe} - \frac{0\cdot059}{2}\log\frac{1}{[Fe^{2+}]}$$ $$= -0\cdot45\ V - \frac{0\cdot059}{2}\log\frac{1}{0\cdot01}$$ $$= -0\cdot45\ V - 0\cdot059\ V$$ $$= -0\cdot509\ V$$	½ 1 ½
18	The number of reacting species taking part in an elementary reaction, which must collide simultaneously in order to bring about a chemical reaction is called molecularity of a reaction. When one of the reactants is in excess.	1 1
19	(a) (b) or Saccharic acid is formed.	1 1
20	(a) (i) (ii)	1

		1
	OR	
20	(b)(i)It reacts with water to form alkane.	1
	(ii)Alcoholic KOH acts as a stronger base than aqueous KOH leads to elimination reaction of alkyl halide. / alkoxide ions in alcoholic KOH acts as a stronger base due to which elimination reaction takes place.	1
21	(a)	1
	(b)	1
	SECTION C	
22	Cell constant(G*) = Conductivity x Resistance	
	= 1.35×10^{-2} x 100	
	= 1.35 cm^{-1}	1
	Cell constant(G*) = Conductivity x Resistance	
	1.35cm^{-1}= k x 90	
	1.35/90= k	
	k=0.015 Scm^{-1}	1
	Molar conductivity(Λ_m)= k x 1000/C	
	$=\dfrac{0.015 \ \times 1000}{0.02}$	
	= 750 Scm^2/mol	1
	(Deduct ½ mark for no unit or incorrect unit)	
23	Rate = $k\left[\text{NO}\right]^{p}\left[\text{Br}_2\right]^{q}$	
	$1{\cdot}0 \times 10^{-3}= k\left[0{\cdot}05\right]^{p}\left[0{\cdot}05\right]^{q}$ ------Eq-1	
	$3{\cdot}0 \times 10^{-3}= k\left[0{\cdot}05\right]^{p}\left[0{\cdot}15\right]^{q}$ ------Eq-2	
	$9{\cdot}0 \times 10^{-3} = k\left[0{\cdot}15\right]^{p}\left[0{\cdot}05\right]^{q}$ -------Eq-3	
	On Comparing (eq1) and (eq2)	
	$\left(\dfrac{1}{3}\right) = \left(\dfrac{1}{3}\right)^{q}$	
	q = 1	
	(eq1) ÷ (eq3)	
	$\left(\dfrac{1}{9}\right) = \left(\dfrac{1}{3}\right)^{p}$	
	p = 2	

	(a)	Order w·r·t NO = 2	½
		Order w·r·t Br_2 = 1	½
	(b)	1×10^{-3} = k $(0.05)^2$ ×0.05	
		$k = \dfrac{1 \times 10^{-3}}{0.05 \times 0.05 \times 0.05}$	
		$k = 8\ L^2\ mol^{-2}\ s^{-1}$ (Unit can be ignored)	1
	(c)	Rate = $k[NO]^2[Br_2]$	
		$= 8 \times (0.4)^2 \times (0.2)$	
		$= 2.56 \times 10^{-1}$ mol L^{-1}	1
24	a)	$K_2[Zn(OH)_4]$	1
	(b) $[Cr(NH_3)_3Cl_3] < [Cr(NH_3)_5Cl]Cl_2 < [Cr(NH_3)_6]Cl_3$		1
	(c) (i) Linkage isomerism		
	(ii) Optical isomerism		½ +½
25	(a)		
	$CH_2 = CH - \underset{\underset{Br}{\mid}}{CH} - CH_3$		1
	(b) 2, 4, 6– trinitrochlorobenzene, because of electron withdrawing nature of $-NO_2$ group.		½ + ½
	(c) $(CH_3)_3C\text{-}Cl$ / tert-butyl chloride		1
26.	(a)		
			½
			½
	(b) (i) $CH_3 - CH_2 - CH_2 - CH_2 - OH$		1
	(ii)		
			1
27	a) A linkage which joins two amino acids through –CONH-bond.		
	b) Hydrogen bonding		
	c) Starch		1 x3
	d) Water soluble – Vitamin B / C		
	Fat soluble – A, D, E, K (Any one)		
	(Any Three)		
28	(A)→ $CH_3\ CH_2\ CH_2\ COO\ CH_2\ CH_3$ / $CH_3\ COOCH_2CH_2\ CH_2\ CH_3$		½ ×6
	(B) → $CH_3\ CH_2\ OH$		

	(C) → $CH_3 CH_2 CH_2 CH_2 OH$	
	(D) → $CH_3 CHO$	
	(E) → $CH_3 - CH = CH - CHO$	
	(F) → $CH_3 COOH$(Either structure or name of A to F)	

