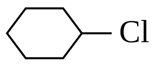
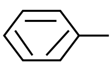
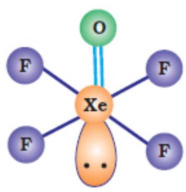
CHEMISTRY MARKING SCHEME
DELHI -2014
SET -56/1/1

Qn	Answers	Marks
1	Oil in water : milk / vanishing cream (any one) Water in oil : butter / cold cream (any one)	½ ½
2	Hydrogen / Iron	1
3	$[Co(en)_3]^{3+}$: because (en) is a chelating ligand / bidentate ligand	½, ½
4	3-hydroxybutanoic acid / 3-hydroxybutan-1-oic acid	1
5	o – nitrophenol	1
6.	Solutions with sameosmotic pressure	1
7.	$C_6H_5NH_2 < (C_2H_5)_2NH < C_2H_5NH_2$	1
8.	Amylose	1
9.	d=11.2 g/cm^3 z=4 a=4x10^{-8} cm $d=\frac{Z \text{ x } M}{N_a \text{x } a^3}$ $11.2 = \frac{4 \text{ x } M}{6.022\text{x}10^{23}}$ x$(4\text{x}10^{-8})^3$ $M = \frac{11.2 \text{ x } 6.022 \text{ x } 10^{23}\text{x}}{4} \frac{4 \text{ x } 10^{-8} \text{ x } 4\text{x}10^{-8} \text{ x } 4\text{x}10^{-8}}{}$ M =11.2x6.022x16x10^{-1} M =107.9gmol^{-1} or 107.9 u	 ½ 1 ½
10	(i) Schottky defect (ii) Decreases (iii Alkali metal halides/ Ionic substances having almost similar size of cations and anions (NaCl/KCl)	1 ½ ½
11	$\Delta T_f = \frac{K_{f \text{ x }} w_{2 \text{ x } 1000}}{w_1 \text{ x } M_2}$ 0.48K = 5.12Kkgmol^{-1}x$\frac{W_2}{75 \text{ x } 256}$x 1000 $w_2 = \frac{0.48 \text{ x } 75 \text{ x } 256}{5.12 \text{ x } 1000}$ w_2= 1.8g	½ 1 ½

12	Solutions which obey Raoult's law over the entire range of concentration A-A or B-B ~A-B interactions $\Delta\ H_{mix} = 0$ $\Delta\ V_{mix} = 0$ (any one)	1 1
13	(i) Order of reaction is meant for elementary as well as for complex reactions but molecularity is for elementary reactions. (ii) Order can be zero or fraction but molecularity cannot be zero or fraction. (or any other difference)	1 1
14	(i) Impurities are more soluble in melt than in solid state of the metal. (ii) Different components of a mixture are differently adsorbed on an adsorbent	1 1
15	(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	
15	(i) HI < HBr < HCl < HF (ii) $H_2O < H_2S < H_2Se < H_2Te$	1 1
16	(i) Tetraamminedichloridochromium (III) ion (ii) Geometrical isomerism / cis – trans	1 1
17	(i) (b) is chiral OR (a) undergoes faster S_N2 (ii) (a) S_N2 (b) S_N1	1 ½, ½
18	(i)  (ii)  $CH_2 - CH_2 - CH_2\ Br$	1 1
19	(a) $\frac{x}{m} = Kp^{1/n}$ 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
20	a) (i) (ii)   	1+1

<table>
<tr><td></td><td>b) White phosphorus</td><td>Red phosphorus</td><td></td></tr>
<tr><td></td><td>It exists as discrete tetrahedral P_4unit</td><td>It exists in the form of polymeric chain.</td><td>1</td></tr>
<tr><td></td><td colspan="2">OR correct structures.</td><td></td></tr>
<tr><td>21</td><td colspan="2">(i) Because +5 oxidation state is more covalent than +3/ high charge to size ratio / high polarizing power
(ii) Because HCl is a mild oxidising agent/ formation of hydrogen gas prevents the formation of $FeCl_3$.
(iii) Because of resonance in O_3 molecule.</td><td>1

1

1</td></tr>
<tr><td>22</td><td colspan="2">$SO_2Cl_2 \rightarrow SO_2 + Cl_2$
At t = 0s0.4 atm 0 atm0 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
$k = \frac{2.303}{t} \log \frac{p_i}{2p_i - p_t}$
$k = \frac{2.303}{t} \log \frac{0.4}{0.8\text{-}0.7}$
$k = \frac{2.303}{100} \log \frac{0.4}{0.1}$
$k = \frac{2.303}{100} \times 0.6021 = 1.39 \times 10^{-2} s^{-1}$</td><td>

1

1
1</td></tr>
<tr><td>23</td><td colspan="2">(a) carbohydrates, lipids, proteins, enzymes, nucleic acids (any two)
(b) Antiseptics are the chemical substances which are used to kill or prevent the growth of microbes. Eg – Dettol / Iodoform / Boric acid/ phenol (or any other correct example)
(c) Becasuse it is unstable at cooking temperature.</td><td>½, ½

