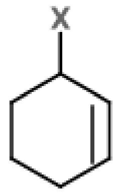
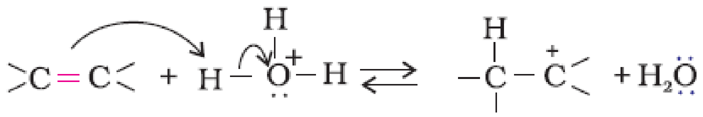
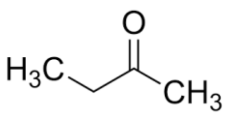
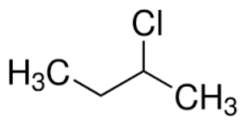
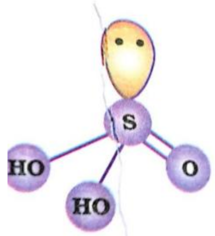
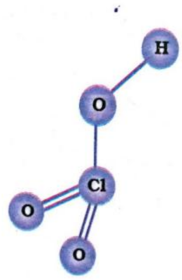
Marking scheme – 2017

CHEMISTRY (043)/ CLASS XII

Outside Delhi set (56/1)

Q No.	Value Points	Marks
1.	H_3PO_4	1
2.	2-Bromo-3-methylbut-2-en-1-ol	1
3.	a. Decreases b. No effect	½ ½
4.		1
5.	Gel e.g. cheese, butter, jellies (any one)	½ + ½
6.	a. p-cresol < Phenol < p-nitrophenol b. 	1 1
	OR	
6	a.  b. 	1 1
7.	n= given mass / molar mass = 8.1 / 27 mol Number of atoms= $\frac{8.1}{27}$ x 6.022×10^{23} Number of atoms in one unit cell= 4 (fcc) Number of unit cells = [$\frac{8.1}{27}$ x 6.022×10^{23}] / 4 = 4.5 $\times 10^{22}$ Or 27g of Al contains= 6.022×10^{23} atoms 8.1g of Al contains =(6.022×10^{23} / 27) x 8.1 No of unit cells = total no of atoms /4 =[$\frac{8.1}{27}$ x 6.022×10^{23}] / 4 =4.5 $\times 10^{22}$	½ ½ ½ ½ ½ ½ ½ ½

<table>
<tr><td>8.</td><td>a.) 
b.) </td><td>1,1</td></tr>
<tr><td>9.</td><td>Mercury cell
Anode : $Zn(Hg) + 2OH^- \rightarrow ZnO(s) + H_2O + 2e^-$
Cathode : $HgO + H_2O + 2e^- \rightarrow Hg(l) + 2OH^-$</td><td>1
½
½</td></tr>
<tr><td>10.</td><td>(i) $Na[Au(CN)_2]$
(ii) $[Pt(NH_3)_4Cl(NO_2)]SO_4$</td><td>1
1</td></tr>
<tr><td>11.</td><td>(a) Covalent solid / network solid , molecular solid
(b) $ZnO \xrightarrow{Heating} Zn^{2+} + 1/2\ O_2 + 2e^-$
Because excess Zn^{2+} ions move to interstitial sites and the electrons move to neighbouring voids
(c) Compounds prepared by combination of groups 12 and 16 behave like semiconductors. For eg ZnS, CdS , CdSe, HgTe (Any one)</td><td>½ + ½

1

½ + ½</td></tr>
<tr><td>12.</td><td>(a) $\Delta G^0 = -nFE^0_{cell}$
n= 2
$\Delta G^0 = -2 \times 96500\ C/mol \times 0.236\ V$
= - 45548 J/mol
= -45.548 kJ/mol

(b) Q= I t = 0.5 x 2 x 60 x 60
= 3600 C
96500 C = 6.023×10^{23} electrons
3600 C = 2.25×10^{22} electrons</td><td>½

