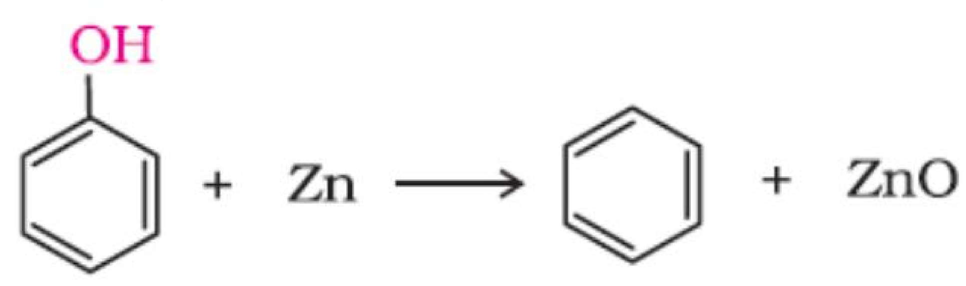
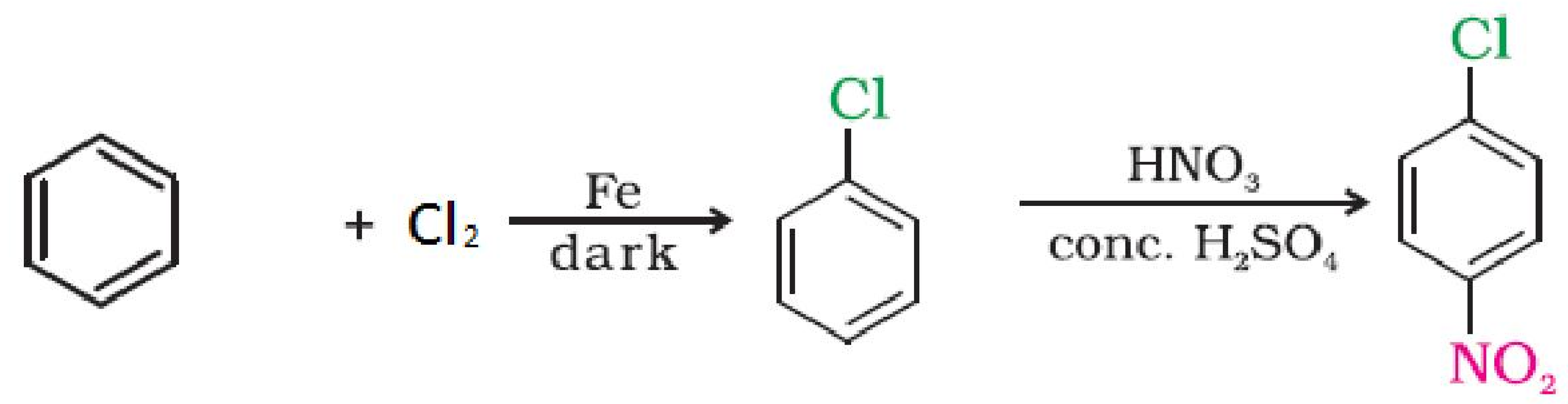
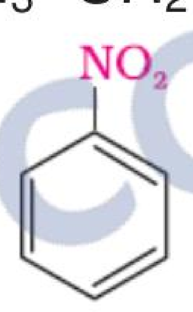
