

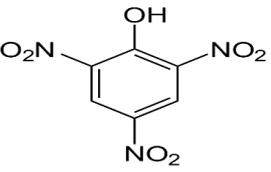
Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Senior Secondary School Examination, 2023
SUBJECT : CHEMISTRY (043)(56/3/1)

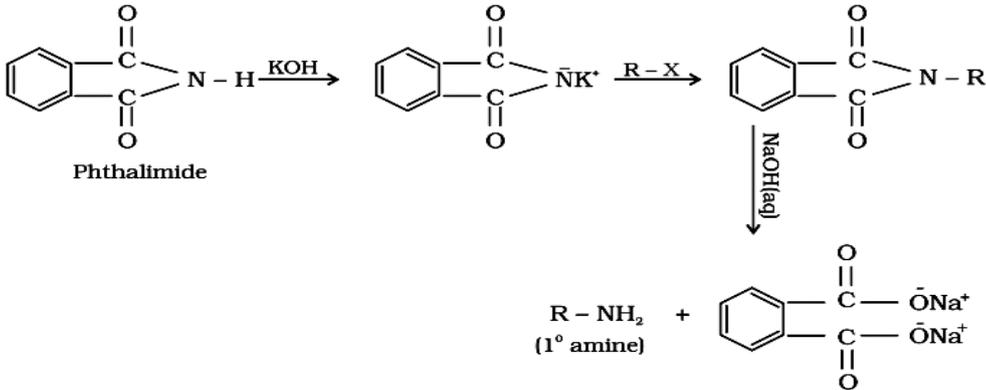
General Instructions: -

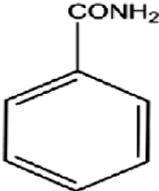
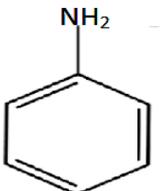
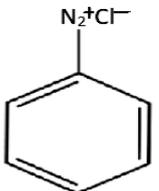
1	You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested 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(\checkmark) wherever answer is correct. For wrong answer CROSS ‘X’ be marked. Evaluators will not put right (\checkmark) 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.

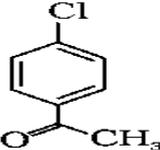
9	If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a note " Extra Question ".
10	No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
11	A full scale of marks 70 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). 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:- <ul style="list-style-type: none"> ● 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: 56/3/1]

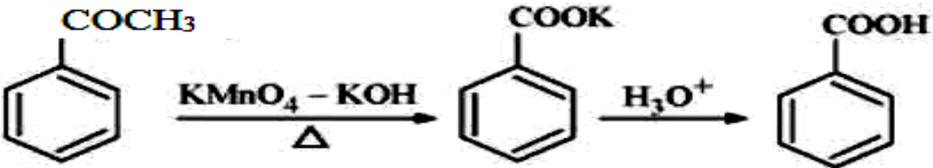
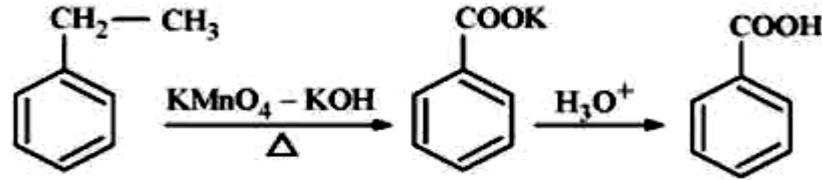
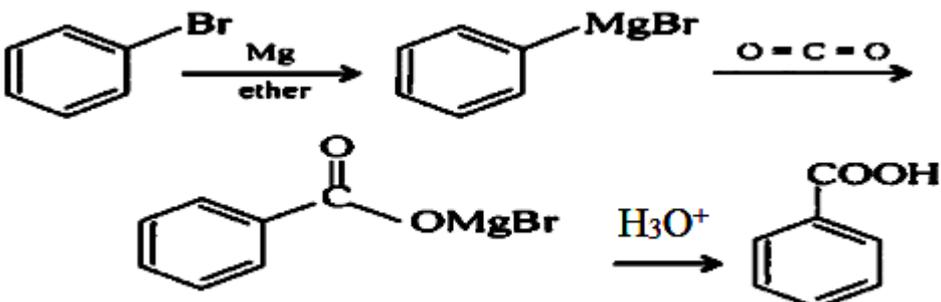
Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks
	SECTION-A	
1.	(c)	1
2.	(b)	1
3.	(b)	1
4.	(d)	1
5.	(a)	1
6.	(d)	1
7.	(c)	1
8.	(b)	1
9.	(a)	1
10.	(a)	1
11.	(c)	1
12.	(b)	1
13.	(b)	1
14.	(a)	1
15.	(d)	1
16.	(a)	1
17.	(c)	1
18.	(a)	1
	SECTION-B	
19.	(a) $(\text{CH}_3)_2\text{CH} - \text{CH}_2\text{OH}$, 2-Methylpropanol (b)  , 2,4,6-Trinitrophenol / 2,4,6-Trinitrobenzenol	$\frac{1}{2}$, $\frac{1}{2}$ $\frac{1}{2}$, $\frac{1}{2}$