½

½

½

1</td></tr>
<tr><td>13.</td><td>(a) Linkage isomerism
(b) In $[NiCl_4]^{2-}$,due to the presence of Cl^- , a weak field ligand no pairing occurs whereas in $[Ni(CN)_4]^{2-}$, CN^- is a strong field ligand and pairing takes place / diagrammatic representation
(c) Because of very low CFSE which is not able to pair up the electrons.</td><td>1
1

1</td></tr>
<tr><td>14.</td><td>(a)
<table>
<tr><th>Multimolecular colloid</th><th>Associated colloid</th></tr>
<tr><td>(a) Aggregation of large number of small atoms or molecules.</td><td>(a) Aggregation of large number of ions in concentrated solutions.</td></tr>
</table>
(b)
<table>
<tr><th>Coagulation</th><th>Peptization</th></tr>
<tr><td>(a) Settling down of colloidal particles.</td><td>(a) Conversion of precipitate into colloidal sol by adding small amount of</td></tr>
</table></td><td>1

1</td></tr>
</table>

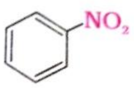
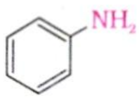
	electrolyte.

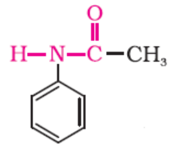
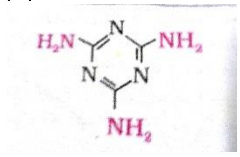
(c)

Homogenous catalysis	Heterogeneous catalysis
(a) Reactants and catalyst are in same phase.	(a) Reactants and catalyst are in different phases.

1

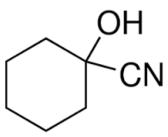
OR

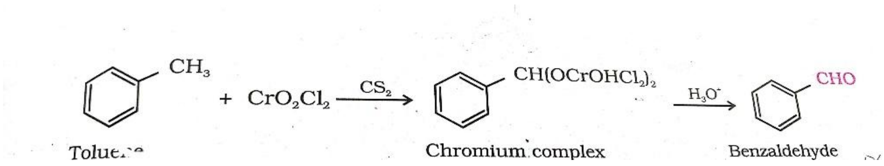
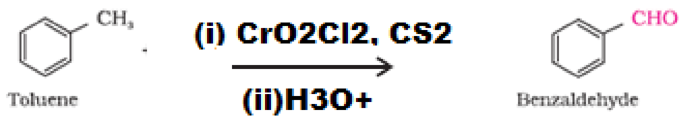
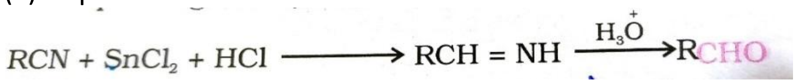
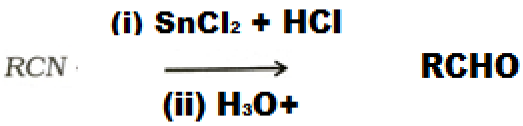
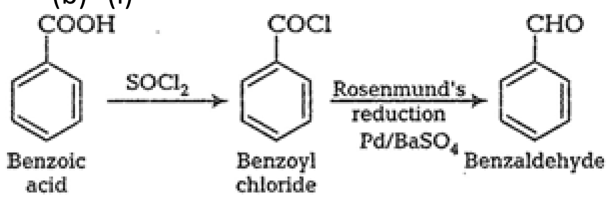
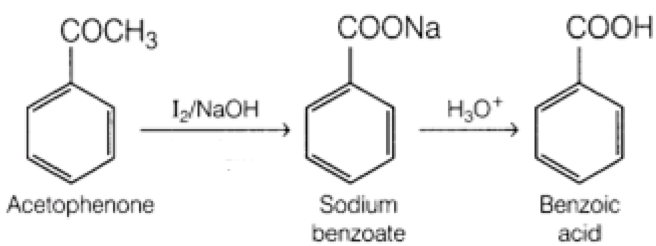
14	(a) Dispersed phase-liquid , Dispersion medium – liquid (b) Both are surface phenomenon / both increase with increase in surface area (or any other correct similarity) (c) Hydrolysis / $FeCl_3+3H_2O \xrightarrow{\text{hydrolysis}} Fe(OH)_3(sol)+3HCl$	1 1 1
15.	$t = \frac{2.303}{k}\log\frac{[A]o}{[A]}$ 20 min $=\frac{2.303}{k}\ log\frac{100}{75}$ - (i) $t = \frac{2.303}{k}\log\frac{100}{25}$ -(ii) Divide (i) equation by (ii) $\frac{20}{t} = \frac{\frac{2.303}{k}\ log\frac{100}{75}}{\frac{2.303}{k}\log\frac{100}{25}}$ $= \frac{\log 4/3}{\log 4}$ 20/ t = 0.1250/ 0.6021 t= 96.3 min (or any other correct procedure)	½ ½ ½ ½ 1
16.	(i) 1- Bromopentane (ii) 2-Bromopentane (iii) 2-Bromo-2-methylbutane	1 1 1
17.	(a) Zone Refining – Impurities are more soluble in the melt than in the solid metal. (b) Mineral particles are wetted by oils forming froth while gangue particles are wetted by water and settle down. (c) Different components of a mixture are differently adsorbed on an adsorbent.	1 1 1
18.	(a) (A) CH_3CONH_2 (B) CH_3NH_2 (C) CH_3NC (b) (A)  (B) 	½ ½ ½ ½ 1/2

