Marking Scheme **Strictly Confidential** **(For Internal and Restricted use only)** **Senior Secondary School Examination, 2023** **SUBJECT : CHEMISTRY (043)(56/4/2)**	
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 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.
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 totaled 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_____(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.
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).This is in view of the reduced syllabus and number of questions in question paper.
13	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.
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 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.
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 totaled 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.

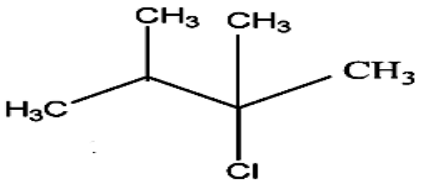
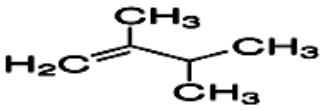
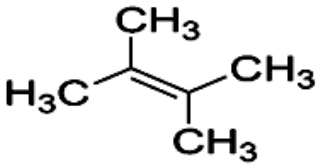
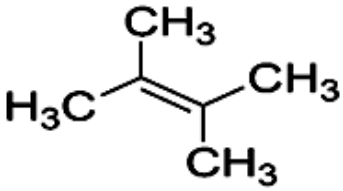
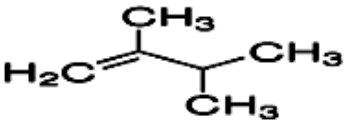
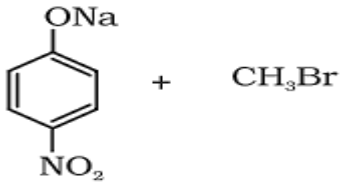
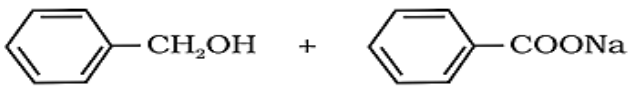
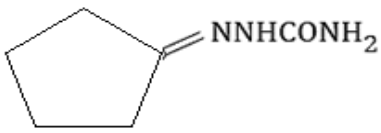
MARKING SCHEME

Senior Secondary School Examination, 2023

CHEMISTRY (Subject Code–043)

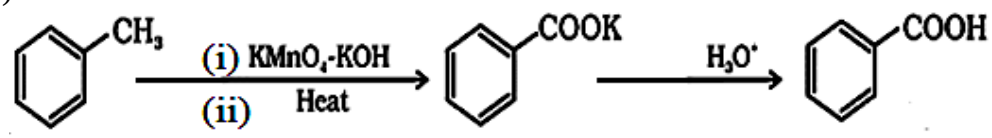
[Paper Code: 56/4/2]

Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks
	SECTION-A	
1.	(b)	1
2.	(d)	1
3.	(a)	1
4.	(c)	1
5.	(c)	1
6.	(a)	1
7.	(a)	1
8.	(b)	1
9.	(d)	1
10.	(b)	1
11.	(a)	1
12.	(c)	1
13.	(b)	1
14.	(d)	1
15.	(a)	1
16.	(c)	1
17.	(a)	1
18.	(b)	1
	SECTION-B	
19.	(a) • Positive deviation, • On adding acetone, some of the hydrogen bonds of ethanol are broken down causing an increase in vapour pressure / the ethanol-acetone shows weaker interactions than pure ethanol-ethanol and acetone-acetone interactions.	1 1
	OR (b) A liquid binary mixture that distills at constant temperature without undergoing a change in composition.	1

	Maximum boiling azeotrope 68% HNO_3+ 32% H_2O	½ ½
20.	A =  B=  OR  C=  OR 	1 ½ ½
21.	$\log k = \log A - \frac{Ea}{2{\cdot}303\ RT}$ $-\frac{Ea}{2{\cdot}303\ R} = -2 \times 10^4\ K$ $E_a = 2{\cdot}303 \times 8{\cdot}314\ J\ K^{-1}\ mol^{-1} \times 2 \times 10^4\ K$ $E_a = 3.830 \times 10^5\ J\ mol^{-1}$	½ ½ ½ ½
22.	(a) Fuel cell (b) Lead storage (c) Mercury cell (d) Dry cell	½ x 4
23.	(a) Triamminetriaquachromium (III) chloride (b) Potassium trioxalatoaluminate (III)	1 1
24.	 Because in (a) alkyl halide is 1° while in (b) p-nitrobromobenzene is less reactive towards nucleophilic substitution with CH_3ONa due to the formation of partial double bond between C and Br.	1 1
25.	(a) (i)  (ii) 	1 1