20.	$-\frac{1}{2} \frac{\Delta(\text{N}_2\text{O}_5)}{\Delta t} = +\frac{1}{4} \frac{\Delta[\text{NO}_2]}{\Delta t} = +\frac{\Delta[\text{O}_2]}{\Delta t}$ <p>(a) Rate of formation of $\text{NO}_2 = \frac{1}{4} \frac{\Delta[\text{NO}_2]}{\Delta t}$</p> $= \frac{1}{4} \times \frac{5 \times 10^{-3}}{10} \text{ mol L}^{-1} = 1.25 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$ <p>(b) $-\frac{\Delta[\text{N}_2\text{O}_5]}{\Delta t} = \frac{2}{4} \frac{\Delta[\text{NO}_2]}{\Delta t} = 0.5 \times 1.25 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$</p> $= 0.625 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1} \text{ OR } 6.25 \times 10^{-5} \text{ mol L}^{-1} \text{ s}^{-1}$	<p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1/2</p>
21.	<p>(a) A Galvanic cell that converts the energy of combustion of fuel directly to electrical energy.</p> <p>Advantages: (1) More efficient. (2) Pollution free. (or any other suitable advantage)</p>	<p>1</p> <p>1/2+ 1/2</p>
OR		
	<p>(b)</p> <ul style="list-style-type: none"> • X is better. • Due to higher standard reduction potential of iron than X, iron will not get oxidised. 	<p>1</p> <p>1</p>
22.	<p>(a) (i) Glycogen liver/muscles/brain (Any one)</p> <p>(ii) Starch is a polymer of α-Glucose whereas Cellulose is a polymer of β-Glucose.</p>	<p>1/2</p> <p>1/2</p> <p>1</p>
OR		
	<p>(b) (i) Peptide linkage : A linkage formed when two amino acids are joined through – CONH – bond.</p> <p>Glycosidic linkage : When two monosaccharides are joined through oxygen atom.</p> <p>(ii) Nucleoside : Base + Sugar</p> <p>Nucleotide : Base + Sugar + Phosphate</p> <p>(or any other correct difference)</p>	<p>1</p> <p>1</p>
23.	<p>(a) Due to resonance of carboxyl carbon with – OH group / explanation through resonating structures.</p> <p>(b) Due to the steric effect and electronic reasons.</p>	<p>1</p> <p>1</p>
24.	<p>(a) $\text{R} - \text{NH}_2 + \text{CHCl}_3 + 3 \text{KOH (alc.)} \longrightarrow \text{R} - \text{NC} + 3\text{KCl} + 3 \text{H}_2\text{O}$</p> <p>(b)</p>  <p style="text-align: center;"> $\text{R} - \text{NH}_2$ (1° amine) </p>	<p>1</p> <p>1</p>

