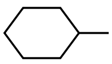
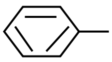
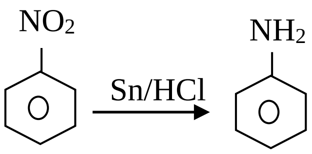
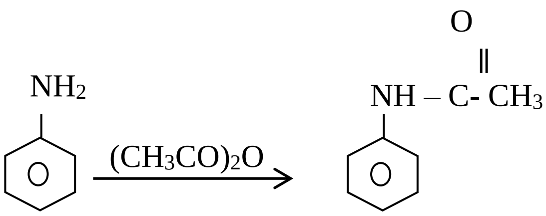
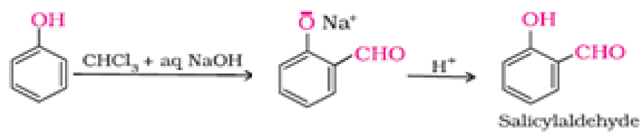
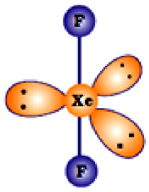
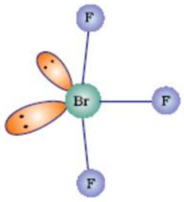
CHEMISTRY MARKING SCHEME
DELHI -2014
SET -56/1/2

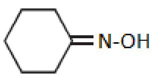
Qn	Answers	Marks
1	Sol – paint, cell fluids Gel – cheese, butter, jellies (or any other, any one example of each)	½ ½
2	Hydrogen / Iron	1
3	3-aminobutanal	1
4	o – nitrophenol	1
5	Azeotropes – Binary mixtures having same composition in liquid and vapour phase and boil at a constant temperature	½, ½
6.	$C_6H_5NH_2 < C_6H_5NH-CH_3 < C_6H_5-CH_2-NH_2$	1
7.	Amylopectin	1
8.	$[Co(en)_3]^{3+}$: because (en) is a chelating ligand / bidentate ligand	½, ½
9.	The solubility of a gas in a liquid is directly proportional to the partial pressure of the gas above the liquid. Solubility decreases with increase of temperature.	1 1
10	(i) Pseudo first order reaction – the reaction which appears to be of higher order but follows first order kinetics is called pseudo first order reaction. (ii) Half life period of reaction : is the time in which concentration of reactant is reduced to half of its initial concentration.	1 1
11	(i) Hydraulic washing : this is based on the differences in gravities of the ore and the gangue particles. (ii) Vapour phase refining : In this the metal forms a volatile compound which on further heating at higher temperature decomposes to pure metal.	1 1
12	(i)  Cl (ii)  $CH_2-CH_2-CH_2Br$	1 1
13	(i) (b) is chiral OR (a) undergoes faster S_N2 (ii) (a) S_N2	 1 ½, ½

