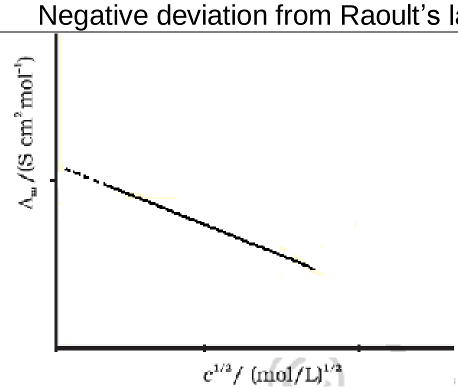
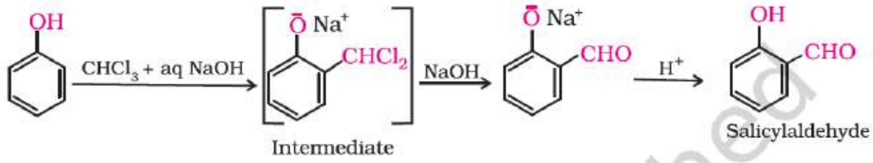
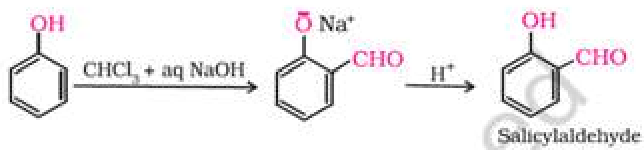
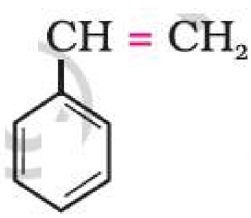
CBSE Class 12 Chemistry Question Paper Solution 2019

Marking scheme – 2019

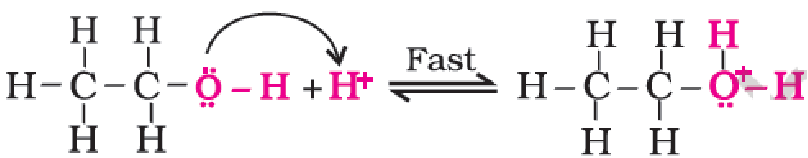
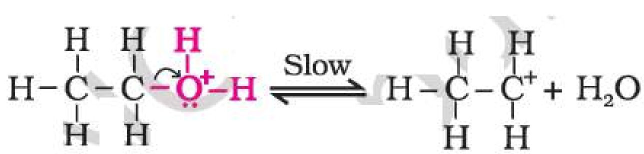
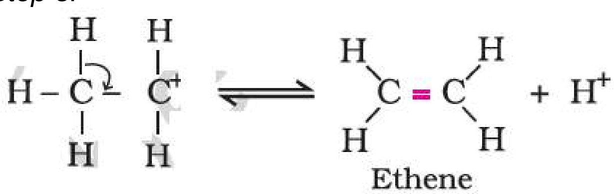
CHEMISTRY (043)/ CLASS XII DELHI 2019