25.	(a) Due to more solubility of oxygen in cold water than in warm water. (b) Sprinkling of salt causes depression in freezing point and snow easily melts.	1 x 2
SECTION-C		
26.	<p>(a)</p> $\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\ddot{\text{O}}-\text{H} + \text{H}^+ \\ \quad \\ \text{H} \quad \text{H} \end{array} \xrightleftharpoons{\text{Fast}} \begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{O}^+-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$ $\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{O}^+-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array} \xrightleftharpoons{\text{Slow}} \begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}^+ \\ \quad \\ \text{H} \quad \text{H} \end{array} + \text{H}_2\text{O}$ $\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C} \quad \text{C}^+ \\ \quad \\ \text{H} \quad \text{H} \end{array} \rightleftharpoons \begin{array}{c} \text{H} \quad \text{H} \\ \backslash \quad / \\ \text{C}=\text{C} \\ / \quad \backslash \\ \text{H} \quad \text{H} \end{array} + \text{H}^+$ <p>(b)</p> $\begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3-\text{CH} \\ \\ \text{C}_6\text{H}_5 \end{array} \xrightarrow{\text{O}_2} \begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3-\text{C}-\text{O}-\text{O}-\text{H} \\ \\ \text{C}_6\text{H}_5 \end{array} \xrightarrow[\text{H}_2\text{O}]{\text{H}^+} \begin{array}{c} \text{OH} \\ \\ \text{C}_6\text{H}_5 \end{array} + \text{CH}_3\text{COCH}_3$	<p>1/2</p> <p>1</p> <p>1/2</p> <p>1</p>
27.	<p>(a) (i)</p> <p>A =  B =  C = </p> <p>(ii) A = CH₃CH₂CN B = CH₃CH₂CH₂NH₂ C = CH₃CH₂CH₂OH</p>	<p>1/2 X 3</p> <p>1/2 x 3</p>
OR		
	<p>(b)</p> <p>(i)</p> $\begin{array}{c} \text{NH}_2 \\ \\ \text{C}_6\text{H}_5 \end{array} \xrightarrow[\text{Pyridine}]{(\text{CH}_3\text{CO})_2\text{O}} \begin{array}{c} \text{O} \\ \\ \text{H}-\text{N}-\text{C}-\text{CH}_3 \\ \\ \text{C}_6\text{H}_5 \end{array} \xrightarrow[\text{CH}_3\text{COOH}]{\text{Br}_2} \begin{array}{c} \text{O} \\ \\ \text{H}-\text{N}-\text{C}-\text{CH}_3 \\ \\ \text{C}_6\text{H}_4 \\ \\ \text{Br} \end{array} \xrightarrow{\text{OH}^- \text{ or } \text{H}^+} \begin{array}{c} \text{NH}_2 \\ \\ \text{C}_6\text{H}_4 \\ \\ \text{Br} \end{array}$ <p>(ii) CH₃COOH $\xrightarrow[\Delta]{\text{NH}_3}$ CH₃CONH₂ $\xrightarrow{\text{Br}_2 / \text{KOH}}$ CH₃NH₂</p> <p>(iii) CH₃CH₂CH₂CN $\xrightarrow{\text{LiAlH}_4}$ CH₃CH₂CH₂CH₂NH₂</p> <p style="text-align: center;">(or any other correct method of conversion)</p>	<p>1</p> <p>1</p> <p>1</p>

