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Senior School Certificate Examination

March 2019

Marking Scheme – CHEMISTRY (SUBJECT CODE: 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 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.

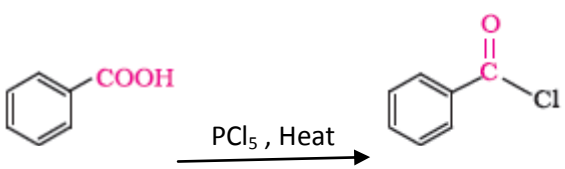
14. Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.

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.

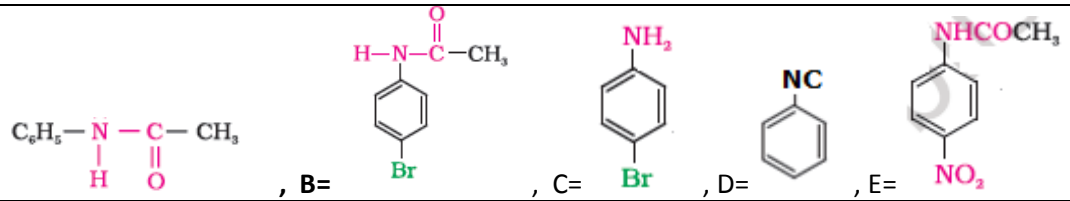
Marking scheme – 2019

CHEMISTRY (043)/ CLASS XII

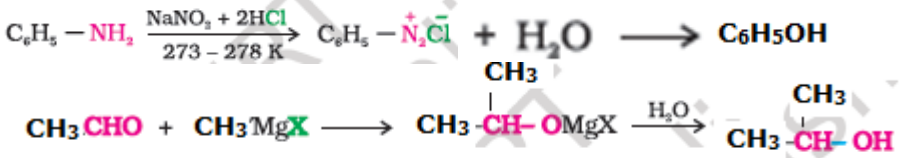
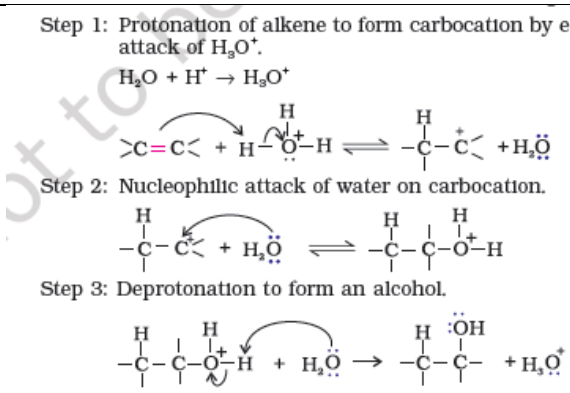
56(B)

Q.No		
	SECTION A	
1	X_2Y_3	1
2	Rhombic sulphur/ α-sulphur	1
	OR	
2	Square pyramidal	1
3	Potassium hexacyanoferrate(II)	1
4	Due to the strong electron withdrawing effect of the carbonyl group and resonance stabilisation of the conjugate base.	1
5	Vitamin C; Amla (or any other)	½ , ½
	OR	
5	Glycogen/Animal starch	1
	SECTION B	
6	Because on addition of non-voilatile solute, vapour pressure of solution lowers down and therefore in order to boil solution, temperature has to be raised. Because it depends on molality / no of solute particles / $\Delta T_b \propto m$	1 1
7	$t_{1/2} = 0.693/k$ $= 0.693/ 2min$ $= 0.3465\ min^{-1}$ $k = \frac{2.303}{t} \log \frac{[A]o}{[A]}$ $= \frac{2.303}{0.3465} \log \frac{100}{10}$ $= \frac{2.303}{0.3465} \log 10 = 6.65\ min$	½ ½ ½ ½
8	<table><tr><td></td><td>Dispersed phase</td><td>Dispersion medium</td></tr><tr><td>FOG</td><td>Liquid</td><td>Gas</td></tr><tr><td>MILK</td><td>liquid</td><td>Liquid</td></tr></table>	1+1
9	Na_3PO_4 , Because of greater valency of PO_4^{3-} ions , thus will be more effective.	1 1
	OR	
9	Desorption of reaction products from the catalyst surface, thereby,making the surface available again for more reaction to occur.	2
10.	a) $CH_3CN \xrightarrow{\text{(i) CH3MgBr (ii) H2O / H+}} CH_3COCH_3$ b)  (Or any other suitable method)	1 1
11		

