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Senior School Certificate Examination

March 2019

Marking Scheme – CHEMISTRY (SUBJECT CODE: 043)

(PAPER CODE – 56-5-1)

General Instructions: -

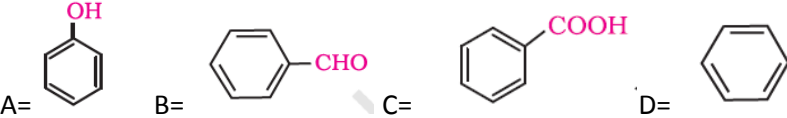
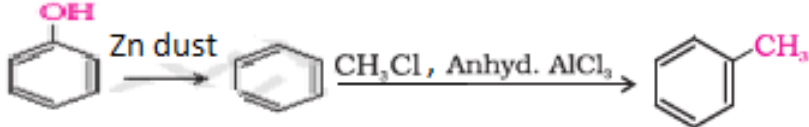
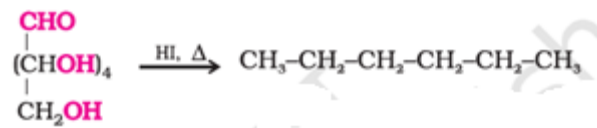
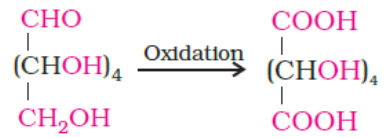
1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully. **Evaluation is a 10-12 days mission for all of us. Hence, it is necessary that you put in your best efforts in this process.**
2. 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.**
3. 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.
4. 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.
5. If a question does not have any parts, marks must be awarded in the left hand margin and encircled.
6. If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out.
7. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
8. A full scale of marks **0-70** has to be used. Please do not hesitate to award full marks if the answer deserves it.
9. Every examiner has to necessarily do evaluation work for full working hours i.e. 8 hours every day and evaluate 25 answer books per day.
10. 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.

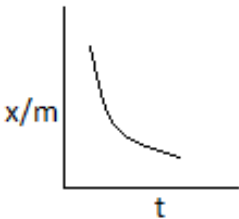
11. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as (X) and awarded zero (0) Marks.
12. Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel 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.
13. The Examiners should acquaint themselves with the guidelines given in the Guidelines for spot Evaluation before starting the actual evaluation.
14. 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.
15. 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.

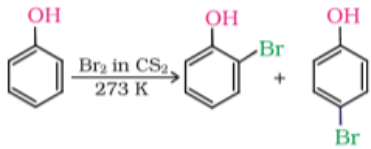
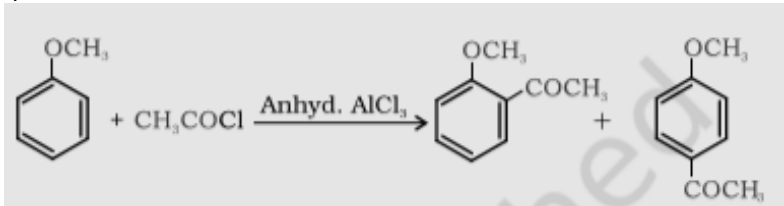
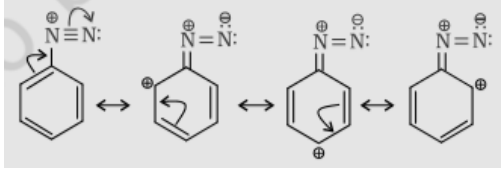
MARKING SCHEME- 2019
CHEMISTRY (043) CLASS XII

