

**Strictly Confidential: (For Internal and Restricted use only)**  
**Senior Secondary & Secondary School Examination**  
**Comptt. Examination, 2021**  
**Marking Scheme – CHEMISTRY (043)**

**(PAPER CODE –56(B))**

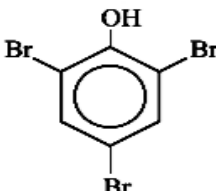
**General Instructions: -**

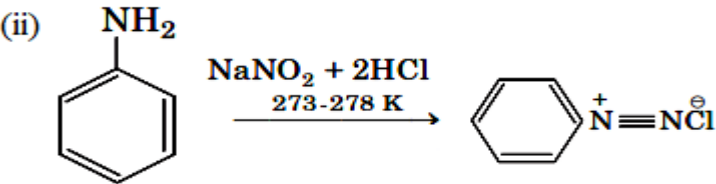
1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully. **Evaluation is a timed mission for all of us. Hence, it is necessary that you put in your best efforts in this process.**
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 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 marks be awarded to them.**
4. 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. 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.
5. 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.
6. Evaluators will mark( ✓ ) wherever answer is correct. For wrong answer ‘X’ be marked. Evaluators will not put right kind of mark 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 does not have any parts, marks must be awarded in the left hand margin and encircled.
8. If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out.
9. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
10. A full scale of marks \_\_\_\_\_ (example 0-80) has to be used. Please do not hesitate to award full marks if the answer deserves it.
11. 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).
12. 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 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.
  - 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.
13. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as (X) and awarded zero (0) Marks.
14. Any unassessed portion, non-carrying over of marks to the title page, or totalling 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.
15. The Examiners should acquaint themselves with the guidelines given in the Guidelines for spot Evaluation before starting the actual evaluation.
16. Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totalled and written in figures and words.
17. The Board permits candidates to obtain photocopy of the Answer Book on request in an RTI application and also separately as a part of the re-evaluation process on payment of the processing charges.

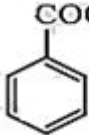
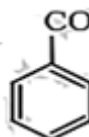
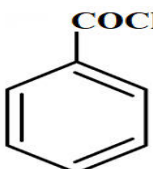
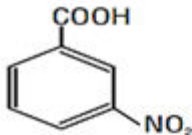
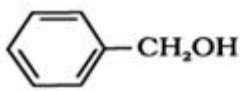
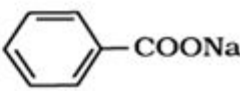
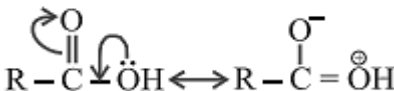
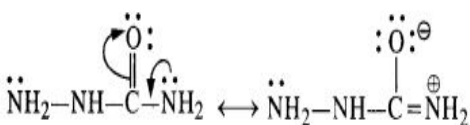
**Marking scheme – 2021**  
**CHEMISTRY (043) / CLASS XII**

