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Senior School Certificate Examination

March 2019

Marking Scheme – CHEMISTRY (SUBJECT CODE: 043)

(PAPER CODE – 56-3-1)

General Instructions: -

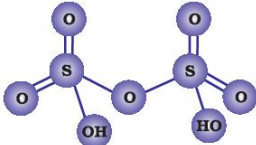
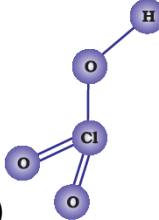
1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully. **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.

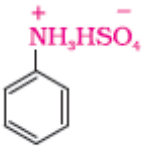
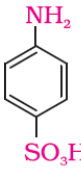
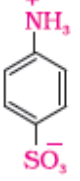
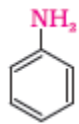
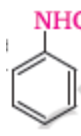
11. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as (X) and awarded zero (0) Marks.
12. Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel 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.

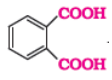
Marking Scheme – 2018-1

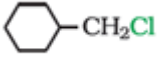
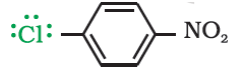
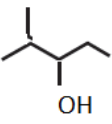
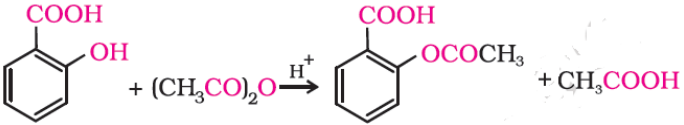
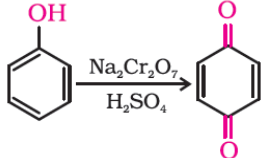
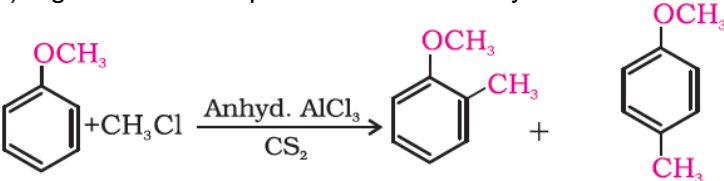
CHEMISTRY (043)/ CLASS XII


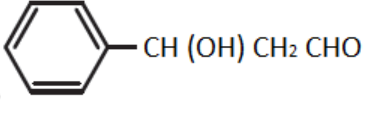
56/3/1

Q.No	Value Points	Marks
1	But-3-en-2-one	1
2	Cresol < Phenol < Benzoic Acid	1
3	Aquacyanidobis(ethylenediamine)Cobalt(III) ion	1
	OR	
3	$(\text{NH}_4)_2 [\text{CoF}_4]$	1
4	Glycosidic linkage is the linkage which joins two monosaccharides through oxygen atom while peptide Linkage is the linkage which joins two amino acids through –CO-NH- bond	1
	OR	
4	Base linked with pentose sugar called as nucleoside while Nucleoside linked with phosphate group are called as nucleotide	1
5	Chloroform in the presence of light forms phosgene gas (COCl_2) which is poisonous in nature.	1
6	Cationic vacancies are produced ; Impurity defect.	1 + 1
	OR	
6	a) Schottky defect	1
	b) Metal excess defect (due to anionic vacancies)	1
7	a) 0.1 molal KCl ; Because KCl undergoes dissociation whereas glucose does not.	$\frac{1}{2} + \frac{1}{2}$
	b) i) Van't Hoff factor $i > 1$	$\frac{1}{2}$
	ii) Van't Hoff factor $i < 1$	$\frac{1}{2}$
8	(a) $\text{C} + 2\text{H}_2\text{SO}_4 \rightarrow \text{CO}_2 + 2\text{SO}_2 + 2\text{H}_2\text{O}$	1
	(b) $\text{XeF}_2 + \text{PF}_5 \rightarrow [\text{XeF}]^+ [\text{PF}_6]^-$	1
	OR	
8	a) $2\text{F}_2 + 2\text{H}_2\text{O} \longrightarrow 4\text{HF} + \text{O}_2$	1
	b) $\text{PH}_3 + 3\text{CuSO}_4 \longrightarrow \text{Cu}_3\text{P}_2 + 3\text{H}_2\text{SO}_4$	1
9	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>a)</p>  </div> <div style="text-align: center;"> <p>b)</p>  </div> </div>	1, 1
10	Anode $\therefore \text{Zn}_{(s)} \rightarrow \text{Zn}^{2+} + 2\text{e}^-$ Cathode $\therefore \text{MnO}_2 + \text{NH}_4^+ + \text{e}^- \rightarrow \text{MnO}(\text{OH}) + \text{NH}_3$ Unlike mercury cell, Dry cell has shorter life (or) Cell potential in mercury cell remains constant but not in dry cell.	$\frac{1}{2}$ $\frac{1}{2}$ 1