28.	$\Delta T_f = i K_f \frac{W_B}{M_B} \times \frac{1000}{W_A}$ $0.45 = i \times 5.12 \text{ K kg mol}^{-1} \times \frac{0.3 \text{ g}}{60 \text{ g mol}^{-1}} \times \frac{1000}{30 \text{ kg}}$ $i = 0.527$ $\alpha = \frac{1-i}{1-\frac{1}{n}}$ $\alpha = \frac{1-0.527}{1-\frac{1}{2}} = 0.946 \text{ or } 94.6\%$	<p>½</p> <p>1</p> <p>½</p> <p>½</p> <p>½</p>
29.	$\log \frac{k_2}{k_1} = \frac{E_a}{2.303 R} \left[\frac{1}{T_1} - \frac{1}{T_2} \right]$ $\log \frac{2k_1}{k_1} = \frac{E_a}{2.303 \times 8.314 \text{ J K}^{-1} \text{ mol}^{-1}} \left[\frac{1}{300} - \frac{1}{310} \right]$ $E_a = \frac{0.3010 \times 19.147 \text{ J mol}^{-1} \times 300 \times 310}{10}$ $E_a = 53598.2 \text{ J mol}^{-1} \text{ or } 53.598 \text{ kJ mol}^{-1} \text{ or } 53.6 \text{ kJ mol}^{-1}$ <p>(Deduct ½ mark for no or incorrect unit)</p>	<p>1</p> <p>1</p> <p>1</p>
30.	<p>(a) CH₃(CH₂)₄ – CH₃</p> <p>(b) HOOC – (CHOH)₄ – COOH</p> <p>(c) HOCH₂ – (CHOH)₄ – COOH</p> <p>(d)</p> $\begin{array}{c} \text{CH} \begin{array}{l} \swarrow \text{CN} \\ \searrow \text{OH} \end{array} \\ \\ \text{(CHOH)}_4 \\ \\ \text{CH}_2\text{OH} \end{array}$	<p>1 x 3</p>
SECTION-D		
31.	<p>(i) C₆H₅MgBr / Phenyl magnesium bromide is formed.</p> <p>(ii) (1) CH₂ = CH – CH₂ – Cl</p> <p>(2) (CH₃)₃C – Cl</p> <p>(iii)(1) CH₃CH₂CH₂CH₂ – Cl $\xrightarrow[\text{acetone}]{\text{NaI}}$ CH₃CH₂CH₂CH₂ – I</p> <p>(2) CH₃CH₂CH = CH₂ $\xrightarrow[\text{peroxide}]{\text{HBr}}$ CH₃CH₂CH₂CH₂-Br</p> <p style="text-align: right;">$\xrightarrow[\text{acetone}]{\text{NaI}}$ CH₃CH₂CH₂CH₂ – I</p> <p style="text-align: center;">OR</p> <p>(iii) (1) CH₃ – CH = CH₂</p> <p>(2)</p> 	<p>1</p> <p>½</p> <p>½</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>