**56 (B)**

Q. No	Expected Answer / Value Points	Marks						
SECTION-A								
1. (i)	(B)	1						
(ii)	(D) OR (B)	1						
(iii)	(C)	1						
(iv)	(C)	1						
2. (i)	(D)	1						
(ii)	(B) OR (A)	1						
(iii)	(D)	1						
(iv)	(A)	1						
3.	(C)	1						
4.	(A) OR (A)	1						
5.	(B) OR (B)	1						
6.	(B)	1						
7.	(A) OR (C)	1						
8.	(B)	1						
9.	(D)	1						
10.	(C)	1						
11.	(C) OR (B)	1						
12.	(A)	1						
13.	(B)	1						
14.	(C) OR (A)	1						
15.	(D)	1						
16.	(A)	1						
SECTION-B								
17.(a)	(i) <div></div> (ii) CH <sub>3</sub> CH <sub>2</sub> CHO	1  1						
17.(b)	<div><div><div>(i) CH<sub>3</sub>CH<sub>2</sub>OH</div><div>PCl<sub>5</sub></div><div>→</div><div>CH<sub>3</sub>CH<sub>2</sub>Cl</div><div>OR</div><div>KCN</div><div>→</div><div>CH<sub>3</sub>CH<sub>2</sub>CN</div></div><div><div>(ii) C<sub>6</sub>H<sub>5</sub>OH</div><div>Zn dust</div><div>→</div><div>C<sub>6</sub>H<sub>6</sub></div><div>CH<sub>3</sub>COCl/ Anhy. AlCl<sub>3</sub></div><div>→</div><div>C<sub>6</sub>H<sub>5</sub>COCH<sub>3</sub></div></div></div> <div>(Or by any other suitable method)</div>	1  1						
18.	<table><tr><th>Ideal Solution</th><th>Non-Ideal solution</th></tr><tr><td>Each component obeys Raoult’s law at all temperature and concentration, have similar structure and polarity, form them.</td><td>They do not obey Raoult’s law. They show positive or negative deviation. Liquids, which are structurally different or have different polarity, form them.</td></tr><tr><td>ΔV<sub>mixing</sub> = 0 and ΔH<sub>mixing</sub> = 0</td><td>ΔV<sub>mixing</sub> ≠ 0 and ΔH<sub>mixing</sub> ≠ 0.</td></tr></table>	Ideal Solution	Non-Ideal solution	Each component obeys Raoult’s law at all temperature and concentration, have similar structure and polarity, form them.	They do not obey Raoult’s law. They show positive or negative deviation. Liquids, which are structurally different or have different polarity, form them.	ΔV <sub>mixing</sub> = 0 and ΔH <sub>mixing</sub> = 0	ΔV <sub>mixing</sub> ≠ 0 and ΔH <sub>mixing</sub> ≠ 0.	1  1
Ideal Solution	Non-Ideal solution							
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ΔV <sub>mixing</sub> = 0 and ΔH <sub>mixing</sub> = 0	ΔV <sub>mixing</sub> ≠ 0 and ΔH <sub>mixing</sub> ≠ 0.							
19. (a)	(i) d <sup>2</sup> sp <sup>3</sup> , Octahedral, diamagnetic, hexacyanidoferrate(II) ion / hexacyanoferrate(II) ion	½ X 4						

<b>OR</b>		
19. (b)	(i) The energy used to split d-orbitals into two sets $t_{2g}$ and $e_g$ . (ii) If $\Delta_0 > P$ : Pairing of electrons occurs and If $\Delta_0 < P$ : No pairing of electrons	1 $\frac{1}{2}, \frac{1}{2}$
20.	For a first order reaction, the time required for 99% completion is $t_1 = \frac{2.303}{k} \log \frac{100}{100-99}$ $= \frac{2.303}{k} \log 100$ $= 2 \times \frac{2.303}{k} \text{-----(i)}$ $t_2 = \frac{2.303}{k} \log \frac{100}{100-90}$ $= \frac{2.303}{k} \log 10$ $= \frac{2.303}{k} \text{-----(ii)}$ Comparing (i) and (ii), $t_1 = 2t_2$ .	$\frac{1}{2}$ $\frac{1}{2}$ 1
21. (a)	(i) Due to incomplete filling of d- orbitals. (ii) Due to the presence of unpaired electrons.	1 1
<b>OR</b>		
21. (b)	Due to the participation of 3d and 4s orbitals electron for bonding. +2, due to stable half filled $3d^5$ configuration.	1 $\frac{1}{2}, \frac{1}{2}$
22.	(i) $H_2$ , Pd / $LiAlH_4$ / $NaBH_4$ (or any other correct reagent) (ii) Zn dust	1 1
23.	(i) Due to resonance. (ii) Due to $sp^2$ hybridised carbon atom.  (or any other correct reason)	1 1
24.	<p>(i) <math display="block">R-\overset{\overset{O}{  }}{C}-NH_2 + Br_2 + 4NaOH \longrightarrow R-NH_2 + Na_2CO_3 + 2NaBr + 2H_2O</math></p> <p>(ii) </p>	1 1
25.	$d = \frac{Z \times M}{N_A \times a^3}$ $7.5 \text{ g cm}^{-3} = \frac{Z \times 72 \text{ g mol}^{-1}}{(4 \times 10^{-8})^3 \text{ cm}^3 \times 6.022 \times 10^{23} \text{ mol}^{-1}}$ $Z = \frac{7.5 \times 6.022 \times 10^{23} \times 64 \times 10^{-24}}{72} = 4$ Unit cell is of fcc type.	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
<b>SECTION-C</b>		
26 (a).	(i) $C_6H_5MgBr$ is formed. (ii) o-Chlorotoluene and p-Chlorotoluene (or structures) (iii) $CH_3NC$	1 1 1
<b>OR</b>		
26 (b).	<p>(i) <math>CH_3CH_2Cl \xrightarrow[\text{KOH (alco.)}]{Na, \text{ dry ether}} CH_3CH_2CH_2CH_3</math></p> <p>(ii) <math>CH_3CH(Br)CH_3 \xrightarrow[1. KCN]{KOH (alco.)} CH_3CH=CH_2 \xrightarrow{HBr, \text{ peroxide}} CH_3CH_2CH_2Br</math></p> <p>(iii) <math>CH_3CH_2Cl \longrightarrow CH_3CH_2COOH</math></p>	1 1 1

