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

**(PAPER CODE –56/1/1)**

**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. **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.

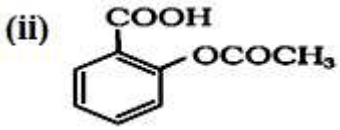
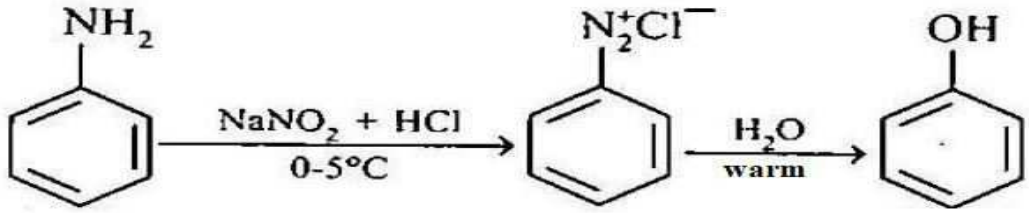
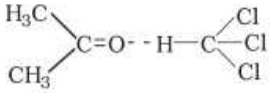
16. Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totalled and written in figures and words.

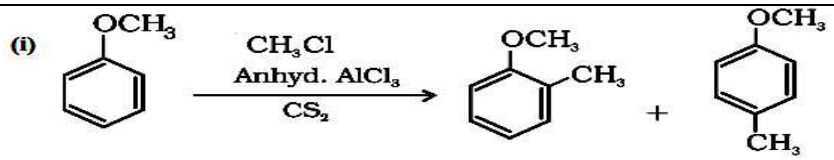
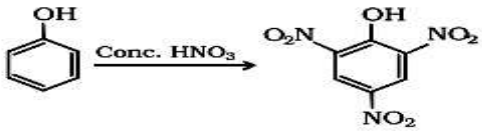
17. The Board permits candidates to obtain photocopy of the Answer Book on request in an RTI application and also separately as a part of the re-evaluation process on payment of the processing charges.

# Marking scheme – 2021

## CHEMISTRY (043) / CLASS XII

## 56/1/1

| Q. No | Expected Answer / Value Points | Marks |
|---|---|---|
| | **SECTION-A** | |
| 1. (i) | (B) | 1 |
| (ii) | (D) | 1 |
| (iii) | (A) | 1 |
| (iv) | (C) **OR** (B) | 1 |
| 2. (i) | (D) | 1 |
| (ii) | (A) | 1 |
| (iii) | (C) | 1 |
| (iv) | (A) **OR** (B) | 1 |
| 3. | (B) **OR** (D) | 1 |
| 4. | (A) | 1 |
| 5. | (B) | 1 |
| 6. | (C) **OR** (D) | 1 |
| 7. | (B) | 1 |
| 8. | (C) **OR** (A) | 1 |
| 9. | (C) | 1 |
| 10. | (B) **OR** (A) | 1 |
| 11. | (C) | 1 |
| 12. | (C) | 1 |
| 13. | (B) **OR** (A) | 1 |
| 14. | (D) | 1 |
| 15. | (B) | 1 |
| 16. | (A) | 1 |
| | **SECTION-B** | |
| 17.(a) | **(i) $CH_3COCH_3$** | 1 |
| | (ii)  | 1 |
| | **OR** | |
| 17.(b) | (i) $C_6H_5OH + NaOH \rightarrow C_6H_5ONa \xrightarrow{CH_3I} C_6H_5OCH_3$ | 1 |
| | (ii)  | 1 |
| | (Or by any other suitable method) | |
| 18. | Negative deviation,  due to the formation of H-bond between $CHCl_3$ and acetone / / due to strong interaction set up between $CHCl_3$ and acetone. | 1 1 |
| | | |