	(C) 	½
19.	(a) H_2N-$(CH_2)_6$-NH_2 , HOOC-$(CH_2)_4$-COOH (b)  and HCHO (c) CH_2=CH-CH=CH_2 , C_6H_5-CH=CH_2	1 1 1
20.	(a) Anionic detergents are sodium salts of sulphonated long chain alcohols or hydrocarbons / alkylbenzene sulphonate or detergents whose anionic part is involved in cleansing action. (b) Limited spectrum antibiotics are effective against a single organism or disease. (c) Antiseptics are the chemicals which either kill or prevent growth of microbes on living tissues.	1 1 1
21.	(a) Red phosphorous being polymeric is less reactive than white phosphorous which has discrete tetrahedral structure. (b) They readily accept an electron to attain noble gas configuration. (c) Because of higher oxidation state(+5) of nitrogen in N_2O_5	1 1 1
22.	(i) Due to the resonance, the electron pair of nitrogen atom gets delocalised towards carbonyl group / resonating structures. (ii)Because of +I effect in methylamine electron density at nitrogen increases whereas in aniline resonance takes place and electron density on nitrogen decreases / resonating structures. (iii)Due to protonation of aniline / formation of anilinium ion	1 1 1
23.	(i) Concerned , caring, socially alert, leadership (or any other 2 values) (ii) Starch (iii) α -Helix and β-pleated sheets (iv) Vitamin B / B_1 / B_2/ B_6 / C (any two)	½ + ½ 1 ½ + ½ ½ + ½
24.	a. (i) Availability of partially filled d-orbitals / comparable energies of ns and (n-1) d orbitals (ii) Completely filled d-orbitals / absence of unpaired d electrons cause weak metallic bonding (iii) Because Mn^{2+} has d^5 as a stable configuration whereas Cr^{3+} is more stable due to stable t^3_{2g} b) Similarity-both are stable in +3 oxidation state/ both show contraction/ irregular electronic configuration (or any other suitable similarity) Difference- actinoids are radioactive and lanthanoids are not / actinoids show wide range of oxidation states but lanthanoids don't (or any other correct difference)	1 1 1 1 1
	OR	
24	a. (i) Cr^{3+} , half filled t^3_{2g} (ii) Mn^{3+} , due to stable d^5 configuration in Mn^{2+}	½ + ½ ½ + ½

