Central Board of School Education

Marking Scheme 2016

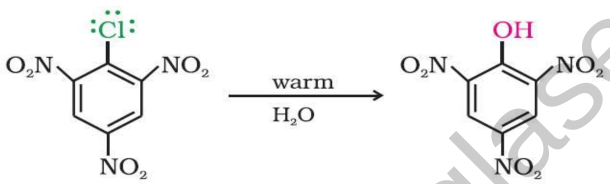
[Official]

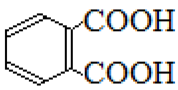
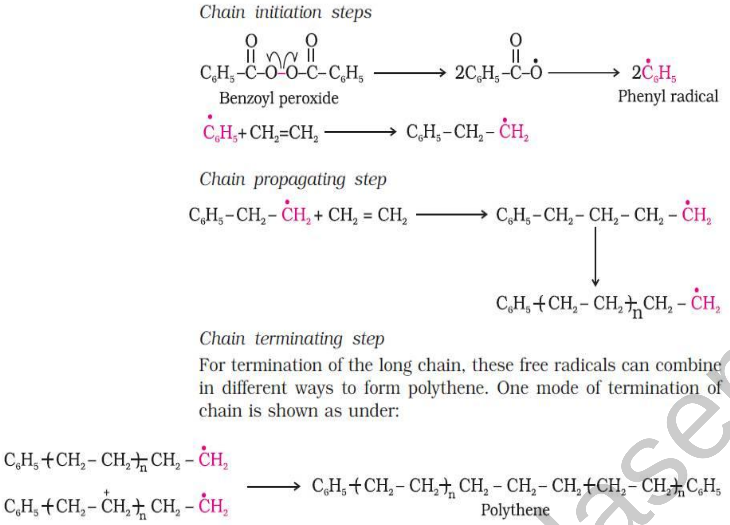
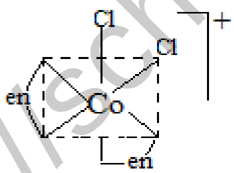
MARKING SCHEME 2016- CHEMISTRY(043)

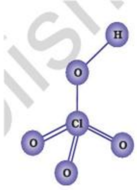
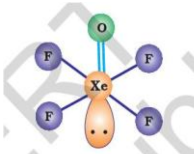
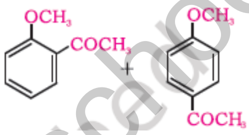
Set 56 / 1/S

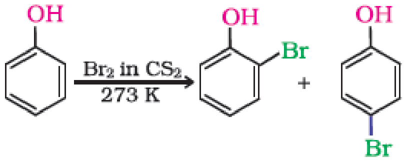
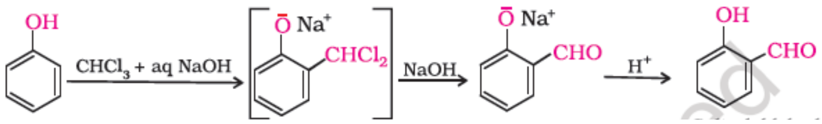
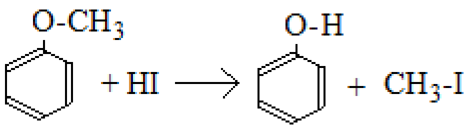
Q. No.	Value Points	Marks
1	CH_2=CH-CH_2Cl	1
2	NO_2	1
3	Anti-ferromagnetism	1
4	2,4-dibromoaniline / 2,4-dibromobenzenamine	1
5	Like Charged particles cause repulsion/ Brownian motion/ solvation	1
6	(i) Mercury cell (ii) Fuel cell (iii) Lead storage cell (iv) Dry cell	4 x ½ =2
7	(i) A : K_2MnO_4 / MnO_4^{2-} , B : $KMnO_4$ / MnO_4^-, (ii) On heating it decomposes forming K_2MnO_4 and oxygen gas OR $2KMnO_4 \longrightarrow K_2MnO_4 + MnO_2 + O_2$	½ + ½ 1
8	(i) $[Pd(NH_3)_4]Cl_2$ (ii) Tetraamminepalladium(II) chloride	1 1
9	(i) Order is zero, and molecularity is two / one . (ii) mol L^{-1} s^{-1}	½ + ½ 1
10	(i) $CH_3CHO \xrightarrow{Zn-Hg\ /\ HCl} CH_3CH_3 + H_2O$ (ii) $R\text{-}CH_2\text{-}COOH \xrightarrow{(i)\ X_2\ /\ Red\ P_4\ \ (ii)\ H_2O} R\text{-}CH(X)\text{-}COOH$ (X = Cl or Br) (any other correct examples)	1 1
	OR	
10	(i) $C_6H_5\text{-}CH_3 + CrO_2Cl_2 \xrightarrow{CS_2} C_6H_5\text{-}CH(OCrOHCl_2)_2 \xrightarrow{H_3O^+} C_6H_5\text{-}CHO$ (ii) $CH_3\text{-}COCl \xrightarrow{H_2\ /\ Pd\ ,\ BaSO_4} CH_3\text{-}CHO + HCl$ (any other correct method)	1 1
11	M x z	