56/4/1

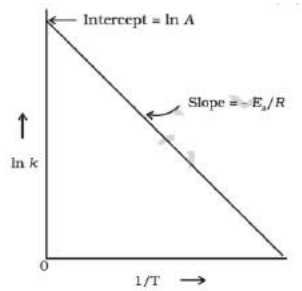
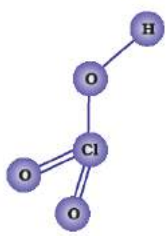
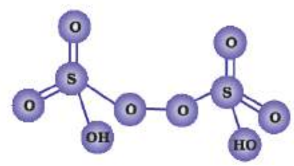
Q. No.	VALUE POINTS	MARKS
1	Schottky defect / Vacancy defect	1
2	$[Cr(H_2O)_5Cl]Cl_2 . H_2O$ / $[Cr(H_2O)_5Cl]Cl_2$	1
	OR	
	Double salt dissociates in simple ions completely when dissolved in water while Complex salt does not .	1
3	Substances which at low concentrations behave as normal strong electrolytes, but at higher concentrations exhibit colloidal behavior due to the formation of aggregates / Micelles. Example : Soap solutions / any other suitable example	½ + ½
4	Due to higher stability of 3^0 / tertiary carbocation	1
5	$R-\overset{O}{\overset{\parallel}{C}}-NH_2 + Br_2 + 4NaOH \longrightarrow R-NH_2 + Na_2CO_3 + 2NaBr + 2H_2O$	1
	OR	
	Propanamine has intermolecular hydrogen bonding whereas N,N-dimethylmethanamine has no intermolecular hydrogen bonding.	1
6	(a) Solubility of gases (O_2) increases with decrease in temperature / Solubilty of gases (O_2) is inversely proportional to temperature / Decrease in temperature decreases K_H and increases solubility of gases (O_2). (b) Due to the lower partial pressure of oxygen / Due to low concentrations of oxygen in the blood.	1 1
	OR	
	Maximum boiling azeotrope Hydrogen bonding between acetone and chloroform / Stronger solute – solvent interaction / Negative deviation from Raoult's law.	1 1
7	 *Λm increases with increase in dilution / $\Lambda m = \kappa V$ / with increase in volume Λm increases.*	1 1
8	Nitrate ion / NO_3^- $[Fe(H_2O)_5(NO)]^{2+}$	1 1
	OR	
	$MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$ / $2KMnO_4 + 16HCl \rightarrow 2KCl + 2MnCl_2 + 8H_2O + 5Cl_2$ / $4HCl + O_2 \xrightarrow{CuCl_2} Cl_2 + 2H_2O$	1

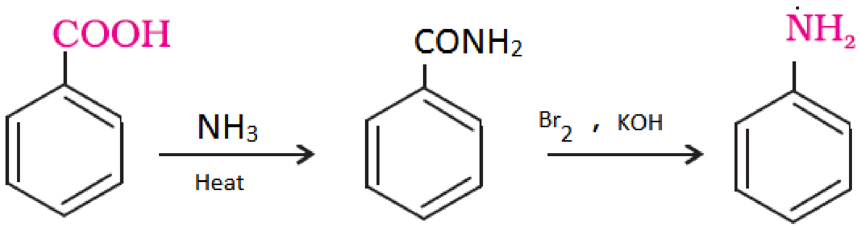
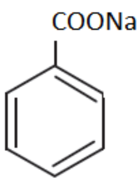
	$H_2 + Cl_2 \rightarrow 2HCl$ $H_2S + Cl_2 \rightarrow 2HCl + S$ $C_{10}H_{16} + 8Cl_2 \rightarrow 16HCl + 10C$ (OR ANY OTHER CORRECT REACTION.)	1
9	(a) Cr^{2+} , due to lower standard reduction potential (E^0) / Higher standard oxidation potential. (b) Mn^{2+} , Due to highest negative standard reduction potential.	½ +½ ½ +½
10	(a) On treating phenol with chloroform in the presence of sodium hydroxide, a –CHO group is introduced at *ortho* position of benzene ring.  OR  (b) An alkyl halide is allowed to react with sodium alkoxide to form ether. R–X + R'–ONa -------→ R–O–R' + Na X (or any other specified equation) (Note: Full marks to be awarded if only equation is given)	½ ½ ½ ½
11	(a) $NH_2(CH_2)_6NH_2$ and $HOOC(CH_2)_4COOH$ (b) $CH_2=CH-CH=CH_2$ and 	1 1
12	(a) Addition polymer; formed by addition of monomers / unsaturated monomeric units (b) Condensation polymer; formed by condensation of bifunctional monomers with elimination of water molecules	½+ ½ ½+ ½
13	$d = \frac{z.M}{a^3.N_A}$ for bcc z=2 $= \frac{2x52\ g\ mol^{-1}}{(300 \times 10^{-10} cm)^3 \times (6.022\times10^{23} mol^{-1})}$ $= 6.39\ g\ cm^{-3}$ (Half mark to be deducted for incorrect or no units) (Or any other correct method)	½ ½ 1 1
14	$\pi = CRT$ $4.98 = (30/180/1) \times RT$	½ ½