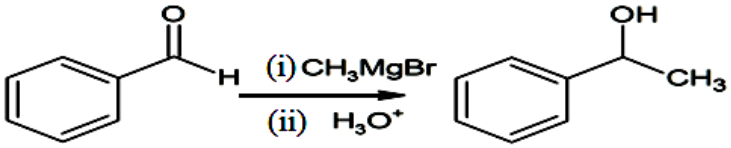
OR

(b) (i)



1

(ii)



1

(or any other correct method of conversion in not more than two steps)

SECTION -C

26.

$$k = \frac{2.303}{t} \log \frac{p_i}{(2p_i - p_t)}$$ ½

$$k = \frac{2{\cdot}303}{100} \log \frac{0{\cdot}4}{0{\cdot}8 - 0{\cdot}6}$$ 1

$$= \frac{2{\cdot}303}{100} \log 2$$ ½

$$= \frac{2{\cdot}303 \times 0{\cdot}3010}{100}$$

$$= 0{\cdot}0069\ s^{-1} \text{ or } 0{\cdot}007\ s^{-1}$$ 1

(Deduct ½ mark for no or incorrect unit)

27.

$$\pi = i \frac{n_B}{V} RT$$ ½

$$6{\cdot}5 = i \times \frac{W_B}{M_B} \times \frac{1000}{V} \times 0{\cdot}0821$$ 1

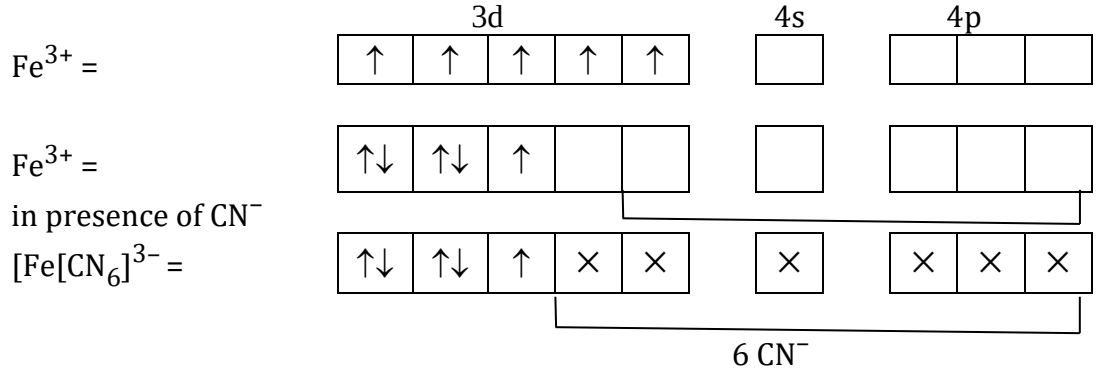
$$6{\cdot}5 = i \times \frac{6{\cdot}1}{122} \times \frac{1000}{100\ L} \times 0{\cdot}0821 \times 300\ K$$

$$i = \frac{6{\cdot}5 \times 122}{6{\cdot}1 \times 0{\cdot}0821 \times 300 \times 10} = 0{\cdot}528$$ ½

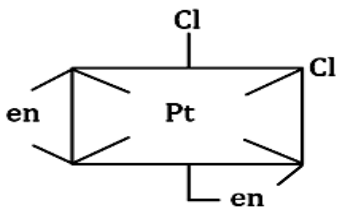
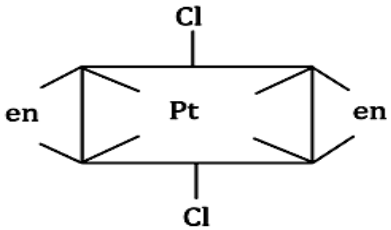
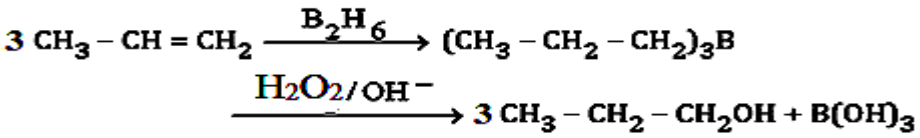
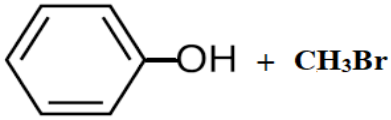
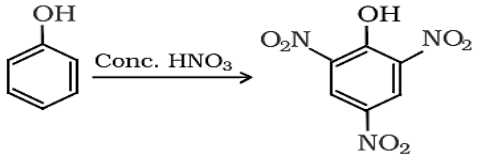
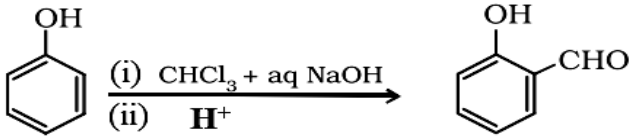
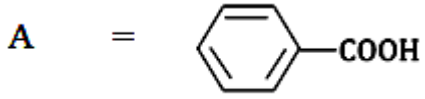
$$\alpha = \frac{1 - i}{1 - \frac{1}{n}} = \frac{1 - 0{\cdot}528}{1 - \frac{1}{2}} = 0{\cdot}944 \text{ or } 94{\cdot}4\%$$ 1