| | | |
|---|---|---|
| 19. (a) | (i) $sp^3d^2$ , paramagnetic<br>(ii) $dsp^2$, diamagnetic<br>**OR** | ½, ½<br>½, ½ |
| 19. (b) | (i) hexaaquamanganese (II) sulphate / hexaaquomanganese (II) sulphate<br>(ii) $CN^-$ is a strong field ligand that causes the pairing of electrons while $F^-$ being a weak field ligand cannot do pairing of electrons. | 1<br>1 |
| 20. | **Rate of disappearing of $I^-$ = $\frac{-d[I-]}{dt} = \frac{-(0.28-0.30)}{10-0} = \frac{0.02}{10}$ = 2 x $10^{-3}$ M $min^{-1}$**<br>**Rate of production of $I_2$ = $\frac{d[I2]}{dt} = \frac{-d[I-]}{dt} = \frac{1}{2}$ x 2 x $10^{-3}$ = $10^{-3}$ M $min^{-1}$** | 1<br>1 |
| 21. (a) | (i) Due to small size of the metal ions / high ionic charge and availability of d-orbitals.<br>(ii) Cr is more stable in + 3 oxidation state. (Any other suitable reason)<br>**OR** | 1<br>1 |
| 21. (b) | Due to incomplete filling of d- orbitals.<br>In transition elements the oxidation states differ from each other by unity while in p-block elements it differs by a unit of two / Heavier members of transition elements are stable in higher oxidation states whereas that of p-block are stable in lower oxidation states.<br>(Any other suitable reason) | 1<br>1 |
| 22. | (i) $R-NH_2 + CHCl_3 + 3KOH \xrightarrow{Heat} R-NC + 3KCl + 3H_2O$<br>(ii) $R-\overset{\overset{O}{\|}}{C}-NH_2 + Br_2 + 4NaOH \longrightarrow R-NH_2 + Na_2CO_3 + 2NaBr + 2H_2O$ | 1<br>1 |
| 23. | (i)  , due to larger size of I than Cl / $I^-$ is a better leaving group than Cl.<br>(ii) $CH_3-CH_2-Cl$ , due to less steric hinderance / as it is a 1° alkyl halide. | ½, ½<br>½, ½ |
| 24. | (i)  <br>(ii)  | 1<br>1 |
| 25. | $d = \frac{Z\ X\ M}{N_A\ X\ a^3}$<br>$6.6\ g\ cm^{-3} = \frac{Z\ X\ 27\ g\ mol^{-1}}{(3\ X\ 10^{-8}\ cm)^3\ X\ 6.022\ X10^{23}\ mol^{-1}}$<br>$z = \frac{6.6\ X\ 6.022\ X10^{23}\ X\ 27\ X\ 10^{-24}}{27}$ = 3.97 ≈ 4<br>Unit cell is of fcc type. | ½<br>½<br>½<br>½ |
| | **SECTION-C** | |
| 26 (a). | Due to high enthalpy of atomization and low enthalpy of hydration.<br>$Cu^+$ disproportionate in the aqueous solution / 2 $Cu^+ \longrightarrow Cu^{2+} + Cu$.<br>High hydration enthalpy of $Cu^{2+}$ over $Cu^+$ which more than compensates for the second ionisation enthalpy of Cu.<br>**OR** | 1<br>1<br>1 |
| 26 (b). | (i) Due to almost similar / comparable atomic radii.<br>(ii) Weak metallic bonding / no unpaired electrons / weak interatomic interaction.<br>(iii) The ability of oxygen to form multiple bonds with metals while F cannot. | 1<br>1<br>1 |
| 27 (a). | (i) In fibrous protein, the polypeptide chains run parallel while in globular protein, the chains of polypeptides coil around to give a spherical shape / Fibrous proteins are insoluble in water while globular proteins are soluble.<br>(ii) Amino acids which cannot be synthesized in the body and are obtained through diet are | 1<br>1 |