	$d = \dfrac{\quad}{a^3 \text{ x } N_A}$ $N_A = (M \text{ x } z) / a^3 \text{ x } d = (280g \text{ x } 4) / (400 \text{ x } 10^{-10}cm)^3 \text{ x } 7gcm^{-3}$ $= 2.5 \text{ x } 10^{24}$ atoms (or any other correct method)	1 1 1
12	$\log k = \log A - E_a / 2.303RT$; $\log k = 14.2 - (1.0\text{x}10^4 K) / T$ $\dfrac{Ea}{2.303RT} = \dfrac{1.0 \text{ x } 10^4 K}{T}$ $E_a = 2.303 \text{ x } 8.314 \text{ J mol}^{-1}K^{-1} \text{ x } 1.0 \text{ x } 10^4 \text{ K}$ $E_a = 19.15 \text{ x } 10^4 \text{ J mol}^{-1} = 191.5 \text{ kJ mol}^{-1}$. Rate constant, $k = 0.693 / t_{1/2} = 0.693 / 200$ min $= 0.0034 \text{ min}^{-1} / 3.4 \times 10^{-3} \text{ min}^{-1}$	½ 1 ½ 1
13	(i) Silica gel (ii) H_3PO_4 is more effective in causing coagulation because of greater negative charge / Hardy Schulze Rule . (iii) Proteins	1 ½ + ½ 1
14	(i) van Arkel method (ii) Leaching / Bayer's Process (iii) Limestone decomposes to CaO (flux) which removes silica impurity as slag. Or $CaCO_3 \xrightarrow{\triangle} CaO + CO_2$ $CaO + SiO_2 \longrightarrow CaSiO_3$ (Slag)	1 1 1
15	$E_{cell} = E^o_{cell} - \dfrac{0.0591}{6} \log \dfrac{[Cr^{3+}]^2}{[Fe^{2+}]^3}$ $0.261 \text{ V} = E^o_{cell} - \dfrac{0.0591}{\quad} \log \dfrac{(0.01)^2}{\quad}$	1 1

	6 $(0.01)^3$ $0.261\ V = E^o_{cell} - \frac{0.0591}{6} \log(10^2)$ $0.261\ V = E^o_{cell} - (0.0591 / 6) \times 2$ $E^o_{cell} = E_{cell} + 0.0197V = 0.2807\ V$	1
16	(i) Due to multiple bonding ability of Oxygen with transition Metals / pπ- dπ bonding. (ii) Due to absence of unpaired electrons in zinc atom and the presence of unpaired electrons in Chromium atom. (iii) Eu^{2+} gets oxidized to more stable +3 state.	1 1 1
17	(i)  (ii) $CH_3\text{-}CH(Cl)\text{-}CH_2\text{-}CH_3 \xrightarrow{\text{alc. KOH}} CH_3\text{-}CH = CH\text{-}CH_3$ (iii) $CH_3\text{-}CH_2\text{-}Cl + Na \xrightarrow{\text{dry ether}} CH_3\text{-}CH_2\text{-}CH_2\text{-}CH_3 + NaCl$	1 1 1
18	(a) In ketones presence of two electron releasing alkyl groups reduce the electrophilicity of the carbonyl group more effectively than in aldehydes wherein only one alkyl group occurs / Presence of two alkyl groups in ketones provide more steric hinderance to incoming nucleophile than in aldehydes where only one alkyl group occurs. (b) Due to the absence of alpha hydrogen. (c) Because the carboxyl group is deactivating and the Lewis acid $AlCl_3$ gets bonded to the the carboxyl group.	1 1 1
19	(i) A : $C_6H_5CONH_2$; B : $C_6H_5NH_2$; C : $C_6H_5NHCOCH_3$ (ii) A : $C_6H_5NO_2$; B : $C_6H_5NH_2$; C : C_6H_5NC.	½ + ½ + ½ ½ + ½ + ½