11	(a) Because aryl halide does not undergo nucleophilic substitution reaction. (b) Because of the absence of acidic hydrogen attached to nitrogen (N-H) in the product of secondary amine.	1 1
12.	<p>i) A=  ; B=  / </p> <p>ii) A=  ; B= </p>	½ + ½ ½ + ½
13	<p>a) $E^{\circ}_{\text{cell}} = E^{\circ}_{(\text{Ag}^+ / \text{Ag})} - E^{\circ}_{(\text{Zn}^{2+} / \text{Zn})}$ $= 0.80 - (-0.76)$ $= 1.56\text{V}$</p> <p>$\Delta G^{\circ} = -nFE^{\circ}_{\text{cell}}$ $= -2 \times 96500 \times 1.56$ $= -301080 \text{ joules/mol}$ $= -301.080 \text{ kJ/mol}$</p> <p>(Deduct half mark if unit is wrong or not written)</p> <p>b) Λ°_m for strong electrolyte is obtained as intercept from plot of Λ_m versus \sqrt{c} whereas Λ°_m for weak electrolyte is obtained from Kohlrausch's law / $\Lambda^{\circ}_m = \nu_+ \lambda^{\circ}_+ + \nu_- \lambda^{\circ}_-$</p>	½ ½ 1 1
14	<p>a) Coagulation : The settling of colloidal particles. Example-Delta formation.</p> <p>b) Multi molecular colloids: When large number of atoms or molecules aggregate to form species having size in the colloidal range. Such colloids are known as multimolecular colloids. Example- Gold sols .</p> <p>c) Gel : When liquid is dispersed in solid then it is called as gel. Example: Butter, cheese (Or any other correct example)</p>	½, ½ ½, ½ ½, ½
OR		
14	<p>a) Ferric hydroxide , Because it is lyophobic sol.</p> <p>b) Demulsification occurs.</p> <p>c) Promoters increase the efficiency of catalyst whereas poison decreases the efficiency of catalyst.</p>	½ + ½ 1 ½ + ½
15	<p>a)</p> $d = \frac{zM}{a^3 N_A}$ <p>$6.89 = 2x M / 6.022 \times 10^{23} \times (3 \times 10^{-8})^3$</p> <p>$M = 6.89 \times 6.022 \times 10^{23} \times 27 \times 10^{-24} / 2$ $M = 56 \text{ g/mol.}$</p> <p>b)</p>	½ 1 ½

