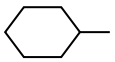
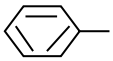
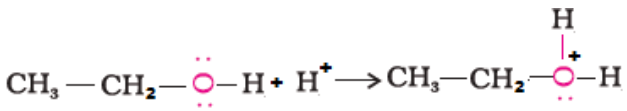
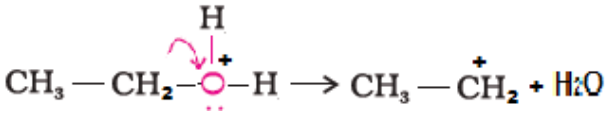
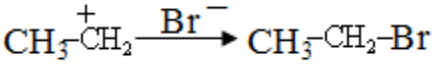
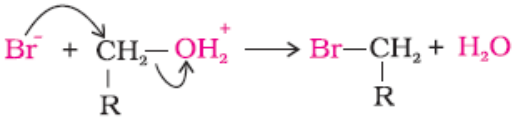
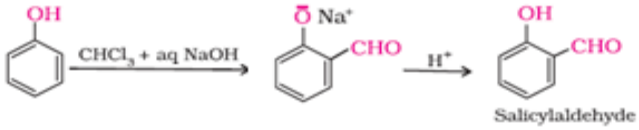
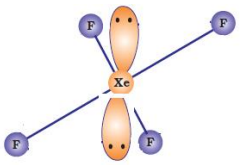
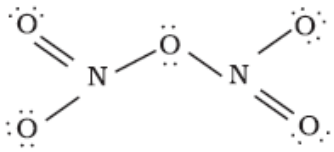
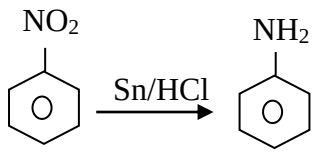
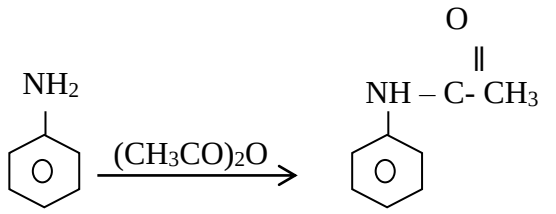
CHEMISTRY MARKING SCHEME
DELHI -2014
SET -56/1/3

Qn	Answers	Marks
1	Lyophilic Sol : gum, gelatin, starch, rubber . Lyophobic Sol : Metal Sol, metal sulphides / hydroxides (or any other, any one example in each case)	½ ½
2	4-hydroxypentan – 2 – one	1
3	Hydrogen bonding	1
4	$[Co(en)_3]^{3+}$: because (en) is a chelating ligand / bidentate ligand	½+ ½
5	$C_6H_5NH_2 < C_6H_5NHCH_3 < C_6H_5N(CH_3)_2$	1
6.	Glucose and fructose	1
7.	o – nitrophenol	1
8.	Hydrogen / Iron	1
9.	For the solution containing volatile components, the partial vapour pressure of each component is directly proportional to its mole fraction. In both cases, $p \propto x$ / Henry's Law is a special case of Raoults Law.	1 1
10	Rate constant (k) : is rate of the reaction when the concentration of reactant/s is unity. Half life period of the reaction : is the time in which the concentration of the reactant is reduced to half of its initial concentration.	1+1
11	(i) Froth floatation method : This is based upon the preferential wetting of mineral/ore particles by oil while the gangue particles by water. (ii) Electrolytic refining : is based on the principle of deposition of pure metal on cathode.	1+1
12	$d=11.2\ g/cm^3$ $z=4$ $a=4x10^{-8}$ cm $d=\frac{Z \times M}{N_a \times a^3}$ $11.2 = \frac{4 \times M}{6.022x10^{23}} \times (4x10^{-8})^3$	½

	$M = \frac{11.2 \times 6.022 \times 10^{23} \times 4 \times 10^{-8} \times 4x10^{-8} \times 4x10^{-8}}{4}$ $M = 11.2 \times 6.022 \times 16 \times 10^{-1}$ $M = 107.9 gmol^{-1}$ or 107.9 u	1 ½
13	(i) Schottky defect (ii) Decreases (iii Alkali metal halides / Ionic substances having almost similar size of cations and anions (NaCl /KCl)	1 ½ ½
14	$\Delta T_f = \frac{K_f \times w_2 \times 1000}{w_1 \times M_2}$ $0.48K = 5.12 Kkgmol^{-1} \times \frac{W_2}{75 \times 256} \times 1000$ $w_2 = \frac{0.48 \times 75 \times 256}{5.12 \times 1000}$ $w_2 = 1.8g$	½ 1 ½
15	(i) (b) is chiral OR (a) undergoes faster S_N2 (ii) (a) S_N2 (b) S_N1	1 ½, ½
16	(i)  (ii)  $CH_2 - CH_2 - CH_2 Br$	1 1
17	(i) $Ca_3 P_2 + 6H_2O \rightarrow 3Ca(OH)_2 + 2PH_3$ (ii) $Cu + 2H_2 SO_4 \rightarrow CuSO_4 + 2H_2O + SO_2$ (give full credit even if correct products are mentioned)	1 1
	OR	
17	(i) HI < HBr < HCl < HF (ii) $H_2O < H_2S < H_2Se < H_2Te$	1 1
18	(i) Tetraamminedichloridochromium (III) ion (ii) Geometrical isomerism / cis – trans	1 1
19	**(a) $HBr \rightarrow H^+ + Br^-$** 	 ½