56/5/1

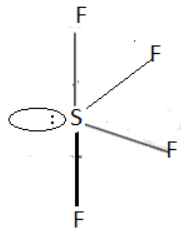
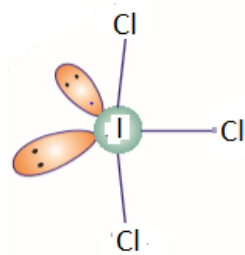
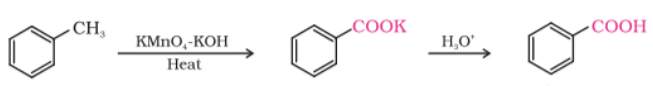
| Q.No. | Expected answers/ Value points | Marks |
|------------------|---|--|
| SECTION A | | |
| 1 | A_3B_2 | 1 |
| 2 | $As_2O_3 + 3H_2S \rightarrow As_2S_3(sol) + 3H_2O$ / By Double decomposition of Arsenic oxide with Hydrogen sulphide. | 1 |
| OR | | |
| 2 | $N_2(g) + 3H_2(g) \xrightarrow{Fe(s)} 2NH_3(g)$ or any other suitable example. | 1 |
| 3 | Steric reason / Electronic reason/ Inductive effect | 1 |
| 4 | Mixture of amines including quaternary ammonium salts / RNH_2 , R_2NH , R_3N , $R_4N^+X^-$ | 1 |
| 5 | Ionization isomerism | 1 |
| OR | | |
| 5 | $[Cr(Cl)_6]^{3-} < [Cr(NH_3)_6]^{3+} < [Cr(CN)_6]^{3-}$ | 1 |
| SECTION B | | |
| 6 | At cathode- $H_2(g)$ is produced due to greater E° value of H^+ ion At anode- $Cl_2(g)$ is produced due to over voltage /over potential of oxygen | 1 1 |
| 7 | $t = (2.303/k) \log [R]_0 / [R]$ Let $[R]_0 = 100$ For 99% completion reaction- $t_{99\%} = (2.303/k) \log (100/1)$ $k = (2.303 \times 2) / t_{99\%}$ For 90% completion $t_{90\%} = (2.303/k) \log (100/10)$ Putting the value of k $t_{90\%} = (2.303 \times t_{99\%} \times \log 10) / 2.303 \times 2$ $2 \times t_{90\%} = t_{99\%}$ (Or any other suitable method) | $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ |
| 8 | $H_2S < H_2Se < H_2Te < H_2O$ From H_2S to H_2Te boiling point increases as magnitude of van der Waal force increases. The boiling point of water is maximum due to H-bonding H_2O / water | 1 $\frac{1}{2}$ $\frac{1}{2}$ |

| 9 | <p>1. When pyrolusite is fused with KOH in presence of air or oxidizing agent , potassium manganate is produced . $2\text{MnO}_2 + 4\text{KOH} + \text{O}_2 \rightarrow 2\text{K}_2\text{MnO}_4 + 2\text{H}_2\text{O}$</p> <p>2. Potassium manganate upon further oxidation or disproportionation in a neutral or acidic medium gives potassium permanganate.</p> <p style="text-align: center;">$3\text{MnO}_4^{2-} + 4\text{H}^+ \rightarrow 2\text{MnO}_4^- + \text{MnO}_2 + 2\text{H}_2\text{O} / \text{MnO}_4^{2-} \xrightarrow[\text{alkaline solution}]{\text{Electrolytic oxidation in}} \text{MnO}_4^-$</p> <p style="text-align: center;">(Award full marks if only correct reactions are given)</p> | 1 1 | | | | | | |
|---|---|------------------------|----------|---|---|-----------------------|--------------------|-----|
| 10 | <p style="text-align: center;">  </p> <p style="text-align: center;">(Full marks may be awarded if only correct names are given)</p> | $\frac{1}{2} \times 4$ | | | | | | |
| OR | | | | | | | | |
| 10 | <p>a)</p> <p style="text-align: center;">  </p> <p>b)</p> <p style="text-align: center;"> $\text{CH}_3\text{CH}_2\text{OH} \xrightarrow[\Delta]{\text{PCC}} \text{CH}_3\text{CHO}$ </p> <p style="text-align: center;">(Or any other suitable method)</p> | 1 1 | | | | | | |
| 11 | <p>a) n-hexane is formed</p> <p style="text-align: center;">  </p> <p>b) Saccharic acid is formed</p> <p style="text-align: center;">  </p> <p style="text-align: center;">(Award full marks if correct reactions are given)</p> | 1 1 | | | | | | |
| OR | | | | | | | | |
| 11 | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Fibrous</th> <th style="width: 50%; text-align: center;">Globular</th> </tr> </thead> <tbody> <tr> <td>i)The polypeptide chains run parallel and are held together by hydrogen and disulphide bonds.</td> <td>The polypeptide chains coil around to give a spherical shape.</td> </tr> <tr> <td>ii)Insoluble in water</td> <td>Soluble in water</td> </tr> </tbody> </table> <p style="text-align: center;">(Or any other correct difference)</p> | Fibrous | Globular | i)The polypeptide chains run parallel and are held together by hydrogen and disulphide bonds. | The polypeptide chains coil around to give a spherical shape. | ii)Insoluble in water | Soluble in water | 1+1 |
| Fibrous | Globular | | | | | | | |
| i)The polypeptide chains run parallel and are held together by hydrogen and disulphide bonds. | The polypeptide chains coil around to give a spherical shape. | | | | | | | |
| ii)Insoluble in water | Soluble in water | | | | | | | |
| 12 | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">DNA</th> <th style="width: 50%; text-align: center;">RNA</th> </tr> </thead> <tbody> <tr> <td>i)Deoxyribose sugar</td> <td>Ribose sugar</td> </tr> <tr> <td>ii)contain bases ATGC</td> <td>Contain bases AUGC</td> </tr> </tbody> </table> | DNA | RNA | i)Deoxyribose sugar | Ribose sugar | ii)contain bases ATGC | Contain bases AUGC | 1+1 |
| DNA | RNA | | | | | | | |
| i)Deoxyribose sugar | Ribose sugar | | | | | | | |
| ii)contain bases ATGC | Contain bases AUGC | | | | | | | |