	<b>2. H<sub>3</sub>O<sup>+</sup></b>	
27.	(i) Due to high enthalpy of atomization and low enthalpy of hydration. (ii) Due to the presence of one unpaired electron in Ti <sup>3+</sup> whereas no unpaired electron in Sc <sup>3+</sup> . (iii) Due to their ability to show variable oxidation state.	1 1 1
28 (a).	(i) Isomers that differ in the configuration as C-1. (ii) Linkage joining two amino acids through -CONH- bond. (iii) Loss of biological activity in proteins when subjected to change in pH, temperature, etc. <b>OR</b> (i) $\begin{array}{c} \text{CHO} \\   \\ (\text{CHOH})_4 \\   \\ \text{CH}_2\text{-OH} \end{array} \xrightarrow{\text{Br}_2 \text{ water}} \begin{array}{c} \text{COOH} \\   \\ (\text{CHOH})_4 \\   \\ \text{CH}_2\text{-OH} \end{array}$ (ii) $\begin{array}{c} \text{CHO} \\   \\ (\text{CHOH})_4 \\   \\ \text{CH}_2\text{-OH} \end{array} \xrightarrow{\text{HI}, \Delta} \text{CH}_3\text{-CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$ (iii) $\begin{array}{c} \text{CHO} \\   \\ (\text{CHOH})_4 \\   \\ \text{CH}_2\text{-OH} \end{array} \xrightarrow{\text{HCN}} \begin{array}{c} \text{CH = NOH} \\   \\ (\text{CHOH})_4 \\   \\ \text{CH}_2\text{OH} \end{array}$	1 1 1  1  1  1
29.	$\frac{P_o - P}{P_o} = X^2$ $\frac{17.536 - P}{17.536} = \frac{w_2}{M_2} \times \frac{M_1}{w_1}$ $\frac{17.536 - P}{17.536} = \frac{20}{180} \times \frac{18}{500}$ $\frac{17.536 - P}{17.536} = 0.004$ $17.536 - P = 0.07$ $P = 17.536 - 0.07$ $= 17.466 \text{ mm Hg}$ <p style="text-align: right;">(Deduct ½ mark for no or incorrect unit).</p>	1  1      1
30.	$k = \frac{2.303}{30 \text{ min}} \log \frac{100}{100 - 60}$ $= \frac{2.303}{30 \text{ min}} \log \frac{10}{4}$ $= 0.95 \text{ min}^{-1}$ $t_{1/2} = \frac{0.693}{k} = \frac{0.693}{0.95} = 0.73 \text{ min}$	1  1  1
	<b>SECTION-D</b>	
31. (a)	(i) (I): Due to small size of nitrogen lone pair of electrons is easily available for donation. (II): Because O is less electronegative than F. (III): Due to small size, high electronegativity, absence of d-orbital. (ii) (I):	1 1 1  1