	4.98= 0.166 RT ……………….. (i) 1.52 = CRT ……………………….(ii) Divide eq. (ii) by (i) 0.305= C/0.166 C = 0.0506 mol l^{-1} (Or any other correct method)	½ ½ ½ ½
15	$E^0_{cell} = E_{cathode} – E_{anode}$ = - 0.403 –(-0.763) = 0.360 V $\Delta_r G^0 = - nFE^0_{cell}$ = -2x 96500 x 0.360 = - 69480 J mol-1 or -69.480 kJ mol^{-1} log $K_c = nE^0_{cell}$ / 0.059 = 2 x 0.360 / 0.059 log Kc= 12.20	½ ½ ½ ½ ½ ½
	OR	
	6 x 96500 C deposit 1 mole Cr = 52 g 24000 C will deposit 52 x 24000 / 6 x 96500 = 2.155 g 52 g of Cr deposited by 6 x 96500 C 1.5 g Cr deposited by 6 x 96500 x 1.5 / 52= 16701.9 C Q=I × t t = Q/I = 16701.9 C / 12.5 A= 1336 s (Or any other correct method)	½ ½ ½ ½ ½ ½
16	(a) Mutual coagulation / coagulation / cancellation of charges (b) Due to coagulating property of $FeCl_3$ for blood to form clots. (c) Due to saturation / log x/m = K $p^{1/n}$ When 1/*n*= 0, *x/m* = constant, the adsorption is independent of pressure.	1 1 1
17	(a) To prevent one of the sulphide ore from coming to the froth. (b) For refining of Ni / To form volatile complex with Ni which decomposes on further heating/ $Ni + 4CO \xrightarrow{Heat} Ni(CO)_4$ $Ni(CO)_4 \xrightarrow{Heat} Ni + 4CO$ (c) To separate (remove) impurities by forming soluble sodium aluminate / $Al_2O_3(s) + 2NaOH(aq) + 3H_2O(l) \rightarrow 2Na[Al(OH)_4](aq)$	1 1 1
	OR	
	1) $Al_2O_3(s) + 2NaOH(aq) + 3H_2O(l) \rightarrow 2Na[Al(OH)_4](aq)$ 2) $2Na[Al(OH)_4](aq) + CO_2(g) \rightarrow Al_2O_3.xH_2O(s) + 2NaHCO_3(aq)$ 3) $.Al_2O_3.xH_2O(s) \rightarrow Al_2O_3(s) + xH_2O(g)$ 4) $2Al_2O_3 + 3C \rightarrow 4Al + 3CO_2$ or 4) Cathode: Al^{3+}(melt) + $3e^- \rightarrow Al(l)$ Anode: $C(s) + O^{2-} \rightarrow CO(g) + 2e^-$ (Balancing may be ignored)	1 ½ ½ 1
18	Fusion of chromite ore ($FeCr_2O_4$) with sodium or potassium carbonate in free access of air to form sodium chromate $4 FeCr_2O_4 + 8 Na_2CO_3 + 7 O_2 \rightarrow 8 Na_2CrO_4 + 2 Fe_2O_3 + 8 CO_2$ On acidification of Sodium chromate with sulphuric acid to form sodium dichromate $2Na_2CrO_4 + 2 H^+ \rightarrow Na_2Cr_2O_7 + 2 Na^+ + H_2O$ (Full marks may be awarded for writing correct equations only. Balancing may be ignored) $Cr_2O_7^{2-} + 14 H^+ + 6 Fe^{2+} \rightarrow 2 Cr^{3+} + 6 Fe^{3+} + 7 H_2O$	1 1 1
	OR	