<table>
<tr><td></td><td>(iii) Ti^{4+} , No unpaired electrons
b. (i) $2MnO_4^- + 16H^+ + 5S^{2-} \rightarrow 5S + 2Mn^{2+} + 8H_2O$
(ii) $2KMnO_4 \rightarrow K_2MnO_4 + MnO_2 + O_2$</td><td>½ + ½
1
1</td></tr>
<tr><td>25</td><td>a) $\Delta T_f = K_f m$
Here , $m = w_2 x 1000 / M_2 X M_1$
273.15-269.15 = K_f x 10 x1000/ 342 x90
K_f = 12.3 K kg/mol
$\Delta T_f = K_f m$
= 12.3 x 10 x1000/ 180x90
= 7.6 K
T_f = 273.15 – 7.6 = 265.55 K (or any other correct method)
b) (i) Number of moles of solute dissolved in per kilo gram of the solvent.
(ii) Abnormal molar mass: If the molar mass calculated by using any of the colligative properties to be different than theoretically expected molar mass.</td><td>½

1
½

1
1
1</td></tr>
<tr><td></td><td>OR</td><td></td></tr>
<tr><td>25.</td><td>(a) $(P_A^0 - P_A)/P_A^0 = (w_B \times M_A)/(M_B \times w_A)$
$$\frac{23.8 - P_A}{23.8} = (30 \times 18)/60 \times 846$$
$$23.8 - P_A = 23.8 \times [(30 \times 18)/60 \times 846]$$
$$23.8 - P_A = 0.2532$$
$$P_A = 23.55\ mm\ Hg$$
(b)
<table>
<tr><th>Ideal solution</th><th>Non ideal solution</th></tr>
<tr><td>(a) It obeys Raoult's law over the entire range of concentration.
(b) $\Delta_{mix} H = 0$
(c) $\Delta_{mix} V = 0$</td><td>(a) Does not obey Raoult's law over the entire range of concentration.
(b) $\Delta_{mix} H$ is not equal to 0.
(c) $\Delta_{mix} V$ is not equal to 0.</td></tr>
</table>
(any two correct difference)</td><td>½
1
½
1
1 +1</td></tr>
<tr><td>26.</td><td>a.
(i) 
(ii) </td><td>1
1</td></tr>
</table>

	(iii) CH_3-CH=CH-CHO b. (i) Tollen’s reagent test: Add ammoniacal solution of silver nitrate (Tollen’s Reagent) in both the solutions. Butanal gives silver mirror whereas Butan-2-one does not. (ii) Add neutral $FeCl_3$ in both the solutions, phenol forms violet colour but benzoic acid does not. (or any other correct test)	1 1 1
	OR	
26	(a) (i)Étard reaction  or  (ii)Stephen reaction  Or  (b) (i)  (ii)  	1 1 1 1

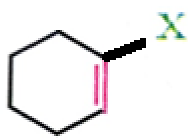
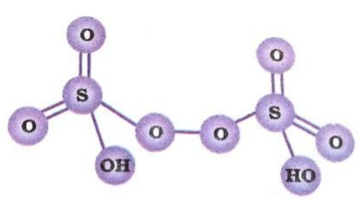
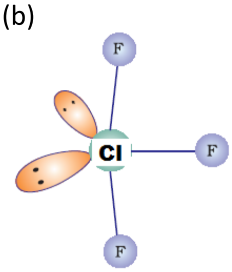
	(c) $CH_3COOH \xrightarrow{Cl_2/P} \underset{\underset{Cl}{\vert}}{CH_2COOH} \xrightarrow{KOH(Aq)} \underset{\underset{OH}{\vert}}{CH_2COOH}$ (or any other correct method)	1