	i) p-type ii) n-type	½ ½
16	$\alpha = 0.95$ $\alpha = (i-1) / (n-1)$ $0.95 = (i-1) / (3-1)$ $i = 2.9$ (Or any other method for calculation of i) $\Pi = i CRT$ $= 2.9 \times 0.1 \times 0.0821 \times 300$ $= 7.143 \text{ atm.}$	½ ½ 1 1 (Deduct half mark for no unit or wrong)
17	At 500 – 800 K , $3\text{Fe}_2\text{O}_3 + \text{CO} \rightarrow 2\text{Fe}_3\text{O}_4 + \text{CO}_2$ $\text{Fe}_3\text{O}_4 + 4\text{CO} \rightarrow 3\text{Fe} + 4\text{CO}_2$ $\text{Fe}_2\text{O}_3 + \text{CO} \rightarrow 2\text{FeO} + \text{CO}_2$ Limestone decomposes to CaO and CO ₂ . CaO combines with impurity (i.e.) SiO ₂ to form slag which is then removed. / $\text{CaO} + \text{SiO}_2 \rightarrow \text{CaSiO}_3$ (Balancing may be ignored)	½ 1 ½ 1
OR		
17	a) It forms complex $[\text{Ag}(\text{CN})_2]^-$ (Or in equation form) b) FeS undergoes roasting to FeO, which combines with SiO ₂ to form slag whereas Cu ₂ S on roasting gives Cu ₂ O which on reduction gives Cu. (Or in equation form) c) It selectively prevents the ZnS from coming to the froth / It acts as Depressant.	1 1 1
18	a) Due to presence of pπ-pπ bonding in oxygen but it is absent in sulphur / oxygen is diatomic but sulphur is polyatomic. b) Because NO reacts with O ₃ to form NO ₂ and O ₂ (g) or equation c) Interhalogens bonds are weaker than bonds in pure halogens / X-X' bond is weaker than X-X bond.	1 1 1
19	a) $\begin{array}{c} \text{CH}_2=\text{C}-\text{CH}=\text{CH}_2 \\ \\ \text{Cl} \end{array}$ b) $\begin{array}{c} \text{HO}-\text{CH}-\text{CH}_2-\text{COOH} \\ \\ \text{CH}_3 \end{array}$ and $\begin{array}{c} \text{HO}-\text{CH}-\text{CH}_2-\text{COOH} \\ \\ \text{C}_2\text{H}_5 \end{array}$ c) HCHO and C ₆ H ₅ OH	1,1,1
OR		
19	a) Nylon 6,6 > Bakelite > polythene > Buna-S b) Ethylene glycol and phthalic acid / HO-CH ₂ -CH ₂ -OH and  c) HDP is linear chain whereas LDP is highly branched.	1 1 1
20	a) Metal hydroxides are insoluble and do not increase the pH above neutrality. b) Because it has anticlotting property. c) Because antihistamines and antacids act on different receptors.	1 1 1
OR		
20	a) Chemical compounds used for the treatment of stress and mental diseases. Example- Equanil. b) Antibiotic: Chemical substances produced by micro-organisms that inhibit growth or even destroy micro-organisms. Example- Penicillin. c) Non-ionic detergents: The detergents which do not contain any ion in their constitution. Example- Dish washing liquids.	½, ½ ½, ½ ½, ½ (Or any other suitable example)

21.	<p>(a)  Because it is a primary halide.</p> <p>(b)  It is more reactive due to the presence of electron withdrawing $-NO_2$ group.</p> <p>(iii)  It is optically active due to chiral carbon.</p>	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$
22.	<p>a) Salicylic acid is treated with acetic anhydride in the presence of H^+ to give aspirin.</p> <p></p> <p>b) Phenol in the presence of acidified sodium dichromate gives benzoquinone.</p> <p></p> <p>c) It gives ortho and para substituted methylated anisole.</p> <p></p> <p>(Full marks may be awarded if child writes correct equations only)</p>	1 1 1
23.	<p>a) On addition of silver nitrate, $[Co(NH_3)_5(SO_4)]Cl$ will form white precipitate of $AgCl$ while other does not. (Or any other correct chemical test).</p> <p>b) In $[Ni(CO)_4]$, Ni is in zero oxidation state whereas $[NiCl_4]^{2-}$, it is in +2 oxidation state. In the presence of CO ligand the unpaired d electrons of nickel pair up but Cl^- being a weak ligand is unable to pair up the unpaired electrons.</p> <p>c) i) Strong field ligand --- $t_2g^5 e_g^0$ ii) Weak field ligand ---- $t_2g^3 e_g^2$</p>	1 1 $\frac{1}{2}$ $\frac{1}{2}$
24.	<p>a) Anomers: These are the hemi-acetal forms of glucose which differ in the configuration at C1 of hydroxyl group. Ex- α-glucose and β-glucose.</p> <p>b) The amino acid which do not get synthesised by our body are called essential amino acid. Ex-Valine.</p> <p>c) Denaturation of proteins: When native protein is subjected to change in temperature and pH, then it loses its biological activity. Ex- Curdling of milk. (Or any other correct example.)</p>	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$