	(a) $2MnO_2 + 4KOH + O_2 \rightarrow 2K_2MnO_4 + 2H_2O$ **(b)** $10I^- + 2MnO_4^- + 16H^+ \rightarrow 2Mn^{2+} + 8H_2O + 5 I_2$ **(c)** $Cr_2O_7^{2-} + 14 H^+ + 3 Sn^{2+} \rightarrow 2 Cr^{3+} + 3 Sn^{4+} + 7 H_2O$ (Balancing may be ignored)	1 1 1
19	(i) sp^3d^2 , paramagnetic (ii) dsp^2 , diamagnetic	1 + ½ 1 + ½
20	(a) $-NO_2$ is an electron withdrawing group / It stabilises carbanion through resonance./ Diagrammatic representation (b) Due to symmetry / It fits better in crystal lattice. **(c)** Due to formation of gaseous byproducts / The two gaseous products are escapable.	1 1 1
	OR	
	(a) $CH_3CH_2CH_2CH_2\text{-}Cl + NaI \xrightarrow{\text{Dry acetone}} CH_3CH_2CH_2CH_2\text{-}I + NaCl$ **(b)** 2-Bromo-2-methylbutane is more reactive as it gives more substituted alkene on elimination / Gives more stable product according to Saytzeff Rule. **(c)** 4-Bromo-4-methylpent-2- ene**.**	1 1 1
21	(a) $CH_3\ C\ (CH_3){=}CH\ CH_3 \xrightarrow{H_2O,\ H^+} CH_3\ C(CH_3)(OH)CH_2CH_3$ / $CH_2{=}C(CH_3)CH_2CH_3 \xrightarrow{H_2O,\ H^+} CH_3\ C(CH_3)(OH)CH_2CH_3$ (b) Mechanism *Step 1:*  *Step 2:*  *Step 3:* 	1 1 ½ ½
22	(a) (i) CH_3NH_2 with Hinsberg's Reagent (Benzene Sulphonyl Chloride) forms a precipitate which is soluble in base. $(CH_3)_2NH$ with Hinsberg's Reagent (Benzene Sulphonyl Chloride) forms a precipitate which is insoluble in base. (Or any other suitable chemical test)	1

	(ii)Add benzene diazoniumchloride to both the compounds, aniline forms yellow dye while ethanamine does not. (Or any other suitable chemical test) (b) Due to salt formation between Aniline and anhydrous $AlCl_3$. / Aniline behave as lewis base and anhydrous $AlCl_3$ behaves as lewis acid. / Nitrogen of aniline acquires positive charge which acts as a strong deactivating group.	1 1
23	(a) Glucose does not give Schiff's test / does not form the hydrogensulphite addition product / Pentaacetate of glucose does not react with hydroxylamine/ Glucose is found to exist in two anomeric forms. (b) Amylose is a long unbranched chain with α-glucose units / Glycosidic linkage between C-1 & C-4 Amylopectin is a branched chain polymer of α-D-glucose Units / Chain is formed by C1–C4 glycosidic linkage whereas branching occurs by C1–C6 glycosidic linkage. Note: As per the language of question paper **"Amylase"** a protein / enzyme, a polymer of α – amino acid. (c) Due to presence of both, acidic (-COOH) and basic ($-NH_2$) groups / It reacts with both, acids and bases / Exists as Zwitter ion / Correct structure of zwitter ion.	1 1 1
24	(a) Antiseptics are chemicals which either kill or prevent the growth of micro-organisms applied to the living tissues such as wounds, cuts. Examples- Soframicine. (b) Drugs which relieve pain without causing addiction.Examples- Aspirin. (c) Cationic detergents are quarternary ammonium salts of amines with acetates, chlorides or bromides as anions/ Cationic part possess a long hydrocarbon chain and a positive charge on Nitrogen atom / Cationic part is involved in cleansing action. Example: Cetyltrimethyl ammonium bromide (Or any other correct example.)	½ + ½ ½ + ½ ½ + ½
25	(a) (i) Zero order (ii) – k (b) $\log\frac{k_2}{k_1} = \frac{E_a}{2.303R}\left[\frac{T_2 - T_1}{T_1T_2}\right]$ $\log 4 = \left(\frac{E_a}{2.303\times 8.314\,JK^{-1}mol^{-1}}\right)\left[\frac{313-293}{313\times 293}\right]$ $0.602 = E_a \times 20 / 19.147 \times 91709$ $E_a = 52862\ J\ mol^{-1} = 52.862\ kJ\ mol^{-1}$ (Deduct ½ mark if incorrect or no unit is given)	1 1 1 1 1
	OR	