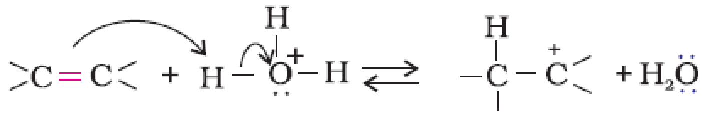
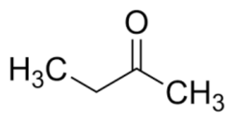
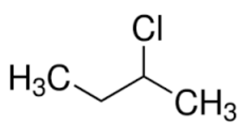
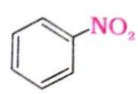
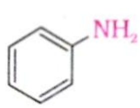
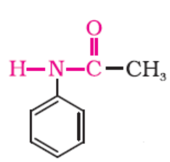
1	Dr. (Mrs.) Sangeeta Bhatia		12	Sh. S. Vallabhan	
2	Dr. K.N. Uppadhya		13	Dr. Bhagyabati Nayak	
3	Prof. R.D. Shukla		14	Ms. Anila Mechur Jayachandran	
4	Sh. S.K. Munjal		15	Mrs. Deepika Arora	
5	Sh. D.A. Mishra		16	Ms. Seema Bhatnagar	
6	Sh. Rakesh Dhawan		17	Mrs. Sushma Sachdeva	
7	Dr. (Mrs.) Sunita Ramrakhiani		18	Dr. Azhar Aslam Khan	
8	Mrs. Preeti Kiran		19	Mr. Roop Narain Chauhan	
9	Ms. Neeru Sofat		20	Mr. Mukesh Kumar Kaushik	
10	Sh. Pawan Singh Meena		21	Ms. Abha Chaudhary	
11	Mrs. P. Nirupama Shankar		22	Ms. Garima Bhutani	

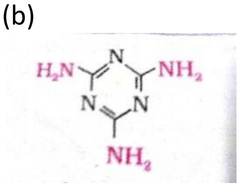
Marking scheme – 2017

CHEMISTRY (043)/ CLASS XII

Outside Delhi set (56/2)

Q.No	Value points	Marks
1.	a. Decreases b. No change	½ ½
2.	Sol : example- paints, cell fluids (any one)	½ + ½
3.	3-phenyl-prop-2-en-1-ol	1
4.	H_2SO_4	1
5.		1
6.	(i) $[Cr(en)_3]Cl_3$ (ii) $K_2[Zn(OH)_4]$	1 1
7.	(a)  (b) 	1 1
8.	Lead storage battery Anode : $Pb_{(s)}+SO_4^{2-}{}_{(aq)} \rightarrow PbSO_{4(s)} + 2e^-$ Cathode : $PbO_2+SO_4^{2-}{}_{(aq)}+ 4H^+ +2e^- \rightarrow PbSO_{4(s)} + 2\ H_20_{(l)}$	1 ½ ½
9.	n= given mass / molar mass = 8.1 / 27 mol Number of atoms= $\frac{8.1}{27}$ x $6.022\text{x}10^{23}$ Number of atoms in one unit cell= 4 (fcc) Number of unit cells = $[\frac{8.1}{27}$ x $6.022\text{x}10^{23}]$ / 4 = $4.5\ \text{x}10^{22}$	½ ½ ½ ½

	Or 27g of Al contains= $6.022 x 10^{23}$ atoms 8.1g of Al contains =($6.022 x 10^{23}$ / 27) x 8.1 No of unit cells = total no of atoms /4 $=[\frac{8.1}{27} x\ 6.022 x 10^{23}] / 4$ $=4.5\ x 10^{22}$	½ ½ ½ ½
10.	a. p-cresol < Phenol < p-nitrophenol b. 	1 1
	OR	
10	a.  b. 	1 1
11.	(a)Metal is converted into volatile compound which on strong heating is decomposed to give pure metal. (b)It acts as a leaching agent / forms soluble complex with Ag (c)Enhances non-wettability of mineral particles. For e.g.-Pine oil, Fatty acids, xanthates (Any one).	1 1 ½ + ½
12.	(a) (A) CH_3CONH_2 (B) CH_3NH_2 (C) CH_3NC (b) (A)  (B)  (C) 	½ ½ ½ ½ ½ ½