	OR	
11	a) Neoprene b) Glyptal	1+1
12	a) Elastomers b) Fibre c) Thermoplastic d) Thermosetting plastic	½ ×4
	SECTION C	
13	2×10^{24} atoms weigh = 300g 6.023×10^{23} weigh= $\frac{300 \times 6.023 \times 10^{23}}{2 \times 10^{24}}$ = 90.3g $\rho = (zxM) / a^3 x N_a$ $= 4 \times 90.3 / [(250x10^{-10})^3 \times 6.022x10^{23}]$ $= 38.4 \text{ g cm}^{-3}$ (Or any other suitable method)	1 ½ ½ 1
14	$\Delta T_b = T_b^o - T_b$ $= 36.86 - 35.60$ $T_b = 1.26$ K $\Delta T_b = K_b m$ $= K_b \frac{w_2 \times 1000}{M_2 \times w_1}$ $= \frac{2.02 \text{ K Kg mol}^{-1} \times 8\text{g} \times 1000}{1.26 \text{ K} \times 100 \text{ g}}$ $M_2 = 128.25 \text{ g mol}^{-1}$ (Deduct ½ mark if unit is not given or wrong)	½ ½ 1 1
15	a) Rate of a reaction depends on concentration of reactants and since concentration becomes less and less as the reaction progresses , the rate also goes on decreasing. b) At hilly areas, atmospheric pressure is low as a result of which water boils at lower temperature. c) This is because of improper orientation of the colliding molecules.	1 1 1
16	a)Metals having lower melting point flow down on heating leaving behind impurities. For example- Tin metal (Or any other) b)The impurities are more soluble in the melt than in the solid state of the metal. Example- Germanium (Or any other)	1 + ½ 1 + ½
	OR	
16	a) Oxygen evolved at the anode reacts with carbon electrodes to form CO and CO_z and hence anode is burnt away. b) Because reduction of oxide is easier to form metal than from its sulphide. c) The positive entropy change is higher if the metals formed is in liquid state. This is because entropy of liquid is more than that of solid. Thus value of ΔG becomes more –ve and reduction becomes easier.	1 1 1
17	a) A is NO_2 , B is N_2O_4 b) $MNO_3 + H_2SO_4 \rightarrow MHSO_4 + NO_2 + H_2O$ $2\ NO_2 \xrightarrow{\text{Cooling}} N_2O_4$	1, ½ 1 ½
18	i) The +3 oxidation state of Bi is more stable than Sb(III). ii) Because electronegativity of chlorine is greater than that of iodine. iii) Due to decrease in electronegativity and increase in atomic size from oxygen to sulphur.	1 1 1
	OR	
18	i) In H_3PO_3 , the phosphorous is in intermediate +3 oxidation state while in H_3PO_4 phosphorous is in	1

	highest +5 oxidation state. ii) Ozone acts as a strong oxidising agent so it oxidises iodide ions to iodine (Violet vapours). iii) Chlorine water produces nascent oxygen which is responsible for bleaching action and oxidation.	 1 1
19.	a) i) $[Cu\ Br_4]^{2-}$ ii) $[\ Co(NH_3)_6\ ]_2\ (SO_4)_3$ b) Ammonia has lone pair of electron.	1,1 1
	OR	
19	a) i) $[Co(NH_3)_5\ NO_2\ ]\ (NO_3)_2$ ii) $[\ Ni(NH_3)_3\ Cl]\ NO_3$ b) 5	1,1 1
20.	a) Cyclohexyl chloride ; Because of partial double bond character of C-Cl bond in Chlorobenzene / Resonance effect / sp^3 hybridised carbon in cyclohexyl chloride whereas sp^2 carbon in chlorobenzene. b) 2-Butene and 1-Butene (or structures) c) All chlorine atoms are bonded to carbon atom by covalent bonds.	½ , ½ ½ , ½ 1
21	A= C_6H_5CHO , B= $C_6H_5CH_2OH$, C= C_6H_5COONa , D= C_6H_6	1, ½ , ½ ,1
22	 **A=** , **B=** , C= , D= , E=	1, ½ , ½ , ½ , ½
23	a) Globular / Fibrous Proteins in which molecules are extensively folded into compact units approaching almost spherical shape. / They consist of linear thread like molecules which lie side by side They are soluble in water. / They are insoluble in water. Example – Insulin / Example - Keratin (Any one difference) (Or any other correct example) b) Because they contain most of the nutrients needed by our body.	 1 ½ + ½ 1
	OR	
23	a) i) Native / Denatured They are found in biological system with unique 3D structure and biological activity is seen. / It has no biological activity ii) α Helix / β pleated sheets They are polypeptide chains stabilized by intra molecular H-Bonding / They are stabilized by inter molecular H-Bonding b) It is soluble in water and is excreted in urine.	 1 1 1
24	a) Tranquilizers b) Magnesium hydroxide, because it is insoluble and does not allow the pH to increase above neutrality. c)Less branched hydrocarbon chain in detergents.	1 ½ , ½ 1
	SECTION D	
25	a) $E_{cell} = E^o_{cell} - (0.059/n) \log [A^{+2}]/[B^{+2}]$ $2.6805 = E^o_{cell} - (0.059/2) \log [0.0001]/[0.001]$ $= E^o_{cell} - (0.059/2) \log [10^{-1}]$	 1 1