| | | |
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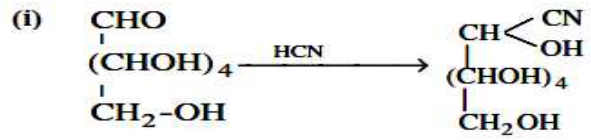
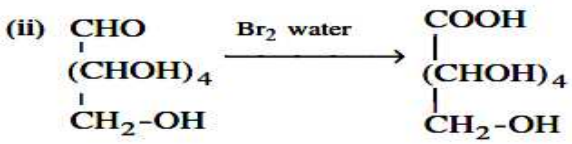
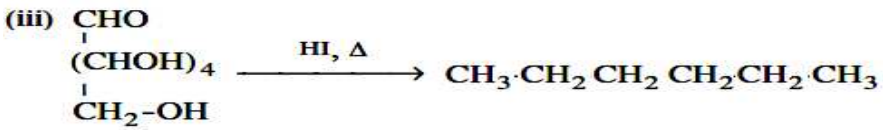
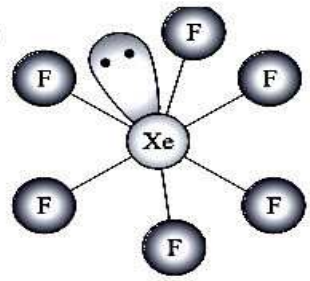
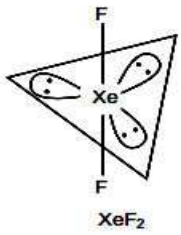
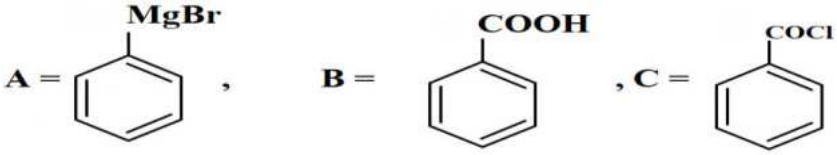
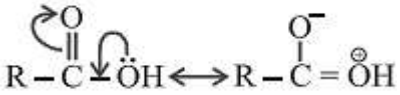
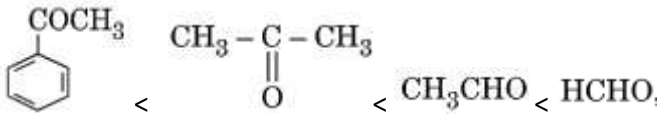
| | essential amino acids while those which can be synthesized in the body are known as non-essential amino acids. | |
| | (iii) DNA has Thymine while RNA has Uracil base / DNA has deoxyribose sugar while RNA has ribose sugar / DNA has double helical while RNA has single helical structure.<br>(or any other suitable difference) | 1 |
| 27 (b). | **OR**<br>(i)  | 1 |
| | (ii)  | 1 |
| | (iii)  | 1 |
| 28. | (i) Rate = k $[X]^a$ $[Y]^b$<br>0.05 = k $[0.1]^a$ $[0.2]^b$ ----------(i)<br>0.10 = k $[0.2]^a$ $[0.2]^b$----------(ii)<br>0.05 = k $[0.1]^a$ $[0.1]^b$----------(iii)<br>On solving a= 1 and b = 0.<br>Order w.r.t X = 1 and Order w.r.t Y = 0<br>(ii) Rate = k $[X]^1$ $[Y]^0$<br>(iii) Rate = k [X] or 0.05 = k [0.1]<br>k = $\frac{0.05}{0.1}$ = 0.5 $min^{-1}$ | 1<br>1<br>1 |
| 29. | $\frac{Po-P}{Po} = X2$<br>$\frac{17.536-P}{17.536} = \frac{w2}{M2} X \frac{M1}{w1}$<br>$\frac{17.536-P}{17.536} = \frac{20}{180} X \frac{18}{500}$<br>$\frac{17.536-P}{17.536} = 0.004$<br>17.536 – P = 0.07<br>P = 17.536 – 0.07<br>= 17.466 mm Hg<br>(Deduct ½ mark for no or incorrect unit). | 1<br>1<br>1 |
| 30. | (i) Due to -I effect of halogen / electron-withdrawing nature of halogen.<br>(ii) Sulphuric acid converts KI to HI and then oxidises HI to $I_2$.<br>(iii) $CN^-$ is an ambident nucleophile. KCN is ionic, so 'C' is a nucleophilic centre that give stable C—C bond to give nitrile. AgCN is mainly covalent, so 'N' is the nucleophilic centre to give isonitrile. | 1<br>1<br>1 |
| | **SECTION-D** | |
| 31. (a) | (i) (I): Due to increase in atomic size and metallic character.<br>(II): Due to lower Ionization enthalpy of Xe.<br>(III) Due to equatorial lp-lp repulsions. | 1<br>1<br>1 |