20	(i) It acts as initiator of free radical / catalyst. (ii) CH_2OH-CH_2OH and  or Ethylene glycol and phthalic acid / IUPAC name. (iii) Buna-N < PVC < Nylon-6	1 1 1
	OR	
20		1 1 1
21	(i) α-D-Glucose and α-D-Glucose / Glucose and Glucose. (ii) Vitamin-B_6 / Pyridoxine. (iii) Fibrous protien : Keratin / Myosin / Kephalin Globular protien : Insulin / Albumin / Haemoglobin (or any other one)	1 1 ½ ½
22	(a) sp^3d^2 hybridisation ; Paramagnetic ; High spin complex. (b) 	1 + ½ + ½ 1
23	i) Aware, concerned or any other correct two values. (ii) Side effects, unknown health problems (iii)Neurologically active drugs/ stress relievers example- valium, equanil (or any other correct two examples)	½ + ½ 1 1 ½ + ½
24	(a) (i) Due to decrease in bond enthalpy from H_2S to H_2Te / Larger H-Te bond than H-S bond allowing more dissociation of H_2Te. (ii) +5 oxidation state of P in PCl_5 makes it more covalent/ high charge to size ratio.	1 1

	(iii) Interhalogen compounds are slightly polar having dipole-dipole forces but pure halogens non-polar, have weak van der Waals forces. (b) (i)  (ii) 	1 1+1
	OR	
24	(i) $H_3PO_4 < H_3PO_3 < H_3PO_2$ (ii) Xe ; Lower ionization enthalpy of Xe than He. (iii) High pressure , optimum temperature ,Use of catalyst (iv) For bleaching woodpulp / cotton / textiles/ Extraction of gold / Platinum/ Manufacture of dyes/ drugs/ $CHCl_3$/ CCl_4/ DDT/ Sterilising water, etc (or any other two uses) (v) SO_2 decolourises acidified dilute solution of $KMnO_4$ / changes orange color of aidified $K_2Cr_2O_7$ to green.	1 ½ + ½ 1 ½ + ½ 1
25	(a) (i) $CH_2 = CH- CHO$ (ii) C_6H_6 /  (iii)  (b) (i) $CH_3-CH_2-\ddot{O}-H + H^+ \longrightarrow CH_3-CH_2-\overset{+}{O}(H)-H$ (ii) $CH_3CH_2-\ddot{O}(H): + CH_3-CH_2-\overset{+}{O}(H)H \rightarrow CH_3CH_2-\overset{+}{O}(H)-CH_2CH_3 + H_2O$ (iii) $CH_3CH_2-\overset{+}{O}(H)-CH_2CH_3 \longrightarrow CH_3CH_2-O-CH_2CH_3 + H^+$	1 1 1 ½ 1 ½
	OR	
25	(a) (i)	

	 (ii)  (iii)  (b) (i) On treatment with acetic acid or acetic anhydride in presence of drops of H_2SO_4, ethanol gives pleasant smell but Diethyl ether does not. (ii) On treatment with anhy.$ZnCl_2$ and HCl, ter-butyl alcohol gives immediate turbidity but Propanol does not. (or any other correct test)	1 1 1 1 1
26	(a) $\Delta T_b = i\ K_b\ m$ $\Delta T_b = i\ K_b \dfrac{w_b \times 1000}{M_b \times w_a}$ $T_b - T_b^0 = \dfrac{3 \times 0.52\ \text{k kg/ mol} \times 2 \times 1000\ \text{g kg}^{-1}}{142\ \text{g / mol} \times 50\ \text{g}}$ $T_b - 373\ \text{K} = 0.44\text{K}$; $T_b = 373.44\ \text{K}$ / 100.44^oC (b) (i) Properties of dilute solutions that depend on the number of particles of solute but not on nature of the solute particles are called colligative properties. (ii) The solutions which obey Raoult's law over the entire range of concentration are known as ideal solutions.	1 1 1 1 1
	OR	
26	(a) $\Delta T_f = K_f\, m$; or $M_B = K_f\,(w_B \times 1000) / (\Delta T_f \times w_A)$ $M_B = (3.83 \times 2.56 \times 1000) / (0.383 \times 100)$ $= 256\ \text{g mol}^{-1}$ Atomicity = 256 / 32 = 8 Formula of Sulphur = S_8.	½ 1 ½ 1

	(b) (i) Shrinks (ii) Swells	1 1

Name	**Signature**	**Name**	**Signature**
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