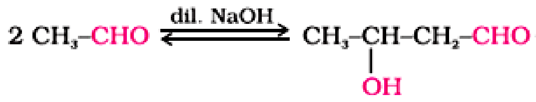
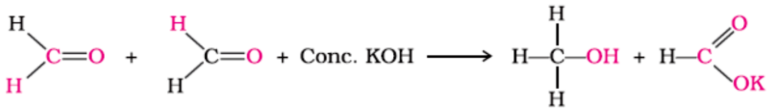
	(b) S_N1	
14	(i) HI < HBr < HCl < HF (ii) $H_2O < H_2S < H_2Se < H_2Te$	1 1
15	(i) Tetraamminedichloridochromium (III) ion (ii) Geometrical isomerism / cis – trans	1 1
16	d=11.2 g/cm^3 z=4 a=4x10^{-8} cm $d=\frac{Z \times M}{N_a \times a^3}$ $11.2 = \frac{4 \times M}{6.022 \times 10^{23}} \times (4 \times 10^{-8})^3$ $M = \frac{11.2 \times 6.022 \times 10^{23} \times}{4} \frac{4 \times 10^{-8} \times 4 \times 10^{-8} \times 4 \times 10^{-8}}{}$ $M = 11.2 \times 6.022 \times 16 \times 10^{-1}$ M = 107.9gmol^{-1} or 107.9 u	½ (for $d=\frac{Z \times M}{N_a \times a^3}$) 1 (for $11.2 = \dots$) ½ (for M = 107.9)
17	(i) Schottky defect (ii) Decreases (iii Alkali metal halides / Ionic substances having almost similar size of cations and anions (NaCl /KCl)	1 ½ ½
18	$\Delta T_f = \frac{K_f \times w_2 \times 1000}{w_1 \times M_2}$ $0.48K = 5.12 Kkgmol^{-1} \times \frac{W_2}{75 \times 256} \times 1000$ $w_2 = \frac{0.48 \times 75 \times 256}{5.12 \times 1000}$ w_2= 1.8g	½ 1 1/2
19	(a) $CH_3Br \xrightarrow{KCN} \underset{A}{CH_3CN} \xrightarrow{LiAlH_4} \underset{B}{CH_3CH_2NH_2} \xrightarrow[273K]{HNO_2} \underset{C}{CH_3CH_2OH}$ (b) $CH_3COOH \xrightarrow[\Delta]{NH_3} \underset{A}{CH_3CONH_2} \xrightarrow[KOH]{Br_2} \underset{B}{CH_3NH_2} \xrightarrow[NaOH]{CHCl_3} \underset{C}{CH_3NC}$	½+½ +½ ½+½ +½
	OR	

19	(i)  	1
	(ii) $CH_3COOH \xrightarrow{NH_3} CH_3CONH_2 \xrightarrow[+KOH]{Br_2} CH_3NH_2$	1
	(iii)  (Or by any other suitable method.)	1
20	**(a) HBr → H^+ + Br^-**	
	$CH_3-CH_2-\ddot{O}-H + H^+ \rightarrow CH_3-CH_2-\overset{H}{\overset{\vert}{\ddot{O}^+}}-H$	½
	$CH_3-CH_2-\overset{H}{\overset{\vert}{\ddot{O}^+}}-H \rightarrow CH_3-\overset{+}{C}H_2 + H_2O$	½
	$CH_3-\overset{+}{C}H_2 \xrightarrow{Br^-} CH_3-CH_2-Br$	1
	Or	
	$Br^- + \underset{R}{\underset{\vert}{CH_2}}-\overset{+}{O}H_2 \longrightarrow Br-\underset{R}{\underset{\vert}{CH_2}} + H_2O$ (where R = $-CH_3$)	
	(b)  	1

21	(i) Concern towards environment / caring / socially aware / team work. (atleast two values)	1
	(ii) Polymers which can be degraded by the action of microorganisms. Eg. PHBV , Nylon -2-nylon- 6/ any natural polymer	½+½

	(iii) Addition polymer.		1
22	(i)  (ii)  b)		1+1
	b) White phosphorus	Red phosphorus	
	It exists as discrete tetrahedral P_4unit	It exists in the form of polymeric chain.	1
	OR correct structures		
23	(a) $\frac{x}{m} = K\ p^{1/n}$ or log (x/m)= log K + 1/n log p (b) Reversible in nature/ stable sol/ solvent loving (or any other) (c) Associated colloid – Soap/ micelles ; Multimolecular colloid - S_8/ gold sol. (or any other)		1 1 ½, ½
24	(i) Because Bi is more stable in +3 oxidation state than that of Sb . (ii) Because of interelctronic repulsion owing to small bond length of N-N / smaller size of nitrogen atom . (iii) Because of weak dispersion forces.		1 1 1
25	(i) Sucrolose (or any other) (ii) Antibiotics are the chemical substances that inhibit the growth or even destroy micoorgnisms. Example : Ofloxacin, Chloramphenicol (or any other) (iii) Carbohydrates, lipids, proteins, nucleic acids, enzymes (any two)		1 ½+½ ½+½
26	$SO_2Cl_2 \rightarrow SO_2 + Cl_2$ At t = 0s 0.4 atm 0 atm 0 atm At t = 100s (0.4 – x) atm x atm x atm Pt = 0.4 – x + x + x Pt = 0.4 + x 0.7 = 0.4 + x x = 0.3 $k = \frac{2.303}{t} \log \frac{p_i}{2p_i - p_t}$ $k = \frac{2.303}{t} \log \frac{0.4}{0.8\text{-}0.7}$		1