32.	(i) $[\text{Ni}(\text{H}_2\text{O})_6]\text{Cl}_2$, 6 (ii) Pentaamminechloridocobalt(III)sulphate (iii) (1) $[\text{Ni}(\text{CO})_4]$ – tetrahedral, diamagnetic (2) $[\text{Fe}(\text{CN})_6]^{3-}$ - octahedral, paramagnetic OR (iii) (1) Because Δ_t is not sufficient for the pairing of electrons / Crystal field splitting energy (CFSE) is not sufficient for pairing of electrons. (2) NH_3 being a strong field ligand can pair up the electrons to form d^2sp^3 but cannot pair up in Ni^{2+} as two vacant d-orbitals are not available. $\therefore sp^3d^2$ is formed.	$\frac{1}{2}, \frac{1}{2}$ 1 $\frac{1}{2}, \frac{1}{2}$ $\frac{1}{2}, \frac{1}{2}$ 1 1
SECTION-E		
33.	(a) (i) (1) Because of small size, high ionic charge and availability of d-orbital. (2) Because of stable half-filled $3d^5$ configuration in Mn^{2+} . (3) Cu^+ ion (aq.) undergoes disproportionation to Cu^{2+} (aq.) and Cu / $2 \text{Cu}^+ (\text{aq.}) \longrightarrow \text{Cu}^{2+} (\text{aq.}) + \text{Cu}$. (ii) $2 \text{MnO}_2 + 4 \text{KOH} + \text{O}_2 \longrightarrow 2 \text{K}_2\text{MnO}_4 + 2 \text{H}_2\text{O}$ $3 \text{MnO}_4^{2-} + 4 \text{H}^+ \longrightarrow 2 \text{MnO}_4^- + \text{MnO}_2 + 2 \text{H}_2\text{O}$ (or any other suitable method of preparation)	1 1 1 1 1
OR		
	(b) (i) (1) Sc (2) Cr / Fe (ii) (1) $\text{Cr}_2\text{O}_7^{2-} + 14 \text{H}^+ + 6 \text{Fe}^{2+} \longrightarrow 2 \text{Cr}^{3+} + 6 \text{Fe}^{3+} + 7 \text{H}_2\text{O}$ (2) $2 \text{KMnO}_4 \xrightarrow{\Delta} \text{K}_2\text{MnO}_4 + \text{MnO}_2 + \text{O}_2$ (iii) An alloy of Lanthanoid (95% lanthanoid + 5% Fe) is Mischmetal. It is used in bullets, flints etc.	1 1 1 1 $\frac{1}{2}, \frac{1}{2}$
34.	(a) (i) (1) $\text{CH}_3-\text{CH}_2-\text{CH}_2-\overset{\text{O}}{\underset{\text{O}}{\text{C}}}-\text{CH}_3$ (2) $(\text{CH}_3)_3\text{C}-\text{CHO}$ (3) $\text{CH}_3-\text{CH}_2-\overset{\text{CH}_3}{\underset{\text{H}}{\text{C}}}-\text{CHO}$ (ii) (1) $\text{>C=O} \xrightarrow[-\text{H}_2\text{O}]{\text{NH}_2\text{NH}_2} \text{>C=NNH}_2 \xrightarrow[\text{heat}]{\text{KOH/ethylene glycol}} \text{>CH}_2 + \text{N}_2$	1 1 1 1

	<p>(2)</p> $\text{R-CH}_2\text{-COOH} \xrightarrow[\text{(ii) H}_2\text{O}]{\text{(i) X}_2/\text{Red phosphorus}} \text{R-CH(X)-COOH}$ <p style="text-align: center;">X = Cl, Br</p>	1
	<p style="text-align: center;">OR</p> <p>(b) (i)</p> <p>(1).</p>  <p>(2).</p>  <p>(3).</p>  <p style="text-align: center;">(or any other suitable method of conversion).</p> <p>(ii) (1) $\text{NC-CH}_2\text{-COOH} < \text{F-CH}_2\text{-COOH} < \text{NO}_2\text{-CH}_2\text{COOH} /$ $\text{F-CH}_2\text{-COOH} < \text{CN-CH}_2\text{-COOH} < \text{NO}_2\text{-CH}_2\text{COOH}$</p> <p>(2) Butanone < Propanone < Propanal < Ethanal</p>	1 x 3
35.	<p>(a)</p> $E_{\text{cell}} = E_{\text{cell}}^{\circ} - \frac{0.059}{2} \log \frac{[\text{Zn}^{2+}]}{[\text{H}^+]^2}$ $= 0.76 \text{ V} - \frac{0.059}{2} \log \frac{[0.1]}{[0.01]^2}$ $= 0.76 \text{ V} - \frac{0.059}{2} \log 10^3$ $= 0.76 \text{ V} - \frac{0.059 \times 3}{2}$ $E_{\text{cell}} = 0.671 \text{ V}$ <p style="text-align: right;">(Deduct 1/2 mark for no or incorrect unit)</p> <p>(b) Limiting molar conductivity of an electrolyte is equal to the sum of individual contributions of cation and anion of the electrolyte. Because no. of ions per unit volume decreases.</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
