Strictly Confidential (For Internal and Restricted Use Only)

Senior School Certificate Examination
2018
Marking Scheme ------- Chemistry

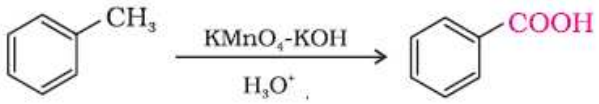
General Instructions

1. The Marking Scheme provides general guidelines to reduce subjectivity in the marking. The answers given in the Marking Scheme are Suggested answers. The content is thus indicative. If a student has given any other answer which is different from the one given in the Marking Scheme, but conveys the same meaning, such answers should be given full weight-age.
2. The Marking Scheme carries only suggested value point for the answers. These are only guidelines and do not constitute the complete answers. The students can have their own expression and if the expression is correct the marks will be awarded accordingly.
3. The Head-Examiners have to go through the first five answer-scripts evaluated by each evaluator to ensure that the evaluation has been carried out as per the instruction given in the marking scheme. The remaining answer scripts meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
4. 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.
5. If a question has parts, please award marks in 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 circled.
6. If a question does not have any parts, marks be awarded in the left-hand margin.
7. If a candidate has attempted an extra question, marks obtained in the question attempted first should be retained and the other answer should be scored out.
8. No Marks to be deducted for the cumulative effect of an error. It should be penalized only once.
9. A full scale of marks 0-70 has to be used. Please do not hesitate to award full marks if the answer deserves it.
10. Separate marking schemes for all the three sets have been provided.
11. As per orders of the Hon'ble Supreme Court. The candidate would now be permitted to obtain photocopy of the Answer Book on request on payment of the prescribed fee. All examiner/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.
12. The Examiners should acquaint themselves with the guidelines given in the Guidelines for sport Evaluation before starting the actual evaluation.
13. Every Examiner should stay upto sufficiently reasonable time normally 5-6 hours every day and evaluate 20-25 answer books and should minimum 15-20 minutes to evaluate each answer book.
14. Every Examiner should acquaint himself/herself with the marking schemes of all the sets.

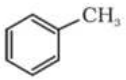
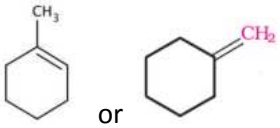
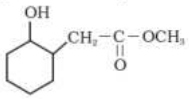
Marking Scheme – 2017-18

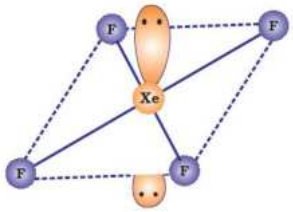
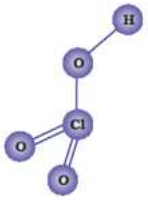
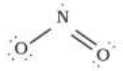
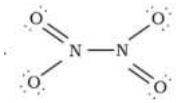
CHEMISTRY (043)/ CLASS XII

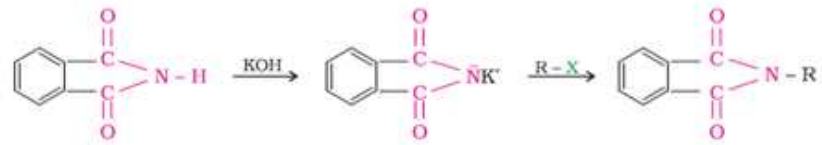
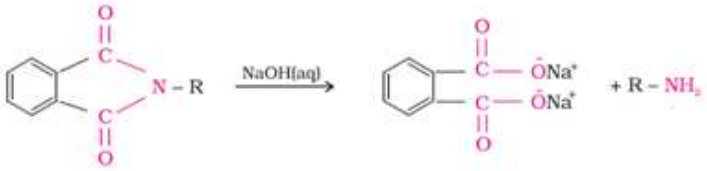
56/1