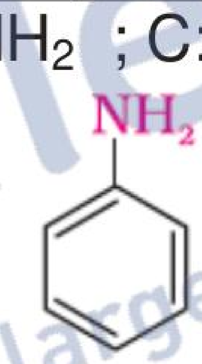
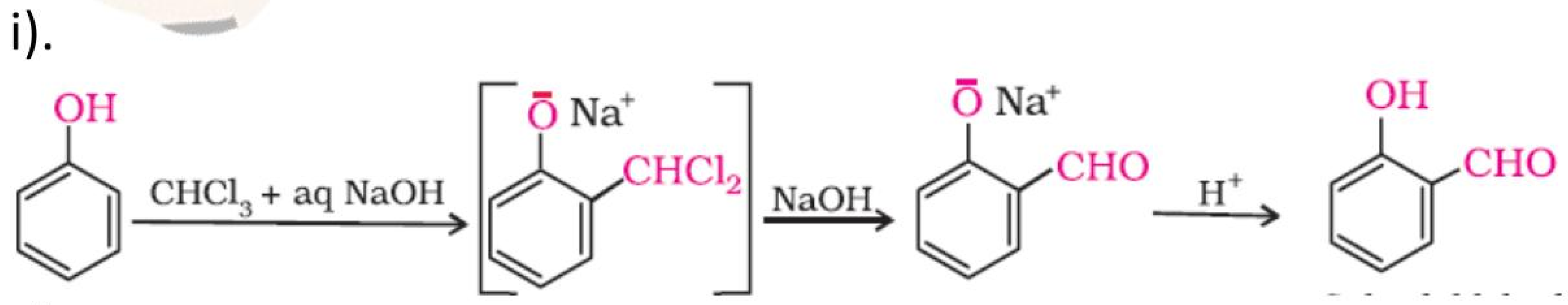
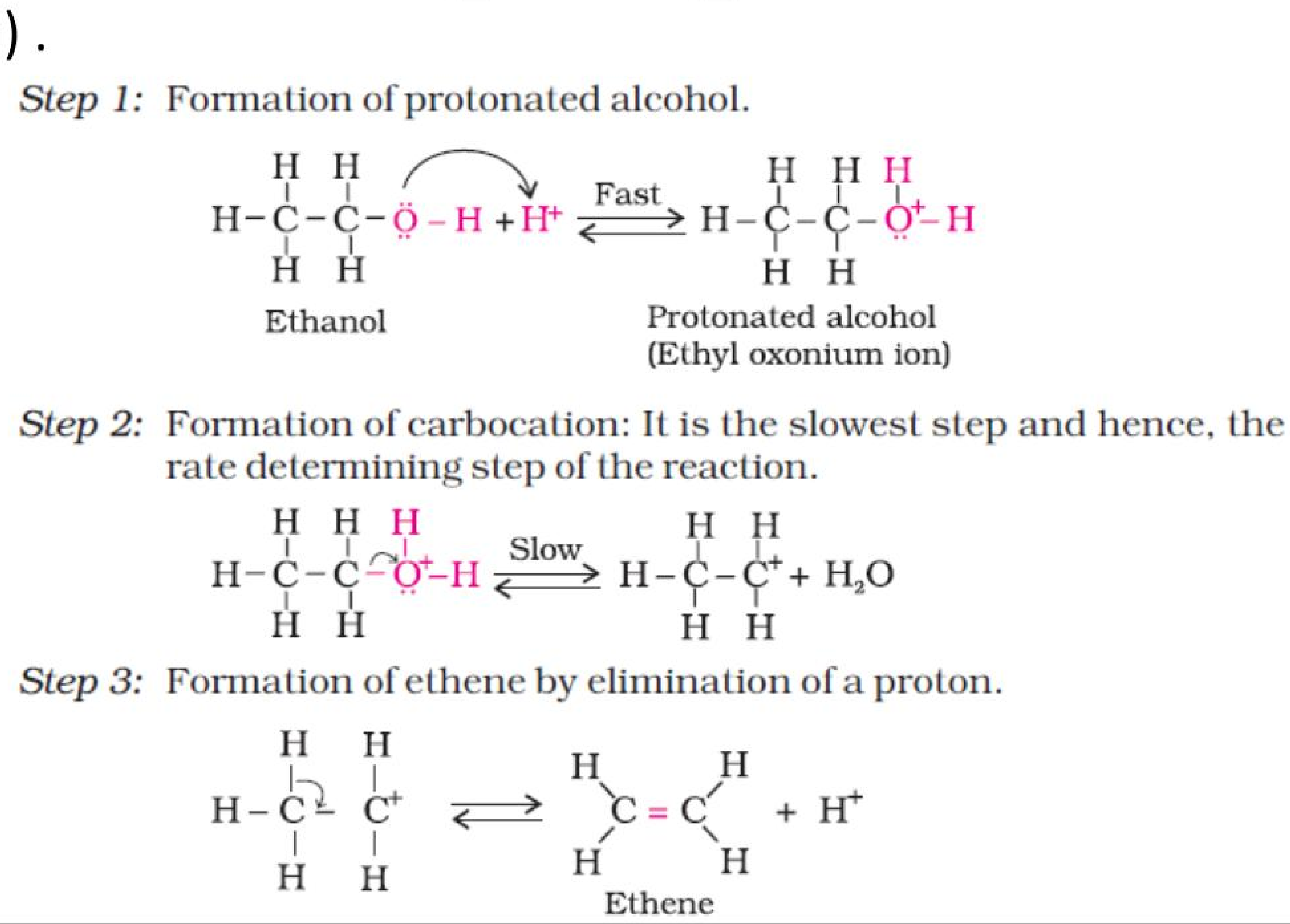
Marking scheme – 2017 (Compartment)