SECTION D		
25	<p>a) Order of a reaction: It is the sum of the power to which the concentration terms are raised in the rate law equation. Order of reaction is applicable for complex reaction but molecularity has no meaning for the complex reaction.</p> <p>ii)</p> $k = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$ $= \frac{2.303}{25} \log (100/50)$ $= 0.0277 \text{ min}^{-1}$ $t_{80\%} = \frac{2.303}{0.0277} \log 100/20$ $= 58.11 \text{ min}$	<p>1</p> <p>1</p> <p>½</p> <p>1</p> <p>½</p> <p>1</p>
OR		
25	<p>a)</p> $\log \frac{k_2}{k_1} = \frac{E_a}{2.303R} \left[\frac{1}{T_1} - \frac{1}{T_2} \right]$ $\log \frac{7.5 \times 10^4}{2.5 \times 10^4} = \frac{19.147 \times 10^3}{2.303 \times 8.314} \left[\frac{1}{300} - \frac{1}{T_2} \right]$ $\log 3 = 1000 \left[\frac{T_2 - 300}{300 T_2} \right]$ $\frac{0.4771 \times 300 \times T_2}{1000} = T_2 - 300$ $T_2 = \frac{300}{0.856} = 350\text{K}$ <p>b) When one of the reactants is in excess. $\text{CH}_3\text{COOCH}_3 + \text{H}_2\text{O (excess)} \rightarrow \text{CH}_3\text{COOH} + \text{CH}_3\text{OH}$ (Or any other suitable example)</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
26.	<p>a) (i) </p> <p>(ii) $\text{CH}_3 \text{CH}(\text{OH}) \text{COOCH}_3$</p> <p>(iii) </p> <p>b) On adding NaOH / I₂ and heat, acetophenone forms yellow ppt. of iodoform (CHI₃) whereas benzophenone does not.</p> <p>c) Due to resonance stabilisation of conjugate base of carbonyl compound.</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
OR		
26	a) i) $\text{CH}_3\text{CH}_2\text{CH}(\text{OCH}_3)_2$	1

	ii) $\text{CH}_3\text{CH}_2\text{CH}(\text{OH})\text{CH}(\text{CH}_3)\text{CHO}$ iii) $\text{CH}_3\text{CH}_2\text{CH}_3$ b) i) $\text{CH}_3\text{COOH} < \text{HCOOH} < \text{FCH}_2\text{COOH} < \text{O}_2\text{N-CH}_2\text{COOH}$ ii) Acetophenone < Benzaldehyde < acetone < acetaldehyde	1 1 1 1
27	a) i) Due to the presence of maximum no. of unpaired electrons . ii) because Cr is more stable in +3 oxidation state due to stable t_{2g}^3 configuration whereas Mn is more stable +2 oxidation state due to half filled $3d^5$ configuration. iii) Due to the presence of one unpaired electron in V^{4+} whereas there is no unpaired electron in Ti^{4+} . b) $2\text{MnO}_2 + 4\text{KOH} + \text{O}_2 \rightarrow 2\text{K}_2\text{MnO}_4 + 2\text{H}_2\text{O}$ $3\text{MnO}_4^{2-} + 4\text{H}^+ \rightarrow 2\text{MnO}_4^- + \text{MnO}_2 + 2\text{H}_2\text{O}$ Due to the formation of Mn^{2+} ion from MnO_4^- / or reaction	1 1 1 1 $\frac{1}{2}$ $\frac{1}{2}$ 1
OR		
27	a) Transition elements show variable oxidation states that differ by 1 unit whereas p-block elements it differs by 2 units / Heavier transition elements are stable in higher oxidation state whereas p-block elements are stable in lower oxidation state. b) Because of strong interatomic interactions / Strong metallic bonding between atoms. c) Cerium / Terbium ; Oxidising agent. d) Steady decrease in atomic radii with increase in atomic number due to poor shielding effect of 4f orbital electrons. Consequence : 5d series have almost same size as 4d series (Or any other correct consequence) e) $\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{Fe}^{2+} \rightarrow 2\text{Cr}^{3+} + 6\text{Fe}^{3+} + 7\text{H}_2\text{O}$	1 1 $\frac{1}{2}, \frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 1