	SECTION D	
29	(a) Primary batteries are not rechargeable while secondary batteries are rechargeable. (Or any other correct difference)	1
	(b) Overall reaction does not involve any ion in solution whose concentration can change during its lifetime.	1
	(c)	
	Cathode: $PbSO_4(s) + 2e^- \rightarrow Pb(s) + SO_4^{2-}(aq)$ Anode: $PbSO_4(s) + 2H_2O(l) \rightarrow PbO_2(s) + SO_4^{2-}(aq) + 4H^+(aq) + 2e^-$	1 1
	OR	
	(c) (i) More efficiency (ii) Pollution free	1+1
30	(a) The energy used in the splitting of degenerate d- orbitals due to the presence of ligands in a definite geometry is called Crystal Field Splitting Energy.	1
	(b) $Ti^{3+} = 3d^1$ i.e. $t_{2g}^1 e_g^0$ Due to d – d transition.	1
	(c)	
	$Cr^{3+} = 3d^3$ ↑ ↑ ↑ _ _ Due to stable t_{2g}^3 configuration, hence paramagnetic.	1
	$Ni^{2+} = 3d^8$ 3d ↑↓ ↑↓ ↑↓ ↑ ↑	1
	CN^- being strong field ligand pair up the electrons and hence diamagnetic.	
	OR	
	(c) CN^- being a strong ligand leads to the pairing of electrons in $[Fe(CN)_6]^{3-}$ leading to d^2sp^3 hybridization. H_2O being a weak ligand does not lead to the pairing of electrons in $[Fe(H_2O)_6]^{3+}$ leading to sp^3d^2 hybridization. / In $[Fe(CN)_6]^{3-}$, (n-1)d orbitals of central metal ion are used in hybridization (d^2sp^3). Hence inner orbital complex whereas in $[Fe(H_2O)_6]^{3+}$ n d orbitals of central metal ion are used in hybridization (sp^3d^2).	1+1

	SECTION E	
31	(a)(i)As $K_H \propto \dfrac{1}{Solubility}$ of Gas $\therefore O_2$ gas has higher K_H; because higher the K_H value, lower the solubility of gas in liquid.	½ + ½
	(ii) Blood cells shrink.	1
	(iii) $\Delta T_b = iK_b m$	½
	$T_b - T_b^0 = i \times 0\cdot52$ K Kg $mol^{-1} \times 1$ mol Kg^{-1}	½
	$\alpha = \dfrac{i-1}{n-1}$ n=5	
	$0\cdot6 = \dfrac{i-1}{5-1}$	1
	i = 3·4	
	$T_b - 373$ K $= 3\cdot4 \times 0\cdot52 \times 1$	½
	$T_b = 1\cdot768 + 373$ K	
	$T_b = 374\cdot768$K(If boiling point of water is 373.15K then $T_b = 374.918$K)	½

31	(b) (i) $P_T = p_A^{\,0}x_A + p_B^{\,0}x_B$	½
	P_T= 75 × 0·4 + 25 × 0·6 P_T= 30 + 15 = 45 mm Hg In Vapour phase	½
	$p_B = y_B \times P_T$ $y_B = {p_B}/{P_T} = \dfrac{p_B^0 x_B}{P_T}$	½
	$y_B = \dfrac{15}{45} = \dfrac{1}{3} = 0.33$ mm Hg	½
	(ii)The property which depends upon the number of solute particles but not on the nature of solute. ; Osmotic pressure.	1,1
	(iii)Because sodium chloride undergoes dissociation (i=2) in water while glucose does not./ π= i C R T ; For NaCl , i=2 and for glucose i=1.	1
32	a) Because N, N – diethyl-benzenesulphonamide does not contain any hydrogen atom attached to nitrogen atom, it is not acidic, hence insoluble in alkali. **b)** Due to salt formation with aluminum chloride, the Lewis acid which is used as a catalyst. c) On reacting with nitrous acid at low temperature aniline forms benzene diazonium chloride which on reacting with phenol forms orange dye whereas methylamine does not. (Or any other suitable chemical test) (d) (e) (f) (g) (ANY FIVE)	1 x5
33	(a) (i)(1) Because of the absence of unpaired electrons in their d-orbitals resulting in weak bonding between the atoms/ due to presence of fully filled d orbitals , weak metallic bonding takes place.	1
	(2) Because Cr is more stable in +3 due to stable t_{2g}^{3} configuration while Mn	1

	is more stable in +2 due to stable d^5 configuration.	
	(3) Because of high $\Delta_a H^0$ and low $\Delta_{hyd} H^0$, E^o value for Cu is positive.	1
	(ii)	
	1. $$2KMnO_4 \rightarrow K_2MnO_4 + MnO_2 + O_2$$	1
	2. $$Cr_2O_7^{2-} + 6I^- + 14\overset{.}{H}^+ \rightarrow 2\,Cr^{3+} + 3I_2 + 7H_2O$$	1
	OR	
33	(b)(i) $CuCl_2$ is more stable than Cu_2Cl_2 as Cu^{+2} is more stable than Cu^+ due to high $\Delta_{hyd}H^0$/	1
	Cu^+ in aqueous solution undergoes disproportionation, i.e., $2Cu^+(aq) \overset{.}{\rightarrow} Cu^{2+}(aq) + Cu(s)$	
	(ii) $(n-2)f^{1-14} (n-1) d^{o-1} ns^2$	1
	(iii) Fe^{3+}, presence of unpaired electron leading to d-d transition.	½ , ½
	(iv)	
	$$2Na_2CrO_4 + 2\,H^+ \rightarrow Na_2Cr_2O_7 + 2\,Na^+ + H_2O$$ $$Na_2Cr_2O_7 + 2\,KCl \rightarrow K_2Cr_2O_7 + 2\,NaCl$$	½ ½
	(v) Because of their ability to show variable oxidation states and complex formation / provide large surface area.	1