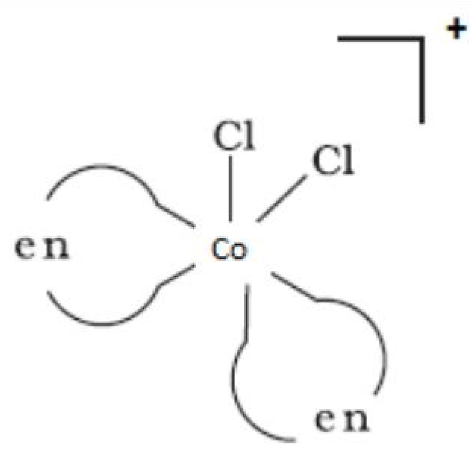
CHEMISTRY (043)/ CLASS XII

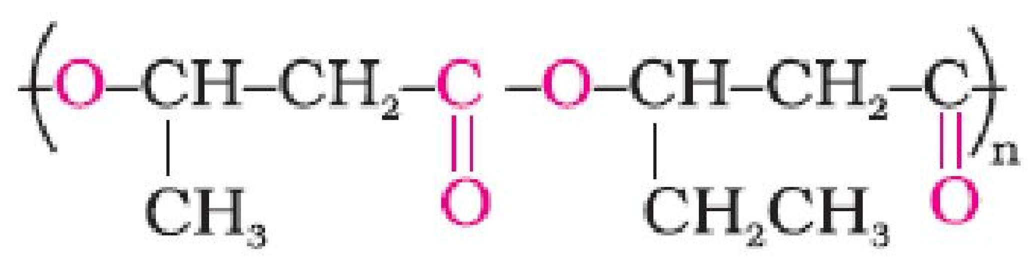
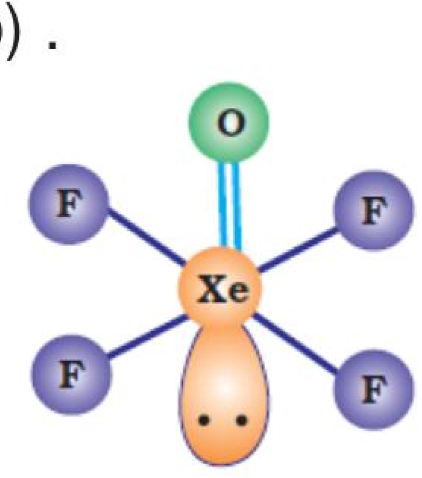
Set 56/2

Q.No	Value Points	Marks
1	Dispersion medium- liquid/ water ; Dispersed phase – liquid/ oil	½ , ½
2	Tetraamminechloridonitrito-N -cobalt(III) ion	1
3	N,N-dimethylbutan-1-amine	1
4	Schottky Defect	1
5	 / Benzene is formed	1
6	a) Due to high activation energy b) Rate = k $[A_2]^0 [B_2]^0$	1 1
	OR	
6	$R \rightarrow P$ $\text{Rate} = -\frac{d[R]}{dt} = k[R]$ or $\frac{d[R]}{[R]} = -k dt$ Integrating this equation, we get $\ln [R] = -kt + I$ (4.8) When $t = 0$, $R = [R]_0$, where $[R]_0$ is the initial concentration of the reactant. Therefore, equation (4.8) can be written as $\ln [R]_0 = -k \times 0 + I$ $\ln [R]_0 = I$ Substituting the value of I in equation (4.8) $\ln[R] = -kt + \ln[R]_0$ (4.9) Rearranging this equation $\ln \frac{[R]}{[R]_0} = -kt$ or $k = \frac{1}{t} \ln \frac{[R]_0}{[R]}$ $k = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$	1 1
7	i) Silver can exhibit +2 oxidation state wherein it will have incompletely filled d-orbital. ii) Much higher third ionisation energy of Mn where the required change is from d^5 to d^4	1 1
8	a) $CH_3\text{-}CH(Br)\text{-}CH_3 \xrightarrow{\text{alc KOH}} CH_3\text{-}CH{=}CH_2 \xrightarrow{\text{HBr, Peroxide}} CH_3\text{-}CH_2\text{-}CH_2\text{-}Br$ b) .	1