	E^{o}_{cell} = 2.6805- 0.0295 = 2.6510 V Or $E_{cell} = E^{o}_{cell}$- (0.059/n) log $[A^{+2}]/[B^{+2}]$ E_{cell} = 2.6805 - (0.059/2) log [0.0001]/[0.001] E_{cell} = 2.71 V b) i) Because the overall reaction does not involve any ion in the solution whose concentration changes during its lifetime. ii) Aluminium has lesser reduction electrode potential than H^+ , so during electrolysis H^+ ions are discharged at cathode.	1 1 1 1 1 1
	OR	
25	a) $\Lambda_m^0(\text{HCOOH}) = \lambda^0(H^+) + \lambda^0(HCOO^-)$ $= 349.6 + 54.6$ $= 404.2\ \text{Scm}^2\ \text{mol}^{-1}$ Now, degree of dissociation: $\alpha = \frac{\Lambda_m(\text{HCOOH})}{\Lambda_m^0(\text{HCOOH})}$ $= \frac{46.1}{404.2}$ $= 0.114(\text{approximately})$ Thus, dissociation constant: $K = \frac{c\alpha^2}{(1-\alpha)}$ $= \frac{(0.025\ \text{mol L}^{-1})(0.114)^2}{(1-0.114)}$ $= 3.67\times10^{-4}\ \text{mol L}^{-1}$ b) i) Zinc lies below Cu in electrochemical series due to which zinc is oxidised and copper ions are reduced. ii) Saline medium has extra salt such as NaCl dissolved in water due to which concentration of electrolyte becomes greater as a result of which more electrochemical cells are formed and hence rusting is promoted.	1 1 1 1 1 1
26	a) Because actinoids are radioactive and show wide range of oxidation sates. b) Ce^{4+} gets reverted to Ce^{3+} in aq. Solution / Ce^{3+} is more stable in aq medium. c) Because it undergoes disproportionation reaction in aqueous medium / Or reaction d) Mn^{2+} has stable electronic configuration ($3d^5\ 4s^0$) and thus does not easily change to Mn^{3+} where in case of iron , Fe^{3+} ($3d^5\ 4s^0$) is more stable than Fe^{2+}. e) Ti(III) has electronic configuration ($3d^1$) and is less stable while Ti(IV) is more stable having noble gas configuration.	1 1 1 1 1
	OR	
26	a) i) Cr ; Cr^{2+} is oxidised to Cr^{3+} which has stable d^3/ t_2g^3 configuration. ii) Mn, it has maximum number of unpaired electrons. iii) Sc	½ , ½ ½ , ½ 1

	b) i) $5C_2O_4^{2-} + 2MnO_4^- + 16H^+ \longrightarrow 2Mn^{2+} + 8H_2O + 10CO_2$ ii) $5Fe^{2+} + MnO_4^- + 8H^+ \rightarrow Mn^{2+} + 4H_2O + 5Fe^{3+}$	1 1
27	a) i)  ii) b) i) Heat both the compounds with iodine and NaOH at 330K, isopropyl alcohol gives yellow ppt of iodoform. ii) Add neutral ferric chloride solution to both the compounds, phenol gives green-voilet colour. (Or any other suitable chemical test) c) 3-Hydroxybenzaldehyde.	1 1 1 1 1
	OR	
27	 a) b) i) The higher b.p of p-nitrophenol is due to intermolecular hydrogen bonding but in ortho-nitrophenol intra-molecular hydrogen bonding takes place. ii)The C-Br bond in bromobenzene is difficult to break because of partial double bond character .	1 1 1 1