| | | |
|---|---|---|
| | (ii)     $XeF_2$ | 1+ 1 |
| | **OR** | |
| 31. (b) | (i) A = Chlorine, B = Nitrogen, C = Nitrogen trichloride.<br>$MnO_2 + 4\ HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$<br>$8\ NH_3 + 3\ Cl_2 \rightarrow 6\ NH_4Cl + N_2$<br>$NH_3 + 3\ Cl_2$ (excess) $\rightarrow NCl_3 + 3\ HCl$<br>(Ignore balancing in the above equations)<br>(ii) (I) He < Ne < Ar < Kr < Xe<br>(II) HI < HBr < HCl < HF | ½ x 3<br>½<br>½<br>½<br><br>1<br>1 |
| 32 (a). | (i) (I) A: Phenyl magnesium bromide B: Benzoic acid C: Benzoyl chloride /<br>  <br>(II) A: Ethanal, B: 3-Hydroxybutanal, C: But-2-enal /<br>A: $CH_3CHO$, B: $CH_3CH(OH)CH_2CHO$, C: $CH_3CH{=}CHCHO$ | ½ x 6 =3 |
| | (ii) (I) On heating ethanol with NaOH and $I_2$, it will give *yellow ppt.* of iodoform whereas Benzaldehyde does not.<br>(II) On adding $NaHCO_3$, acetic acid will give the brisk effervescence whereas acetone does not.<br>(Or any other suitable chemical test) | 1<br>1 |
| | **OR** | |
| 32 (b). | (i) (I) $KMnO_4$, KOH (II) DIBAL-H / $NaBH_4$<br>(ii) $CH_3$-$CH_2$-CH = NOH<br>(iii) 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 /<br>  <br>(iv)  < $CH_3CHO$ < HCHO | 1 + 1<br>1<br>1<br><br>1 |
| 33 (a). | (i) $E_{cell} = E^0_{cell} - \frac{0.059}{6}\log\frac{[Al^{3+}]^2}{[Cu^{2+}]^3}$<br>$E_{cell} = 2 - \frac{0.059}{6}\log\frac{[10^{-1}]^2}{[10^{-2}]^3}$<br>$E_{cell} = 2 - \frac{0.059}{6}\log 10^4$<br>$E_{cell} = 2 - \frac{0.059}{6} X\ 4\ \log 10$<br>$E_{cell} = 2 - 0.039$<br>$E_{cell} = 1.961$ V (Deduct ½ mark, if no or incorrect unit) | 1<br>1<br><br><br><br>1 |
| | (ii) Molar conductivity of a solution at a given concentration is the conductance of the volume *V* of | |

| | | |
|---|---|---|
| | solution containing one mole of electrolyte kept between two electrodes with area of cross section *A* and distance of unit length / Conductivity observed for one molar solution. | 1 |
| | HCOOH is a weak electrolyte which dissociates into a greater or more number of ions on dilution whereas HCOONa being a strong electrolyte will not be affected much. | 1 |
| | **OR** | |
| 33 (b). | $A = \pi r^2 = \frac{22}{7} \times (0.7)^2 = 1.54\ cm^2$ | |
| | $\ell = 44$ cm | |
| | $\frac{\ell}{A} = \frac{44}{1.54}\ cm^{-1}$ | |
| | $\frac{1}{\rho} = \frac{1}{R}\frac{l}{A}$ | ½ |
| | $= \frac{1}{5\ X\ 10^3} X \frac{44}{1.54}\ cm^{-1}$ | |
| | $\rho = \frac{5\ X\ 10^3}{44} \times 1.54$ | |
| | $\rho = 175\ \Omega$ cm | ½ |
| | $k = 1/\rho$ | ½ |
| | $= 1/175$ | |
| | $k = 0.0057\ \Omega^{-1}\ cm^{-1}$ | ½ |
| | $\Lambda_m = \frac{k}{c} X\ 1000$ | ½ |
| | $= \frac{0.0057}{0.02} X\ 1000$ | |
| | $= 285\ Scm^2mol^{-1}$ | ½ |
| | (ii) $Ni(s) \mid Ni^{2+}(aq.) \parallel Ag^{+}(aq.) \mid Ag(s)$ | 1 |
| | (I): Ag (II) electrons | ½ , ½ |

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