Q.No	Value Points	Marks
1	Shows metal deficiency defect / It is a mixture of Fe^{2+} and Fe^{3+}/Some Fe^{2+} ions are replaced by Fe^{3+} / Some of the ferrous ions get oxidised to ferric ions.	1
2	Selectivity of a catalyst	1
3	Coordination Number = 6 , Oxidation State = +2	½, ½
4	Benzyl chloride ; Due to resonance, stable benzyl carbocation is formed.	½ ½
5	3,3 - Dimethylpentan-2-ol	1
6	$\Delta T_f = K_f\, m$ $= K_f \frac{w_2 \times 1000}{M_2 \times w_1}$ $= \frac{1.86 \times 60 \times 1000}{180 \times 250}$ $= 2.48$ K $\Delta T_f = T_f^{\circ} - T_f$ $2.48 = 273.15 - T_f$ $T_f =$ 270.67 K / 270.52 K / - 2.48 °C	½ ½ ½ ½
7	$Rate = \frac{1}{4}\frac{\Delta(NO2)}{\Delta(t)} = -\frac{1}{2}\frac{\Delta(N_2O_5)}{\Delta(t)}$ $\frac{1}{4}(2.8 \times 10^{-3}) = -\frac{1}{2}\frac{\Delta(N_2O_5)}{\Delta(t)}$ Rate of disappearance of N_2O_5 $(-\frac{\Delta(N_2O_5)}{\Delta(t)}) = 1.4 \times 10^{-3}$ M/s (Deduct half mark if unit is wrong or not written)	½ ½ 1
8	(a)PH_3 (b)NH_3 (c)NH_3 (d)BiH_3	½ ½ ½ ½
9	(a)$CH_3CHO \xrightarrow{(i)CH_3MgBr,\ Dry\ ether\ (ii)H_2O/H^+} CH_3CH(OH)CH_3 \xrightarrow{CrO_3} CH_3COCH_3$ (b)  (or any other correct method)	1 1
	OR	
9	(a) because the carboxyl group is deactivating and the catalyst aluminium chloride (Lewis acid) gets bonded to the carboxyl group (b) Nitro group is an electron withdrawing group (-I effect) so it stabilises the carboxylate anion and strengthens the acid / Due to the presence of an electron withdrawing Nitro group (-I effect).	1 1

10.	(a) $5Fe^{2+} + MnO_4^- + 8H^+ \longrightarrow Mn^{2+} + 4H_2O + 5Fe^{3+}$ (b) $2MnO_4^- + H_2O + I^- \longrightarrow 2MnO_2 + 2OH^- + IO_3^-$ (Half mark to be deducted in each equation for not balancing)	1 1
11	(a) As compared to other colligative properties, its magnitude is large even for very dilute solutions / macromolecules are generally not stable at higher temperatures and polymers have poor solubility / pressure measurement is around the room temperature and the molarity of the solution is used instead of molality. (b) Because oxygen is more soluble in cold water or at low temperature. (c) Due to dissociation of KCl / KCl (aq) → $K^+ + Cl^-$, i is nearly equal to 2	1 1 1
12	$d = \frac{z\,M}{a^3\,N_A}$ $= \frac{4 \times 40}{(4\times10^{-8})^3 \times 6.022\times10^{23}}$ $= 4.15\ g/cm^3$ No of unit cells = total no of atoms /4 $=[\frac{4}{40} \times 6.022\times10^{23}] / 4$ $=1.5\times10^{22}$ (Or any other correct method)	½ ½ ½ ½ ½ ½
13	$k_2 = 0.693 / 20$, $k_1 = 0.693/40$ $\log\frac{k_2}{k_1} = \frac{E_a}{2.303R}[\frac{1}{T_1} - \frac{1}{T_2}]$ $k_2/k_1 = 2$ $\log 2 = \frac{E_a}{2.303 \times 8.314}[\frac{320-300}{320\times300}]$ Ea = 27663.8 J/mol or 27.66 kJ/ mol	½ ½ ½ ½ 1
14	(a)Peptisation occurs / Colloidal solution of $Fe(OH)_3$ is formed (b)Coagulation occurs (c)Demulsification or breaks into constituent liquids	1 1 1
15	$4Au(s) + 8CN^-(aq) + 2H_2O(aq) + O_2(g) \rightarrow 4[Au(CN)_2]^-(aq) + 4OH^-(aq)$ $2[Au(CN)_2]^-(aq) + Zn(s) \rightarrow 2Au(s) + [Zn(CN)_4]^{2-}(aq)$ (No marks will be deducted for not balancing) NaCN leaches gold/NaCN acts as a leacing agent / complexing agent Zn acts as reducing agent / Zn displaces gold.	1 1 ½ ½
16	(a) The comparatively high value for Mn shows that $Mn^{2+}(d^5)$ is particularly stable / Much larger third ionisation energy of Mn (where the required change is from	1