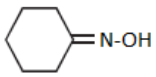
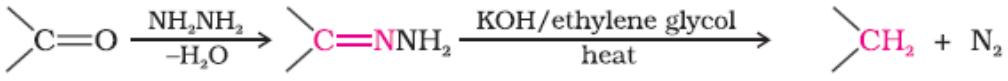
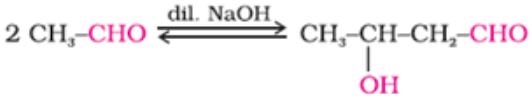
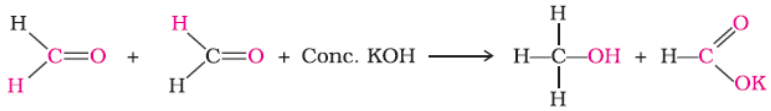
		½
		1
	Or	
	 (where R = -CH_3)	
	(b)	
		1
20	a) (i) (ii)	1+1
	 	
	b) White phosphorus / Red phosphorus	
	It exists as discrete tetrahedral P_4unit / It exist in the form of polymeric chain.	1
	OR correct structures	
21	(a) $CH_3Br \xrightarrow{KCN} CH_3CN \xrightarrow[A]{LiAlH_4} CH_3CH_2NH_2 \xrightarrow[273K]{HNO_2} CH_3CH_2OH$ (B, C)	½+½+½
	(b) $CH_3COOH \xrightarrow[\Delta]{NH_3} CH_3CONH_2 \xrightarrow[KOH]{Br_2} CH_3NH_2 \xrightarrow[NaOH]{CHCl_3} CH_3NC$ (A, B, C)	½+½+½

	OR	
21	(i) 	1
	(ii) $CH_3\ COOH \xrightarrow[NH_3]{} CH_3\ CONH_2 \xrightarrow[+KOH]{Br_2} CH_3\ NH_2$	1
	(iii)  (Or by any other suitable method.)	1
22	(i) Because in vapour form sulphur (S_2) contains unpaired electrons. (ii) Because of higher oxidation state (+4) / high charge to size ratio / high polarizing power. (iii) Because of the two P – H bonds in H_3PO_2 whereas in H_3PO_3there isone P-H bond .	1 1 1
23	(i) Disinfectants are the chemicals which kill or prevent the growth of micoorganisms. Example : 1% phenol, SO_2, Cl_2 (or any other.) (ii) Carbohydrates, lipids, protein, nucleic acids, enzymes (any two) (iii) Anionic detergents are sodium salts of suphonated long chain alcohols or hydrocarbons / In anionic detergents, the anionic part of the molecule is involved in the cleansing action. Example : soduim lauryl sulphate,sodium dodecylbenzene sulphonate (any one)	½+½ ½+½ ½+½
24	(a) Vitamin C (b) Peptide linkage (c) n-hexane or its structure	1 1 1
25	(a) $\frac{x}{m} = K\ p^{1/n}$ or $\log (x/m) = \log K + 1/n \log p$	1

	(b) Reversible in nature/ stable sol/ solvent loving (or any other)	1
	(c) Associated colloid – Soap/ micelles ; Multimolecular colloid - S_8/ gold sol. (or any other)	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	
	$k = \frac{2.303}{t} \log \frac{p_i}{2p_i - p_t}$	1
	$k = \frac{2.303}{t} \log \frac{0.4}{0.8-0.7}$	
	$k = \frac{2.303}{100} \log \frac{0.4}{0.1}$	1
	$k = \frac{2.303}{100} \times 0.6021 = 1.39 \times 10^{-2} s^{-1}$	1
27	(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
28	(a) (i) $2MnO_2 + 4KOH + O_2 \rightarrow 2K_2MnO_4 + 2H_2O$	1
	(ii) $2Na_2CrO_4 + 2\ H^+ \rightarrow Na_2Cr_2O_7 + 2\ Na^+ + H_2O$	1
	(b) (i) Because of $3d^5$(half filled) stable configuration of Mn^{2+}	1
	(ii) Because in zinc there is no unpaired electron / there is no contribution from the inner d electrons.	1
	(iii) Because of comparable energies of 7s, 6d and 5f orbitals	1
	OR	
28	(i) Mn , because of presence of 5 unpaired electrons in 3d subshell	½ + ½
	(ii) Cu , because enthalpy of atomization and ionisation enthalpy is not compensated by enthalpy of hydration.	½ + ½
	(iii) Mn^{3+} , because Mn^{2+} is more stable due to its half filled ($3d^5$) configuration	½ + ½
	(iv) Eu^{+2} (Eu)	1

	(v) $MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$	1

29	(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	
29	(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

30	(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 × 10^{-4} S $m^2 mol^{-1}$ = 124 S cm^2 mol^{-1}	1 1 1 1 1
	OR	
30	(a) The amount of substance deposited at any electrode during electrolysis is directly proportional to the quantity of electricity passed through the electrolyte. (aq. solution or melt) 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 1 ½ ½ 1

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4	Sh. S.K. Munjal		12	Mrs. Maya George	
5	Sh. Rakesh Dhawan		13	Sh. Virendra Singh Phogat	
6	Sh. D.A. Mishra		14	Dr. (Mrs.) Sunita Ramrakhiani	
7	Sh. Deshbir Singh		15	Ms. Garima Bhutani	
8	Ms. Neeru Sofat				