	$k = \frac{2.303}{100} \log \frac{0.4}{0.1}$ $k = \frac{2.303}{100} \times 0.6021 = 1.39 \times 10^{-2} s^{-1}$	1 1
27	(i) Vitamin D (ii) Fibrous protein : Keratin, myosin, Globular protein : insulin, albumins, (or any other, any one example of each type) (iii) Gluconic acid or COOH | $(CHOH)_4$ | CH_2OH	1 ½+½ 1
28	(a) (i)  (ii)  (iii) $Cl - CH_2 - COOH$ (b) (i) Add $NaHCO_3$, benzoic acid will give brisk effervescence whereas benzaldehyde will not give this test. (or any other test) (ii) Add tollen's reagent , propanal will give silver mirror whereas propanone will not give this test. (or any other test)	1 1 1 1 1
	OR	

28	(a) (i) Because the positve charge on carbonyl carbon of CH_3 CHO decreases to a lesser extent due to one electron releasing (+I effect) CH_3 group as compared to CH_3 $COCH_3$ (two electron releasing CH_3 group) and hence more reactive. (ii) Because carboxylate ion (conjugate base) is more resonance stablized than phenoxide ion. (b) (i)  (ii)  (or any other example) (iii)  (or any other example)	1 1 1 1 1
29	(a) (i) Limiting molar conductivity – when concentration approches zero the conductivity is known as limiting molar conductivity (ii) Fuel cell – are the cells which convert the energy of combustion of fuels to electrical energy. (b) Cell constant = G^* = conductivity × resistance = 1.29 S/m × 100 Ω = 129 m^{-1} = 1.29 cm^{-1} Conductivity of 0.02 mol L^{-1} KCl solution = cell constant / resistance $\kappa = \frac{G^*}{R} = \frac{129\ m^{-1}}{520\ \Omega} = 0.248\ S\ m^{-1} = 0.248 \times 10^{-2}\ Scm^{-1}$ Concentration = 0.02 mol L^{-1} = 1000 × 0.02 mol m^{-3} = 20 mol m^{-3} Molar conductivity = $\Lambda_m = \frac{\kappa}{c}$ $= \frac{248 \times 10^{-3}\ S\ m^{-1}}{20\ mol\ m^{-3}}$ $= 124 \times 10^{-4}\ S\ m^2 mol^{-1} = 124\ S\ cm^2\ mol^{-1}$	1 1 1 1 1
	OR	
29	(a) The amount of substance deposited at any electrode during electrolysis is directly proprtional to the quantity of electricity passed through the electrolyte. (aq. solution or melt)	1

	Charge = Q = 2F (b) $E\ cell = E^0\ cell - \frac{0.059}{n} \log \frac{[Mg^{2+}]}{[Cu^{2+}]}$ $E\ cell = 2.71 - \frac{0.059}{2} \log \frac{0.10}{0.01}$ $E\ cell = 2.71 - \frac{0.059}{2} \log 10$ $= 2.71 - 0.0295 = 2.68$ V	1 1 ½ ½ 1
30	(a) (i) $2MnO_2 + 4KOH + O_2 \rightarrow 2K_2MnO_4 + 2H_2O$ (ii) $2Na_2CrO_4 + 2H^+ \rightarrow Na_2Cr_2O_7 + 2Na^+ + H_2O$ (b) (i) Because of $3d^5$(half filled) stable configuration of Mn^{2+} (ii) Because in zinc there is no unpaired electron / there is no contribution from the inner d electrons. (iii) Because of comparable energies of 7s, 6d and 5f orbitals	1 1 1 1 1
	OR	
30	(i) Mn , because of presence of 5 unpaired electrons in 3d subshell (ii) Cu , because enthalpy of atomization and ionisation enthalpy is not compensated by enthalpy of hydration. (iii) Mn^{3+} , because Mn^{2+} is more stable due to its half filled ($3d^5$) configuration (iv) Eu^{+2} (Eu) (v) $MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$	½ + ½ ½ + ½ ½ + ½ 1 1

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