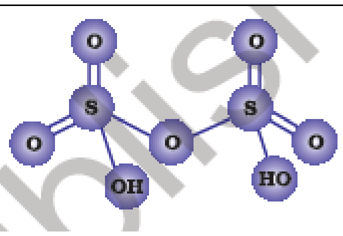
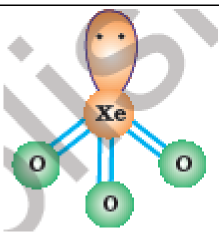
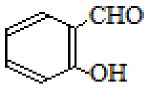
Chemistry-Marking Scheme 2015

Chennai- 56/3/MT

Q.No	Value points	Marks
1	3 Faraday / 3F	1
2	CH_3-CH_2-Br.	1
3	1-methoxypropan-2-ol.	1
4	Dispersed phase – Solid , Dispersion medium – Liquid.	1
5	Due to incompletely filled d-orbitals in +2 oxidation state (i e., in Cu^{2+} state.)	1
6	(i) C_6H_5-NH_2 < C_6H_5-NH-CH_3 < CH_3-CH_2-NH_2. (ii) CH_3-NH-CH_3 < CH_3-CH_2-NH_2 < C_2H_5-OH.	1 1
7	Rate constant is the proportionality constant that relates rate of reaction with concentration of reactants / Rate of the reaction when molar concentration of the reactant becomes unity. (i) Unit : $time^{-1}$ or s^{-1}. (ii) Unit : L mol^{-1} $time^{-1}$ or M^{-1} s^{-1}.	1 ½ ½
8	 i)  (ii)	1,1
9	As per Raoult's law $p_A = x_A\, p_A^o$ $P_A = p_A^o(1 - x_B) = p_A^o - p_A^o x_B$ $(p_A^o - p_A) / p_A^o = x_B$ $\Delta p / p_A^o = x_B = w_B M_A / M_B w_A$ $M_B = \dfrac{w_B M_A}{(\Delta p / p_A^o)\, w_A}$	2
10	Pentaamminecarbonatocobalt(III) chloride. Ionization isomerism	1 1
	OR	
10	(i) $[CuCl_4]^{2-}$ (ii) $K_2[Zn(OH)_4]$	1,1
11	(i) Due to intramolecular H-bonding in o-nitrophenol / p-nitrophenoxide is more stabilized than o-nitrophenoxide due to more delocalization of the negative charge. (ii) The mutual repulsion between bulky alkyl groups is stronger than the l.p-l.p electronic repulsions. (iii) CH_3ONa is not only nucleophile but also stronger base, thereby leads to elimination reaction of the alkyl halide.	1 1 1

12	(i) $C_6H_5NH_2 \xrightarrow{NaNO_2 + HCl / 278K} C_6H_5N_2Cl \xrightarrow{H_3PO_2 + H_2O} C_6H_6$ (ii) $CH_3\text{-}CONH_2 \xrightarrow{KOH + Br_2} CH_3NH_2$ (iii) $C_6H_5NO_2 \xrightarrow{Sn+HCl \text{ or } Fe+HCl} C_6H_5NH_2$	1 1 1
	OR	
12	(i) $C_2H_5NH_2 + CH_3COCl \xrightarrow{pyridine} C_2H_5\text{-}NHCOCH_3 + HCl$ (ii) $C_2H_5NH_2 + C_6H_5SO_2Cl \longrightarrow C_2H_5NH\text{ -}O_2SC_6H_5 + HCl$ (iii) $C_2H_5NH_2 + CHCl_3 + KOH \longrightarrow C_2H_5NC + KCl + H_2O$	1 1 1
13	(i) Anion vacancies occupied by free electrons in alkali metal halides, (when they have metal excess defects) are called F-centre. (ii) When Si or Ge is doped with a trivalent impurity then electron vacancies are created called positive holes which impart electrical conduction. They are called p-type semiconductors. (iii) Ferrimagnetism is observed when the magnetic moments are aligned in parallel and antiparallel way in unequal numbers in a substance leading to small net permanent magnetic moment.	1 1 1
14	$\log (k_2 / k_1) = (E_a / 2.303R) (T_2\text{-}T_1) /T_1T_2$ $\log [(8x10^{-2})/(2x10^{-2})] = 20\ E_a / 2.303x8.314x300x320$ $E_a = [\log(4)x2.303x8.314x300x320] / 20$ $E_a = 55336.8J\ mol^{-1} = 55.34\ kJ\ mol^{-1}$.	1 1 1
15	(i) In a catalysis process when the reactants and catalyst occur in same phase , the process is called homogeneous catalysis. (ii) The process of settling of colloidal particles forming precipitate is called coagulation. (iii) Polymeric substances or macromolecules when added to suitable solvents form solutions in which the size of the macromolecules may be in colloidal range. Such colloids are known as macromolecular colloids.	1 1 1
16	(i) $CH_3\text{- }CH(OH)\text{-}CH_3$ (ii) $CH_3\text{-}CH{=}CH\text{-}CH_3$ (iii) p-Br-C_6H_4-CO-CH_3	1 1 1
17	(i) The principle of zone refining is that the impurities are more soluble in the melt of metal than in solid state of the metal. (ii) As leaching agent, thereby oxidizing the metal into soluble cyano-complex / $[Au(CN)_2]^-$. (iii) Wrought iron	1 1 1