	(a)  (b) $k = (2.303/t) \log [R]_0 / [R]$ $= (2.303 / 30\ min)\ \log 100/80$ $= 0.0074\ min^{-1}$ or $0.007\ min^{-1}$ $t_{½} = 0.693 / k$ $= 0.693 / 0.0074 = 93.6$ min or 99 min OR $t_{1/2} = (2.303 \times 0.3010 \times 30) / (2.303 \times 0.0969)$ $= 93.16$ min / 93.18 min	1 1 1 ½ ½ ½ ½
26	(a) (i) (ii)   (b) (i) Above 1000 K , Sulphur exist as S_2 molecule which has two unpaired electrons. (ii) It is due to low enthalpy of dissociation of F-F bond and high hydration enthalpy of F^- ion. (iii) Exists as $[PCl_4]^+[PCl_6]^-$	1 +1 1 1 1
26	OR	
	(a) (i) $PbS(s) + 4O_3(g) \rightarrow PbSO_4(s) + 4O_2(g)$ (ii) $XeF_6 + NaF \rightarrow Na^+ [XeF_7]^-$ (b) (i) $PH_3 < AsH_3 < NH_3 < SbH_3 < BiH_3$ / $NH_3 > PH_3 < AsH_3 < SbH_3 < BiH_3$; NH_3 molecules associated with intermolecular H-bonding while other hydrides are associated with Van der Waals forces which depends on size. (ii) HF < HCl < HBr < HI ; Down the group bond dissociation enthalpy decreases / Size increases. (iii) $H_2O < H_2S < H_2Se < H_2Te < H_2Po$, Down the group bond dissociation enthalpy decreases / Size increases.	1 1 ½ + ½ ½ + ½ ½ + ½

27	(a) (i)  (ii) $CH_3CH_2COOH \xrightarrow[Heat]{NH_3} CH_3CH_2CONH_2 \xrightarrow{Br_2,\ KOH} CH_3CH_2NH_2 \xrightarrow[273\ K]{HNO_2} CH_3CH_2OH \xrightarrow{KMnO_4 / H^+ \text{ or } OH^-} CH_3COOH$ (Or any other correct method) (b) A : 2-Methylbut-2-ene / $CH_3CH{=}C(CH_3)_2$ B: Ethanal/ Acetaldehyde /CH_3CHO C: Propanone/ Acetone /CH_3COCH_3	1 1 1 1 1
	OR	
	(a) (i)  (ii) $CH_3Br \xrightarrow{KCN\ (alc.)} CH_3CN \xrightarrow[H^+/OH^-]{H_2O} CH_3COOH \xrightarrow[H_3O^+]{LiAlH_4 / \text{Ether or } B_2H_6} CH_3CH_2OH$ (Or any other correct method) (b) (i) $CH_3CH_2CH_3$ (ii) $(CH_3)_3C\ CH_2OH$ + $(CH_3)_3C\ COONa$ (iii) 	1 1 1 1 1