	d^5 to d^4) (b)Due to higher number of unpaired electrons. (c)Absence of unpaired d- electron in Sc^{3+} whereas in Ti^{3+} there is one unpaired electron or Ti^{3+}shows d-d transition.	 1 1
17	(a) (i) /  (b)  (c) 	1 1 1
18	(a) A= $CH_3CH_2CH_2CHO$ B = $CH_3COCH_2CH_3$ C= $(CH_3)_2CHCHO$ D= $CH_3CH_2CH_2CH_3$ (b) B	 ½ ½ ½ ½ 1
19.	(i)  (ii) $C_6H_5CH(OH)CH_3$ (iii) C_2H_5I + C_6H_5OH (No splitting of marks)	 1 1 1
20.	a) To impart antiseptic properties b) 2-3% solution of iodine in alcohol – water mixture / iodine dissolved in alcohol , used as an antiseptic/ applied on wounds. c) Sodium benzoate / Aspartame	1 ½ , ½ 1
21	(a)Carbohydrates that give large number of monosaccharide units on hydrolysis / large number of monosaccharides units joined together by glycosidic linkage Starch/ glycogen/ cellulose (or any other) (b)Proteins that lose their biological activity / proteins in which secondary and tertiary structures are destroyed Curdling of milk (or any other) (c)Amino acids which cannot be synthesised in the body. Valine / Leucine (or any other)	½ ½ ½ ½ ½ ½
	OR	
21	(a)Saccharic acid / COOH-$(CHOH)_4$-COOH (b)Due to the presence of carboxyl and amino group in the same molecule / due to formation of zwitter ion or dipolar ion. (c)α- helix has intramolecular hydrogen bonding while β pleated has intermolecular hydrogen bonding / α- helix results due to regular coiling of polypeptide chains while in β pleated all polypeptide chains are stretched and arranged side by side.	1 1 1
22	(a) $Fe_4[Fe(CN)_6]_3$ (b) Ionisation isomerism (c) sp^3d^2, 4	1 1 ½, ½
23	(a) Concerned about environment, caring, socially alert, law abiding citizen (or any other 2 values)	½ , ½

	(b) Low density polythene is highly branched while high density polythene is linear. (c) As it is non-biodegradable . (d) Which can be degraded by microorganisms, eg *PHBV(or any other correct example)*	1 1 ½ , ½
24	a) (i) In +3 oxidation state of phosphorus tends to disproportionate to higher and lower oxidation states / Oxidation state of P in H_3PO_3 is +3 so it undergoes disproportionation but in H_3PO_4 it is +5 which is the highest oxidation state, so it cannot. (ii) F cannot show positive oxidation state as it has highest electronegativity/ Because Fluorine cannot expand its covalency / As Fluorine is a small sized atom, it cannot pack three large sized Cl atoms around it. (iii) Oxygen has multiple bonding whereas sulphur shows catenation / Due to pπ-pπ bonding in oxygen whereas sulphur does not / Oxygen is diatomic therefore held by weak intermolecular force while sulphur is polyatomic held by strong intermolecular forces. b) (i) (ii)   	1 1 1 1, 1
	OR	
24	a) (i) A = NO_2 , B = N_2O_4 (ii)  ,  (iii) Because NO_2 dimerises to N_2O_4 / NO_2 is an odd electron species. b) HI > HBr > HCl > HF c) $XeF_4 + SbF_5 \rightarrow [XeF_3]^+ [SbF_6]^-$	½, ½ ½ , ½ 1 1 1
25	(a) $Sn + 2\ H^+ \rightarrow Sn^{2+} + H_2$ (Equation must be balanced) $E = E^o - \frac{0.059}{2} \log \frac{[Sn^{2+}]}{[H^+]^2}$ $= [0 - (-0.14)] - 0.0295 \log \frac{(0.004)}{(0.02)^2}$ $= 0.14 - 0.0295 \log 10 = 0.11$ V / 0.1105 V (b) (i) Due to overpotential/ Overvoltage of O_2 (ii) The number of ions per unit volume decreases.	1 ½ ½ 1 1 1
	OR	
25	a) $\Delta G^o = - nFE^o$ $-43600 = - 2 \times 96500 \times E^o$ $E^o = 0.226$ V $E = E^o - 0.059/2 \log ([H^+]^2 [Cl^-]^2 / [H_2])$ $= 0.226 - 0.059/2 \log[(0.1)^2 \times (0.1)^2] / 1$ $= 0.226 - 0.059 /2 \log 10^{-4}$	½ ½ ½ ½ 1

	= 0.226 + 0.118 = 0.344 V (Deduct half mark if unit is wrong or not written) b) Cells that convert the energy of combustion of fuels (like hydrogen, methane, methanol, etc.) directly into electrical energy are called fuel cells. Advantages : High efficiency, non polluting (or any other suitable advantage)	1 ½ ,½
26	(a)(i) Ar/ R-$CONH_2$ + Br_2 + 4 NaOH → Ar/ R-NH_2 + 2NaBr + Na_2CO_3 + 2 H_2O (ii) $C_6H_5NH_2 + NaNO_2 + 2HCl \xrightarrow{273-278K} C_6H_5\bar{N}_2\bar{Cl} + NaCl + 2H_2O$ (or any other correct equation) (iii)   (b)(i)Because of the combined factors of inductive effect and solvation or hydration effect (ii)Due to resonance stabilisation or structural representation / resonating structures.	1 1 1 1 1
	OR	
26	(a) (i) $C_6H_5NHCOCH_3$ (ii) $C_6H_5SO_2N(CH_3)_2$ (iii) C_6H_6 (b) Add chloroform in the presence of KOH and heat , Aniline gives a offensive smell while N,N dimethylaniline does not. (or any other correct test) (c)$C_2H_5NH_2$< $C_6H_5NHCH_3$< $C_6H_5NH_2$	1 1 1 1 1