<table>
<tr><td>18</td><td>$\Delta T_b = K_b\ m$
$\Delta T_b = K_b\ (W_B \times 1000 / M_B \times W_A)$
$353.93 - 353.23 = 2.52 \times 1.5 \times 1000 / M_B \times 90$
$M_B = (2.52 \times 1.5 \times 1000) / (0.7 \times 90)$
$= 60.0\ g\ mol^{-1}$.</td><td>1
1
1</td></tr>
<tr><td>19</td><td>(i) Gluconic acid / $COOH\text{-}(CHOH)_4\text{-}CH_2OH$
(ii) Peptide linkage / -NH-CO- links
(iii)
<table>
<tr><td>s.no</td><td>DNA</td><td>RNA</td></tr>
<tr><td>1</td><td>Sugar is 2-deoxy ribose</td><td>Sugar is ribose</td></tr>
<tr><td>2</td><td>Double helical structure</td><td>Single stranded structure</td></tr>
<tr><td></td><td colspan="2">(or any other one correct difference)</td></tr>
</table></td><td>1
1
1</td></tr>
<tr><td>20</td><td>(a)(i) d^2sp^3 ; Octahedral
(ii) sp^3 ; Tetrahedral
(b)‘en’ , forms chelate .</td><td>½ + ½
½ + ½
½ + ½</td></tr>
<tr><td>21</td><td>(i) But-1,3-diene, Acrylonitrile; $CH_2=CH\text{-}CH=CH_2$, $CH_2=CH\text{-}CN$
(ii) Phenol, Formaldehyde; C_6H_5OH, HCHO
(iii) Tetrafluoroethylene; $CF_2=CF_2$
(Note: half mark for name/s and half mark for structure/s)</td><td>½ + ½
½ + ½
½ + ½</td></tr>
<tr><td>22</td><td>(i) Because of pπ-pπ multiple bonding in nitrogen (diatomic) which is absent in phosphorus (polymeric / polyatomic).
(ii) Because of decrease in tendency of sp^3 hybridisation from H_2O to H_2Te .
(iii) Due to their smallest atomic sizes in respective periods, or due to the fact that they have only one electron less than the next noble gas configuration.</td><td>1
1
1</td></tr>
<tr><td>23</td><td>(i) Social awareness ,Health conscious, Caring , empathy, concern .(or any other two values)
(ii) (ii) Cartoon display / street play/poster making (or any other correct answer)
(iii) Wrong choice and over dose may be harmful.
(iv) Saccharin , Aspartame (or any other example)</td><td>½ , ½
1
1
½ + ½</td></tr>
<tr><td>24</td><td>(a) A is C_6H_5CHO; B & C/ C & B are $C_6H_5CH_2OH$ & C_6H_5COONa
D is $C_6H_5CH(OH)CH_3$
(b) (i) $C_6H_5\text{-}CO\text{-}CH_3$ forms yellow coloured CHI_3 on heating with</td><td>½ x 4
1</td></tr>
</table>

	I_2+KOH/ NaOH but C_6H_5-CO-CH_2-CH_3 does not / equation form.	
	(ii) With neutral $FeCl_{3,}$ phenol gives violet coloration but benzoic acid does not. (any other suitable test).	1
	(c) 	1
	OR	
24	(a) (i) $CH_3CH(OH)CN$	1
	(ii) CH_3CH=N-NH_2	1
	(iii) CH_3CH_2OH	1
	(b) C_6H_5-CO-CH_3 < CH_3-CO-CH_3 < CH_3-CHO	1
	(c) CH_3CHO gives yellow precipitate of CHI_3 with I_2 + KOH but CH_3CH_2CHO does not/ equation form	1
25	$E_{Cell} = (E^o_{Ag} - E^o_{Ni}) – (0.0591/n) \log[Ni^{2+}/(Ag^+)^2]$	1
	$= (0.80 + 0.25) – 0.02955\log(10^{-2}/10^{-6})$	1
	$= 1.05 – 0.0178 = 1.0322$ V	1
	$\Delta G = - n F E_{cell}$	½
	$= - 2 \times 96500 \times 1.0322$	½
	$= - 199214$ J mol^{-1} = $- 199.2$ kJ mol^{-1}	1
	OR	
25	(a) Molar Conductivity (Λ_m) = 1000 K / C	
	$= (1000 \times 1.06 \times 10^{-2}) / 0.1$	½ ½
	$= 106$ S cm^{-2} mol^{-1}.	1
	Deg. of dissociation (α) = Λ_m / Λ^0_m	½
	= 106 / (50.1+76.5)	
	= 0.8373	½
	(b) Primary battery- non rechargeable whereas secondary battery is chargeable.	½ , ½
	Eg: primary battery-dry cell, mercury cell(any one) , secondary battery- lead storage battery, Ni-Cd battery(any one) (or any other correct example)	½ , ½
26	(a)	
	(i) Ce^{4+} gets reverted to 3+ oxidation state in aqueous medium hence is a good oxidizing agent / Ce is more stable in +3 oxidation state.	1
	(ii) Due to very strong metal-metal bonding (involving large no. of electrons of the d-orbitals)	1

26	(iii) Mn has maximum no. of unpaired electrons in 3d-orbitals. (b)(i) $2MnO_4^- + 6H^+ + 5NO_2^- \longrightarrow 2Mn^{2+} + 5 NO_3^- + 3 H_2O$ (ii) $Cr_2O_7^{2-} + 14H^+ + 6 Fe^{2+} \longrightarrow 2Cr^{3+} + 6Fe^{3+} + 7H_2O$ **OR** (a) (i) Due to d-d transitions (involving absorption of energy in visible range) / unpaired electrons in d- orbitals. (ii) Because Cr is more stable in +3 oxidation state. (iii) Due to stability of $5f^0$, $5f^7$, $5f^{14}$ / very small energy difference / comparable energy among 5f, 6d, and 7s orbitals. (b) The overall decrease in atomic and ionic radii from La to Lu (due to poor shielding effect of 4f electrons) is called Lanthanoid contraction. Common oxidation state of Lanthanoids is +3.	1 1 1 1 1 1 1+1