13.	(a) $\Delta G^0 = -nFE^0_{cell}$ n= 2 ΔG^0= - 2 x 96500 C /mol x 0.236 V = - 45548 J/mol = -45.548 kJ/mol (b) Q= I t = 0.5 x 2 x 60 x 60 = 3600 C 96500 C = 6.023 x 10^{23} electrons 3600 C = 2.25 x 10^{22} electrons	½ ½ ½ ½ 1
14.	(i) Due to the resonance, the electron pair of nitrogen atom gets delocalised towards carbonyl group / resonating structures. (ii)Because of +I effect in methylamine electron density at nitrogen increases whereas in aniline resonance takes place and electron density on nitrogen decreases / resonating structures. (iii)Due to protonation of aniline / formation of anilinium ion	1 1 1
15	(a) Red phosphorous being polymeric is less reactive than white phosphorous which has discrete tetrahedral structure. (b) They readily accept an electron to attain noble gas configuration. (c) Because of higher oxidation state(+5) of nitrogen in N_2O_5	1 1 1
16	(a) Anionic detergents are sodium salts of sulphonated long chain alcohols or hydrocarbons / alkylbenzene sulphonate or detergents whose anionic part is involved in cleansing action. (b) Narrow spectrum antibiotics- which are effective against either gram positive or gram negative bacteria. (c) Chemical compounds which are used for the treatment of excess acid produced in the stomach.	1 1 1
17	(a) CH_2 =CHCl (b)  and HCHO (c)CH_2=CH-CH=CH_2 , CH_2=CHCN	1 1 1
18.	(i) 1- Bromopentane (ii) 2-Bromopentane (iii) 2-Bromo-2-methylbutane	1 1 1

19.

$$t = \frac{2.303}{k} \log \frac{[A]o}{[A]}$$ ½

$$20 \text{ min} = \frac{2.303}{k} \, log \frac{100}{75} \quad \text{- (i)}$$ ½

$$t = \frac{2.303}{k} \log \frac{100}{25} \quad \text{-(ii)}$$ ½

Divide (i) equation by (ii)

$$\frac{20}{t} = \frac{\frac{2.303}{k} \, log \frac{100}{75}}{\frac{2.303}{k} \log \frac{100}{25}}$$ ½

$$= \frac{\log 4/3}{\log 4}$$

20/ t = 0.1250/ 0.6021

t= 96.3 min 1

(or any other correct procedure)

20

(a)

Multimolecular colloid	Associated colloid
(a) Aggregation of large number of small atoms or molecules.	(a) Aggregation of large number of ions in concentrated solutions.

1

(b)

Coagulation	Peptization
(a) Settling down of colloidal particles.	(a) Conversion of precipitate into colloidal sol by adding small amount of electrolyte.

1

(c)

Homogenous catalysis	Heterogeneous catalysis
(a) Reactants and catalyst are in same phase.	(a) Reactants and catalyst are in different phases.

1

OR

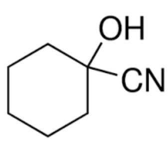
20

(a) Dispersed phase-liquid , Dispersion medium – liquid 1

(b) Both are surface phenomenon / both increase with increase in surface area (or any other correct similarity) 1

(c) Hydrolysis / $FeCl_3 + 3H_2O \xrightarrow{\text{hydrolysis}} Fe(OH)_3(sol) + 3HCl$ 1