| | (Or any other correct difference) | |
|-----------|--|---|
| SECTION C | | |
| 13 | a) Ferromagnetism b) let the number of O^{2-} ions be 100 then total number of $Ni^{2+} = 98$ Let the number of $Ni^{2+} = x$ Then number of $Ni^{3+} = 0.98 - x$ Total charge of cation = Total charge of anion $2x + 3(0.98 - x) = 2$ $x = 0.94$ Fraction of $Ni^{2+} = 0.94/0.98 = 0.96$ Fraction of $Ni^{3+} = 1 - 0.96 = 0.04$ | 1 1 $\frac{1}{2}$ $\frac{1}{2}$ |
| 14 | $n = 6$ $E^{\circ} = E^{\circ}_{cathode} - E^{\circ}_{anode}$ $= (-0.25) - (-1.66)$ $= 1.41 \text{ V}$ $E_{cell} = E^{\circ}_{cell} - (0.059/n) \log [Al^{+3}]^2 / [Ni^{+2}]^3$ $E_{cell} = 1.41 - (0.059/6) \log (10^{-3})^2 / (0.1)^3$ $E_{cell} = 1.4395 \text{ V}$ | $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 1 $\frac{1}{2}$ |
| 15 | For experiment II $[A] = 0.2 \text{ mol L}^{-1}$ For Experiment III Rate = $0.08 \text{ mol L}^{-1} \text{ min}^{-1}$ For Experiment IV $[A] = 0.1 \text{ mol L}^{-1}$ | 1 1 1 |
| 16 | a) Negative sol is formed Due to adsorption of I^{-} from dispersion medium b)  As extent of adsorption decreases with increase in temperature c) 'A'; With higher critical temperature, it will liquify more easily | $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ |
| 17 | a) The ore particles are wetted with oil, while gangue particles are wetted by water / Preferential wettability b) The impurities are more soluble in the melt than in the solid state of metal c) The metal forms a volatile compound with a suitable reagent. The volatile compound is easily decomposed on heating. | 1 1 1 |
| OR | | |
| 17 | a) Cast iron contain 3% carbon while pig iron contain 4% carbon b) Hydraulic washing is the method of concentration of an ore while liquation is the method of refining of metal (or any other suitable difference) c) Leaching is the method of concentration of an ore while roasting is the method used to convert a sulphide ore to oxide | 1 1 1 |