		1
9	Hypophosphorous acid is a good reducing agent as it contains two P-H bonds. There is no P-H bond in orthophosphoric acid , so it is not a reducing agent Example : It reduces $AgNO_3$ to metallic silver/ chemical equation	1 1
10.	$Ag^+ (aq) + e^- \rightarrow Ag(s)$ Because it has higher reduction potential	1 1
11	i) Phenol / 0.2 % phenol is antiseptic while 1% is disinfectant. ii) Aspartame iii) Cationic detergents are quaternary ammonium salts of amines with acetates, chlorides or bromides as anions/ Cationic part has a long chain hydrocarbon which is involved in cleansing action.	1 1 1
12	a) Because they are excreted in urine and cannot be stored in body; Vitamin C / B_1 / B_2/ B_6 b) i) Essential amino acids are those which cannot be synthesized in the body and are supplied through diet whereas non-essential amino acid can be synthesized in the body ii) In fibrous proteins , the polypeptide chains run parallel and are held together by hydrogen or disulphide bonds while in globular, polypeptide chains coil around to give a spherical shape	½ , ½ 1 1
13	i) A: CH_3- CH_2CN ; B: CH_3- CH_2- CH_2NH_2 ; C: CH_3- CH_2- CH_2-NH-$COCH_3$ ii) A: $Ar-\overset{+}{N_2}B\overset{-}{F_4}$; B:  C : 	½ ×3 ½ ×3
14	a) i)Due to –I effect of X , the ring gets partially deactivated ii)They fail to form Hydrogen bonds with water/ more energy is required to break hydrogen bonds in water and less energy is released when new attractions are set up. b)2-Bromo-2-methylbutane < 2-Bromopentane < 1-Bromopentane	1 1 1
15	i).  ii) . 	1 ½ ½ 1
16	Hybridisation : d^2sp^3 Spin : Low spin	1 1

*These answers are meant to be used by evaluators

	 	1
17	i)The impurities are more soluble in the melt than in the solid state of the metal. ii) Different components of a mixture are differently adsorbed on the surface of adsorbent. iii)The more basic / reactive metal gets deposited at the cathode and the less basic / reactive ones go to the anode mud.	1 1 1
18.	A: Na_2CrO_4 ; B: $Na_2Cr_2O_7$ $4\ FeCr_2O_4 + 8\ Na_2CO_3 + 7\ O_2 \rightarrow 8\ Na_2CrO_4 + 2\ Fe_2O_3 + 8\ CO_2$ $2Na_2CrO_4 + 2\ H^+ \rightarrow Na_2Cr_2O_7 + 2\ Na^+ + H_2O$	½ , ½ 1 1
	OR	
18	a) i)Due to d-d transition ii)Due to higher oxidation state of Mn in Mn_2O_7 / Due to high polarizing power of Mn(VII). b) $\mu = \sqrt{4(4+2)}$ = 4.90 B.M	1 1 1
19.	i) The colloidal particles scatter light in all directions in space. ii) The zig-zag movement of particles of the dispersed phase due to unbalanced bombardment of the colloidal particles by the molecules of dispersion medium. iii) As the adsorption is an exothermic process, it decreases with increase in temperature.	1 1 1
20.	$t = \frac{2.303}{k}$ log [R]o/[R] $t_{99\%} = \frac{2.303}{k}$ log 100/1 $= \frac{2.303}{k} \times 2$ ------ (i) $t_{90\%} = \frac{2.303}{k}$ log 100/10 $= \frac{2.303}{k}$-------(ii) Dividing equation (i) by (ii) $\frac{t_{99\%}}{t_{90\%}} = \frac{\frac{2.303}{k} \times 2}{\frac{2.303}{k}}$ $t_{99\%} = 2\ t_{90\%}$	 1 1 1
21	In bcc, z=2 ; d = (zxM) /a^3x N_A (i) Putting values of M in equation (i) M= 7.2g/ cm^3 x(288 x10^{-10} cm)^3 N_A / 2 = 51.8 g/ mol (or any other correct method)	 1 1 1
22	$\Delta rG^o = -nFE^o_{cell}$, n=6 = - 6 × 96500 C/ mol × 0.30 V = -173700 J /mol = -173.7 kJ/mol E^o_{cell}= 0.059V / n × log Kc log Kc = 0.30 V ×6 / 0.059V = 30.5	½ 1 ½ 1
23	a) ***Poly β-hydroxybutyrate – co-β-hydroxyvalerate / (PHBV)*** ***Monomers :*** $CH_3-CH(OH)-CH_2-COOH$, $CH_3-CH_2-CH(OH)-CH_2-COOH$	½ ½ , ½