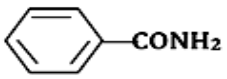
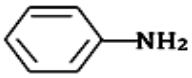
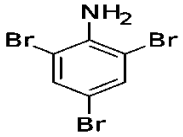
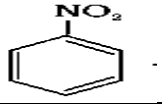
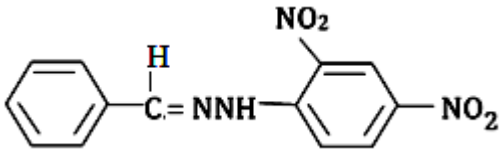
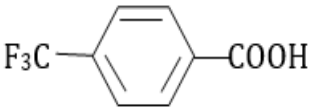
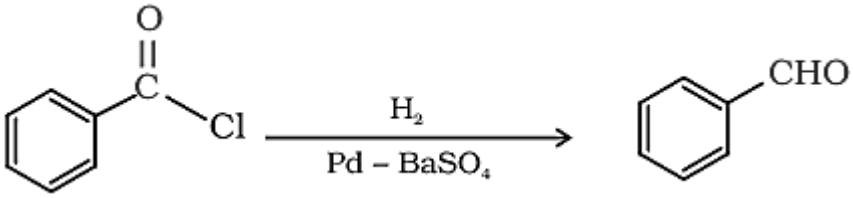
28.

(a) $Fe = 3d^6 4s^2$



Hence hybridization is d^2sp^3

	(b)  cis  trans (c) Cl^- being a weak field ligand does not cause pairing of electrons and hence $[NiCl_4]^{2-}$ is paramagnetic while CO being a strong field ligand causes pairing of electrons therefore $[Ni(CO)_4]$ is diamagnetic. (d) Linkage isomerism. Example, CN^- / NO_2^- / SCN^-	1 x 3
29.	(a) Due to the resonance stabilisation of benzyl carbocation. (b) Because it is a racemic mixture / it contains an equimolar mixture of the two enantiomers of butan-2-ol. (c) Because it forms a poisonous gas phosgene in presence of air and light.	1 1 1
30.	(a) (i)  (ii)  (iii) Because of electron-withdrawing nature or -I effect of $– NO_2$ group / p-nitrophenoxide ion is more stable than phenoxide ion / due to more effective delocalization of negative charge in p-nitrophenoxide ion.	1 1 1
	OR (b) (i)  (ii)  (ii) Because $NaOCH_3$ acts as a strong base which leads to elimination reactions.	1 1 1
	SECTION-D	
31.	(i) $(C_2H_5)_2NH < (C_2H_5)_3N < C_2H_5NH_2$ (ii) Due to the protonation of aniline to form anilinium ion which makes it deactivating and meta-directing. (iii)  	1 1 1

	B = 	½
	C = 	½
	OR	
	(1) 	1
	(2) 	1
32.	(i) **Peptide linkage** : A linkage formed when two amino acids are joined through – CONH – bond. **Glycosidic linkage**: When two monosaccharides are joined through oxygen atom. (or any other correct difference)	1
	(ii) Those which are not synthesised in the body and must be obtained through diet.	1
	(iii) α-helix and β-pleated sheet.	1
	Hydrogen bond, van der Waals forces, disulphide linkages, electrostatic force of attraction. (any two)	½ , ½
	OR	
	(iii) Loss of biological activity when native form of protein is subjected to change in temperature, pH, etc. Example, curdling of milk (or any other suitable example) Secondary and tertiary structure lose their biological activity.	1 1
	SECTION-E	
33.	(a) 	1
	(b) 	1
	(c)  (or any other correct chemical equation)	1
	(d) Due to resonance stabilization of conjugate base enolate ion.	1
	(e) On adding $NaHCO_3$ solution, Benzoic acid gives effervescence of CO_2 whereas Benzaldehyde does not. (or any other suitable chemical test)	1