| | | |
|----|--|--|
| | (or any other suitable difference) | |
| 18 | a) At + 3, Stable d^0 is obtained b) Absence of unpaired electron / no d-d transition occurs c) MnO has Mn in +2 Oxidation State Mn ₂ O ₇ has Mn in +7 Oxidation State . Higher the Oxidation State , Higher is the acidic character. | 1 1 1 |
| | OR | |
| 18 | a) $4f^{1-14} 5d^{0-1} 6s^2$ b) +3 and +4 c) 5f 6d 7s orbitals/levels are of comparable energies | 1 1 1 |
| 19 | a) d^2sp^3 , diamagnetic b) sp^3 , diamagnetic | $1 + \frac{1}{2}$ $1 + \frac{1}{2}$ |
| 20 | a) The stereoisomers related to each other as non superimposable mirror images are called enantiomers. b) Equimolar mixture of d- and l- form is known as racemic mixture c) Resonance effect / difference in hybridisation of carbon atom in C – X bond / instability of phenyl cation /partial double bond character | 1 1 1 |
| 21 | a) Add neutral FeCl ₃ to both the compounds. Phenol gives violet colouration while, 1 – propanol does not. b) Add I ₂ / NaOH(aq) to both the compounds, Ethanol gives yellow precipitate while ether does not c) Add HCl and ZnCl ₂ to both the compounds, 2-methyl-2-propanol gives turbidity immediately while 1-propanol does not (Or any other suitable chemical test) | 1 1 1 |
| | OR | |
| 21 | a) $CH_3-CH_2OH + CH_3I$ b)  c)  | 1 1 1 |
| 22 | a) Due to resonance stabilisation of arene diazonium ion /  b) Methyl amine being basic, gains a proton from water and releases hydroxyl ions which precipitate hydrated ferric oxide. | $1 + \frac{1}{2}$ 1 + $\frac{1}{2}$ |

| | | |
|----|--|--|
| | $\text{CH}_3\text{NH}_2 \xrightarrow{\text{H}_2\text{O}} \text{CH}_3\text{NH}_3^+ + \text{OH}^-$ $\text{FeCl}_3 \xrightarrow{3\text{OH}^-} \text{Fe}(\text{OH})_3 \downarrow + 3\text{Cl}^-$ | |
| | OR | |
| 22 | a) p-nitroaniline > aniline > p-toluidine pK_b decreases, basicity increases / due to inductive effect / EWG $-\text{NO}_2$ and EDG $-\text{CH}_3$ group b) $\text{C}_2\text{H}_5\text{NH}_2 > (\text{C}_2\text{H}_5)_2\text{NH} > (\text{C}_2\text{H}_5)_3\text{N}$ Due to increase in number of ethyl groups, inductive effect increases | 1 $\frac{1}{2}$ 1 $\frac{1}{2}$ |
| 23 | a) Homopolymer as it is formed only from one monomer. b) Addition polymer as it is formed by addition of monomeric units. c) Bakelite is a thermosetting plastic due to extensive crosslinking. | $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ |
| 24 | a) 2-3% solution of iodine in alcohol – water mixture It is an antiseptic / is applied on wounds b) Chloroxylenol and terpineol c) $\text{CH}_3(\text{CH}_2)_6$ - Hydrophobic ; $-\text{COO}(\text{CH}_2\text{CH}_2\text{O})_n\text{CH}_2\text{CH}_2\text{OH}$ - Hydrophilic | $\frac{1}{2}$ $\frac{1}{2}$ 1 $\frac{1}{2} + \frac{1}{2}$ |
| | SECTION D | |
| 25 | a) <div style="text-align: center;"> </div> <p>When a solute is added to a solvent, the vapour pressure of the solvent decreases and it becomes equal to atmospheric pressure at a higher temperature.</p> b) $i = 3$ $\pi = i CRT$ $\pi = 3 \times 0.025 \times 0.0821 \times 298/174 \times 2$ $\pi = 5.27 \times 10^{-3} \text{ atm.}$ (Deduct half mark if unit is not given or wrong) | 1+1 $\frac{1}{2}$ $\frac{1}{2}$ 1 1 |
| | OR | |
| 25 | a) Solution does not obey Raoult's law over the entire range of concentration, $\Delta H_{\text{mix}} \neq 0$ (or any two suitable characteristics) b) $n = 2$ (dimer) $\Delta T_f = i K_f m$ $i = 1.62 \times 122 \times 25 / 4.9 \times 2 \times 1000$ $i = 0.504$ $\alpha = 2(1-i)$ $\alpha = 2(1 - 0.504)$ | 1 + 1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ |

| | | |
|-----------|--|---|
| | <p>= 0.992 = 99.2%</p> <p>(Or any other suitable method)</p> | ½ |
| 26 | <p>a) Due to the presence of an unpaired / unbonded / odd electron on nitrogen atom</p> <p>b) Bleaching effect of chlorine is due to oxidation / oxidation is caused by nascent oxygen released by reaction of Cl₂ and H₂O / $\text{Cl}_2 + \text{H}_2\text{O} \rightarrow 2\text{HCl} + [\text{O}]$ Coloured substance + [O] → colourless substance</p> <p>c) Due to small size of oxygen, the added electron suffers inter electronic repulsion.</p> <p>d) Unavailability of d-orbital in Fluorine / Due to high electronegativity and small size.</p> <p>e) Due to weak dispersion forces.</p> | 1 1 1 1 1 |
| OR | | |
| 26 | <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>a) i) See – saw ii) Bent T</p> </div> <div style="text-align: center;">  <p>b) i) It forms chloride and chlorate. $6 \text{NaOH} + 3 \text{Cl}_2 \rightarrow 5 \text{NaCl} + \text{NaClO}_3 + 3 \text{H}_2\text{O}$ ii) On complete hydrolysis XeO₃ is formed. $\text{XeF}_6 + 3 \text{H}_2\text{O} \rightarrow \text{XeO}_3 + 6 \text{HF}$ iii) Charring of cane sugar takes place. $\text{C}_{12}\text{H}_{22}\text{O}_{11} + \text{H}_2\text{SO}_4 \rightarrow 12 \text{C} + 11 \text{H}_2\text{O}$</p> </div> </div> <p style="text-align: right;">(Balancing may be ignored)</p> | ½ + ½ ½ + ½ ½ + ½ ½ + ½ ½ + ½ |
| 27 | <p>a) But-2-enal</p> <p>b) To both the compounds add Tollen's reagent, ethanal gives silver mirror while ethanol does not (Or any other correct chemical test)</p> <p>c) i)</p> <div style="text-align: center;">  </div> <p>ii)</p> <div style="text-align: center;"> $\text{CH}_3\text{CH}_2\text{OH} \xrightarrow{\text{PCC, Heat}} \text{CH}_3\text{CHO} \xrightarrow[\text{ii) H}_3\text{O}^+]{\text{i) CH}_3\text{MgBr}} \text{CH}_3\text{CH}(\text{OH})\text{CH}_3$ </div> <p>iii)</p> <div style="text-align: center;"> $\text{CH}_3\text{-CH}_2\text{-CHO} \xrightarrow[\text{H}^+]{\text{KMnO}_4} \text{CH}_3\text{-CH}_2\text{-COOH} \xrightarrow[\text{(2) NaOH (aq)}]{\text{(1) Cl}_2 / \text{P}_4} \text{CH}_3\text{-CH}(\text{OH})\text{-COOH}$ </div> | 1 1 1 1 1 |
| OR | | |
| 27 | a) 2-Hydroxy benzoic acid | 1 |

| | | |
|--|---|---|
| | b) Due to Inductive effect of Cl^- / presence of EWG(Cl^-) | 1 |
| | c) i) $(\text{CH}_3)_3\text{C}-\text{CH}_3$ | 1 |
| | ii) $(\text{CH}_3)_3\text{C}-\text{CH}_2\text{OH}$ and $(\text{CH}_3)_3\text{C}-\text{COONa}$ | 1 |
| | iii) $(\text{CH}_3)_3\text{C}-\text{CH}=\text{NNHCONH}_2$ | 1 |