31. (b)	<p><math>2\text{NaOH} + \text{Cl}_2 \rightarrow \text{NaCl} + \text{NaOCl} + \text{H}_2\text{O}</math> (cold and dilute)</p> <p>(II): <math>\text{Cu} + 2 \text{H}_2\text{SO}_4(\text{conc.}) \rightarrow \text{CuSO}_4 + \text{SO}_2 + 2\text{H}_2\text{O}</math></p> <p style="text-align: center;"><b>OR</b></p> <p>(i) (I): <math>\text{HI} &gt; \text{HBr} &gt; \text{HCl} &gt; \text{HF}</math>          (II): <math>\text{BiH}_3 &lt; \text{SbH}_3 &lt; \text{AsH}_3 &lt; \text{PH}_3 &lt; \text{NH}_3</math>          (III): <math>\text{H}_2\text{O} &lt; \text{H}_2\text{S} &lt; \text{H}_2\text{Se} &lt; \text{H}_2\text{Te}</math></p> <p>(ii) (I) : Due to absorption of radiations in visible region which results in the excitation of outer electrons to higher energy level.          (II): Because they easily accept one electron to acquire stable configuration.</p>	<p>1</p> <p>1 1 1</p> <p>1 1</p>
32 (a).	<p>(i) (I) A: <math>\text{CH}_3\text{CHO}</math> / Ethanal B: <math>\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CHO}</math> / 3-Hydroxybutanal          C: <math>\text{CH}_3\text{CH} = \text{CHCHO}</math> / But-2-enal</p> <p>(II) A:  / Potassium benzoate          B:  / Benzoic acid          C:  / Benzoyl chloride</p> <p>(ii): (I) On heating acetone with NaOH and <math>\text{I}_2</math>, it will give <i>yellow ppt.</i> of iodoform whereas propanal does not.          (II) On adding <math>\text{NaHCO}_3</math>, benzoic acid will give the brisk effervescence whereas phenol does not.          (Or any other suitable chemical test)</p>	<p><math>\frac{1}{2} \times 3</math></p> <p><math>\frac{1}{2} \times 3</math></p> <p><math>\frac{1}{2} \times 3</math></p>
32 (b).	<p>(i):</p> <p>(I): </p> <p>(II):  + </p> <p>(III): <math>\text{CH}_3\text{CHO}</math></p> <p>(ii) (I): Lone pairs of electrons on oxygen involved in resonance stabilization of -COOH group /Due to resonance lone pair on -OH of -COOH group decreases the electrophilicity of carbon atom to greater extent /</p> <p></p> <p>(II) Because the other <math>-\text{NH}_2</math> group is involved in resonance with -CO- group /</p> <p></p>	<p>1 X 3</p> <p>1</p> <p>1</p>

33 (a).	<p>(i) <math>E_{\text{cell}} = E^{\circ}_{\text{cell}} - \frac{0.059}{2} \log \frac{[Mg^{2+}]}{[Cu^{2+}]}</math></p> <p><math>E_{\text{cell}} = 2.70 - \frac{0.059}{2} \log \frac{[10^{-3}]}{[10^{-4}]}</math></p> <p><math>E_{\text{cell}} = 2.70 - \frac{0.059}{2} \log 10</math></p> <p><math>E_{\text{cell}} = 2.70 - 0.0295</math></p> <p><math>E_{\text{cell}} = 2.67 \text{ V}</math></p> <p>(Deduct ½ mark, if no or incorrect unit)</p> <p><b><u><math>\Delta G = - nFE_{\text{cell}}</math></u></b></p> <p><math>= -2 \times 96500 \text{ C mol}^{-1} \times 2.67 \text{ V}</math></p> <p><math>= -515310 \text{ J mol}^{-1} \text{ or } -515.310 \text{ kJ mol}^{-1}</math></p> <p style="text-align: center;"><b>OR</b></p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
33 (b).	<p>(i) <b><math>\Delta G^{\circ} = - nFE^{\circ}_{\text{cell}}</math></b></p> <p><math>= -1 \times 96500 \text{ C mol}^{-1} \times 0.03 \text{ V}</math></p> <p><math>= -2895 \text{ J mol}^{-1} \text{ or } -2.895 \text{ kJ mol}^{-1}</math></p> <p><math>E^{\circ}_{(\text{cell})} = \frac{0.059 \text{ V}}{n} \log K_c</math></p> <p><math>\log K_c = \frac{1 \times 0.03 \text{ V}}{0.059}</math></p> <p><math>\log K_c = 0.51</math></p> <p>(ii) Limiting molar conductivity of an electrolyte can be represented as the sum of the individual contributions of the anion and cation of the electrolyte.</p> <p>(iii) Calculation of molar conductivity at infinite dilution (<math>\Lambda_m^{\circ}</math>) for weak electrolytes / Calculation of degree of dissociation [<math>\alpha</math>] and degree of dissociation constant (K).</p>	<p>½</p> <p>1</p> <p>½</p> <p>1</p> <p>1</p> <p>1</p>

S.No.	Name	Signature
1.	Mr. D A Mishra	
2.	Ms. Preeti Kiran	
3.	Mr. Rakesh Dhawan	
4.	Mr. Rahul Tandon	