½, ½
1</td></tr>
<tr><td>24</td><td colspan="2">(a) Vitamin A
(b) Uracil
(c) It suggests that six carbon atoms are in straight chain / CHO – $(CHOH)_4$ – CH_2OH</td><td>1
1
1</td></tr>
<tr><td>25</td><td colspan="2">(i) Concern towards environment / caring / socially aware / team work. (atleast two values)
(ii) Polymers which can be degraded by the action of microorganisms. Eg. PHBV , Nylon -2-nylon- 6/ any natural polymer
(iii) Addition polymer.</td><td>1
1

1</td></tr>
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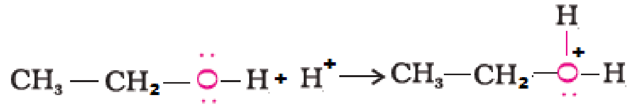
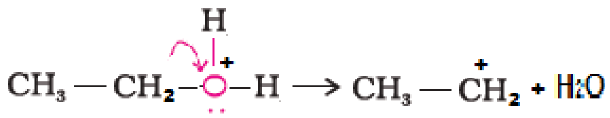
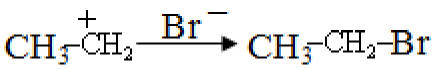
<tr><td>26</td><td>

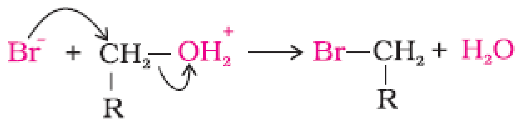
(a) HBr → H^+ + Br^-





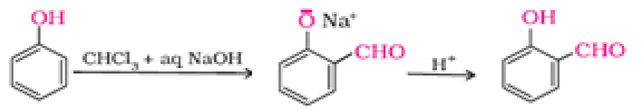


Or



(where R = $-CH_3$)

(b)



Salicylaldehyde

</td><td>½
½
1

1</td></tr>
<tr><td>27</td><td>

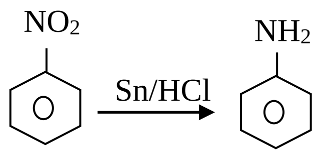
(a) $CH_3Br \xrightarrow{KCN} \underset{A}{CH_3CN} \xrightarrow{LiAlH_4} \underset{B}{CH_3CH_2NH_2} \xrightarrow[273K]{HNO_2} \underset{C}{CH_3CH_2OH}$

(b) $CH_3COOH \xrightarrow[\Delta]{NH_3} \underset{A}{CH_3CONH_2} \xrightarrow[KOH]{Br_2} \underset{B}{CH_3NH_2} \xrightarrow[NaOH]{CHCl_3} \underset{C}{CH_3NC}$

</td><td>½+½
+½

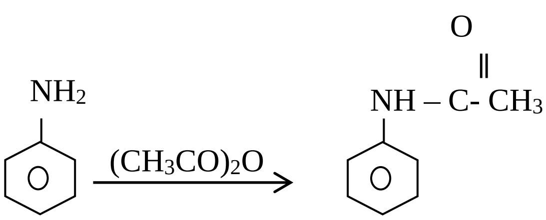
½+½
+½</td></tr>
<tr><td></td><td>OR</td><td></td></tr>
<tr><td>27</td><td>

(i)



(ii) $CH_3COOH \xrightarrow[NH_3]{} CH_3CONH_2 \xrightarrow[+KOH]{Br_2} CH_3NH_2$

(iii)



(Or by any other suitable method.)

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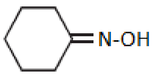
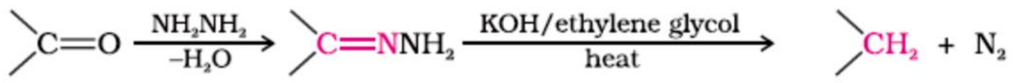
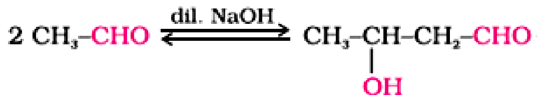
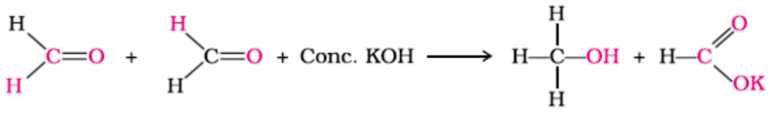
28	(a) (i) Limiting molar conductivity – when concentration approches zero the conductivity is known as limiting molar conductivity (ii) Fuel cell – are the cells which convert the energy of combustion of fuels to electrical energy. (b) Cell constant = G^* = conductivity × resistance = 1.29 S/m × 100 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	
28	(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
29	(a) (i) $2MnO_2 + 4KOH + O_2 \rightarrow 2K_2MnO_4 + 2H_2O$ (ii) $2Na_2CrO_4 + 2\ H^+ \rightarrow Na_2Cr_2O_7 + 2\ Na^+ + H_2O$ (b) (i) Because of $3d^5$(half filled) stable configuration of Mn^{2+}	1 1 1

	(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
	OR	
29	(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
30	(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	
30	(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)	1 1

		1
	(ii)  (or any other example)	1
	(iii)  (or any other example)	1

Sr. No.	Name		Sr. No.	Name	
1	Dr. (Mrs.) Sangeeta Bhatia		9	Sh. Partha Sarathi Sarkar	
2	Dr. K.N. Uppadhya		10	Mr. K.M. Abdul Raheem	
3	Prof. R.D. Shukla		11	Mr. Akileswar Mishra	
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				