	Repeating unit :  *b)* PHBV is used in speciality packaging, orthopaedic devices and in controlled release of drugs.(any two) c) Concern for environment , caring (or any other)	½ ½ , ½ ½ , ½
24	a) i) Due to steric and + I effect of two methyl groups in propanone. ii) Because it is a deactivating group / Due to electron withdrawing carboxylic group resulting in decreased electron density at o- and p- position. iii) Due to resonance, electrophilicity of carbonyl carbon is reduced. b) i) Add NaOH and I_2 to both the compounds and heat, acetophenone forms yellow ppt of iodoform. ii) Add $NaHCO_3$ solution to both the compounds, benzoic acid will give effervescence and liberates CO_2. (Or any other suitable test)	1 1 1 1 1
	OR	
24	a) A: CH_3CHO ; B: CH_3-CH(OH)-CH_2-CHO ; C: CH_3-CH=CH-CHO ; D: CH_3-CH(CH_3)-OH b) CH_3-O-CH_3 < CH_3CHO < CH_3-CH_2-OH < CH_3-COOH	1×4 1
25	a) Vapour pressure of the solvent decreases in the presence of non – voilatile solute (glucose) hence boiling point increases b) $p_{CO2} = K_H X_{CO2}$ $X_{CO2} = p_{CO2}/ K_H$ $= 2.53 \times 10^5$ Pa / 1.67×10^8 Pa $= 1.51 \times 10^{-3}$ n_{H2O} = 500g / 18 g/mol = 27.77 mol Let n_{CO2} = n mol X_{CO2} = n/ (27.77 +n) = 1.51×10^{-3} $n_{CO2} = 1.51 \times 10^{-3} \times 27.77$ mol = 0.042 mol	2 ½ 1 ½ 1
	OR	
25	a) i) The solutions which obey Raoult's law over the entire range of concentration. ii) It is the excess pressure that must be applied to a solution to prevent osmosis. **b)** $\Delta T_b = i K_b m$ Here , $m = w_B x 1000/ M_B X w_A$ ΔT_b =[3 x 0.512 K kg $mol^{-1} \times 1000 \times 10$ g] / [111 g mol^{-1} x200g] = 0.69K	1 1 1 1 1
26	a) A: NO_2 ; B: N_2O_4 $NaNO_3$ + conc. $H_2SO_4 \longrightarrow NaHSO_4 + HNO_3$ (or any other nitrate) $Cu + 4 HNO_3 \longrightarrow Cu(NO_3)_2 + 2 NO_2 + 2 H_2O$ $2NO_2 \xrightarrow{cool} N_2O_4$ b) . 	½ , ½ , 1 1 1 1
	OR	
26	a) i) Stability of higher oxidation state decreases down the group from S to Te/ Stability of lower oxidation state increases down the group from S to Te. ii) ClO_3^- is more stable than ClO^- / ClO_3^- is a weak conjugate base than than ClO^- / Due to higher oxidation state of chlorine in $HClO_3$	1 1

	iii) Fluorine and oxygen are most electronegative and very reactive. b) i) . $4NaCl + MnO_2 + 4H_2SO_4 \rightarrow MnCl_2 + 4NaHSO_4 + 2H_2O + Cl_2$ ii). $6XeF_4 + 12\ H_2O \rightarrow 4Xe + 2Xe0_3 + 24\ HF + 3\ O_2$	1 1 1

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