34. (a) (i)

$$E_{cell} = E^{\circ}_{cell} - \frac{0{\cdot}059}{6} \log \frac{[Al^{3+}]^2}{[Ni^{2+}]^3}$$ 1

$$E_{cell} = [-0{\cdot}25 + 1{\cdot}66] - \frac{0{\cdot}059}{6} \log \frac{[0{\cdot}001]^2}{[0{\cdot}1]^3}$$

$$= 1{\cdot}41 - \frac{0{\cdot}059}{6} \log 10^{-6+3}$$ 1

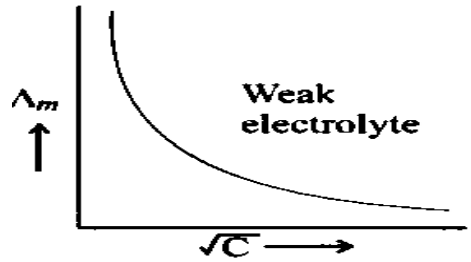
$$= 1{\cdot}41 + \frac{0{\cdot}059}{6} \times 3$$

$$= 1{\cdot}41 + 0{\cdot}0295$$

$$= 1{\cdot}4395 \text{ V}$$ 1

(Deduct ½ mark for no or incorrect unit)

(b) (i)



1

(ii) As seen from the curve, it runs parallel to the y-axis. So, even on extrapolation, it will not intercept, hence Λ°_{m} cannot be obtained. 1

OR

(b) (i)

$$\Lambda_m^{\circ}\ (NH_4Cl) = 73{\cdot}8 + 76{\cdot}2 = 150{\cdot}0 \text{ S cm}^2 \text{ mol}^{-1}$$

$$\Lambda_m = \frac{k}{c} \times 1000 \text{ S cm}^2 \text{ mol}^{-1}$$ ½

$$\Lambda_m = \frac{1{\cdot}29 \times 10^{-2}}{0{\cdot}1} \times 1000 \text{ S cm}^2 \text{ mol}^{-1}$$ ½

$$\Lambda_m = 1{\cdot}29 \times 10^2 = 129 \text{ S cm}^2 \text{ mol}^{-1}$$ ½

$$\alpha = \frac{\Lambda_m}{\Lambda_m^{\circ}}$$ ½

$$\alpha = \frac{129}{150} = 0{\cdot}86$$ ½

(ii)

$$E_{Zn^{2+}|Zn} = E^{\circ}_{Zn^{2+}/Zn} - \frac{0{\cdot}059}{2} \log \frac{1}{[Zn^{2+}]}$$ ½

$$E_{Zn^{2+}|Zn} = -0{\cdot}76 \text{ V} - \frac{0{\cdot}059}{2} \log \frac{1}{0{\cdot}1}$$

$$E_{Zn^{2+}|Zn} = -0{\cdot}76 \text{ V} - 0{\cdot}0295$$ ½

$$= -0{\cdot}7895 \text{ V}$$ 1

35.	(a) (i) (1) Because of no unpaired electron in d-orbitals in Zn^{2+} whereas, Ni^{2+} has 2 unpaired electrons in d-orbitals / Ni^{2+} shows d-d transition while Zn^{2+} does not. (2) Because Cr is more stable in + 3 oxidation state due to stable t_{2g}^3 configuration. (3) Because of their ability to show multiple or variable oxidation states / ability to form complex / provide larger surface area for the reactants. (ii) (1) $\mathbf{2}\ \boldsymbol{MnO_4^-} + 10\ I^- + 16\ H^+ \longrightarrow 2\ Mn^{2+} + 5\ I_2 + 8\ H_2O$ (2) $\boldsymbol{MnO_4^-} + 5\ Fe^{2+} + 8\ H^+ \longrightarrow Mn^{2+} + 5\ Fe^{3+} + 4\ H_2O$	1 1 1 1 1 1
	OR (b) (i) Dichromate ion/ Chromate ion / Permanganate ion (any two) (ii) Changes to CrO_4^{2-} / K_2CrO_4 (iii) Cu^+ ion (aq.) undergoes disproportionation to Cu^{2+} (aq.) and Cu / $2\ Cu^+ (aq.) \longrightarrow Cu^{2+} (aq.) + Cu(s)$ (iv) Cerium /Terbium (**v**) Chromium, Copper	1 x 5

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