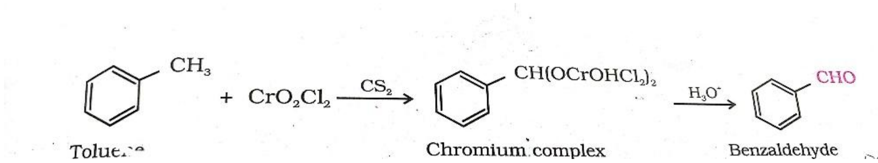
21.	(a) Linkage isomerism (b) In $[NiCl_4]^{2-}$,due to the presence of Cl^- , a weak field ligand no pairing occurs whereas in $[Ni(CN)_4]^{2-}$, CN^- is a strong field ligand and pairing takes place / diagrammatic representation (c) Because of very low CFSE which is not able to pair up the electrons.	1 1 1
22.	(a) Benzene - molecular solid Silver - metallic solid (b) Size of Ag^+ ion is smaller than Na^+ ion (c) p- type	½ ½ 1 1
23.	(i) Concerned , caring, socially alert, leadership (or any other 2 values) (ii) Starch (iii) α -Helix and β-pleated sheets (iv) Vitamin B / B_1 / B_2/ B_6 / C (any two)	½ + ½ 1 ½ + ½ ½ + ½
24	a) $\Delta T_f = K_f m$ Here , $m = w_2 x 1000/ M_2 X M_1$ $273.15-269.15 = K_f$ x 10 x1000/ 342 x90 K_f = 12.3 K kg/mol $\Delta T_f = K_f m$ = 12.3 x 10 x1000/ 180x90 = 7.6 K T_f = 273.15 – 7.6 = 265.55 K (or any other correct method) b) (i) Number of moles of solute dissolved in per kilo gram of the solvent. (ii) Abnormal molar mass: If the molar mass calculated by using any of the colligative properties to be different than theoretically expected molar mass.	½ 1 ½ 1 1 1
	OR	

<table>
<tr><td>24</td><td>(a) $(P_A^0 - P_A)/P_A^0 = (w_B \times M_A)/(M_B \times w_A)$
$$\frac{23.8 - P_A}{23.8} = (30 \times 18)/60 \times 846$$
$$23.8 - P_A = 23.8 \times [(30 \times 18)/60 \times 846]$$
$$23.8 - P_A = 0.2532$$
$$P_A = 23.55\ mm\ Hg$$
(b)
<table>
<tr><th>Ideal solution</th><th>Non ideal solution</th></tr>
<tr><td>(a) It obeys Raoult's law over the entire range of concentration.
(b) $\Delta_{mix} H = 0$
(c) $\Delta_{mix} V = 0$</td><td>(a) Does not obey Raoult's law over the entire range of concentration.
(b) $\Delta_{mix} H$ is not equal to 0.
(c) $\Delta_{mix} V$ is not equal to 0.</td></tr>
</table>
(any two correct difference)</td><td>½
1
½
1
1 +1</td></tr>
<tr><td>25</td><td>a.

(i)

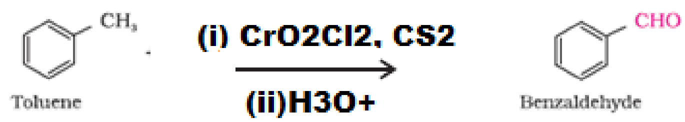
(ii)
(iii) CH_3-CH=CH-CHO
b. (i) Tollen's reagent test: Add ammoniacal solution of silver nitrate (Tollen's Reagent) in both the solutions. Butanal gives silver mirror whereas Butan-2-one does not.
(ii) Add neutral $FeCl_3$ in both the solutions, phenol forms violet colour but benzoic acid does not.
(or any other correct test)</td><td>1
1
1
1
1</td></tr>
<tr><td></td><td>OR</td><td></td></tr>
</table>

<table>
<tr><td>25</td><td>

(a) (i)Étard reaction



or



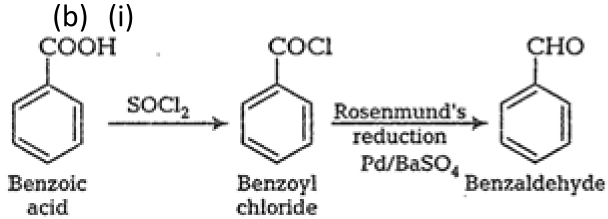
(ii)Stephen reaction

$$RCN + SnCl_2 + HCl \longrightarrow RCH = NH \xrightarrow{H_3\overset{+}{O}} RCHO$$

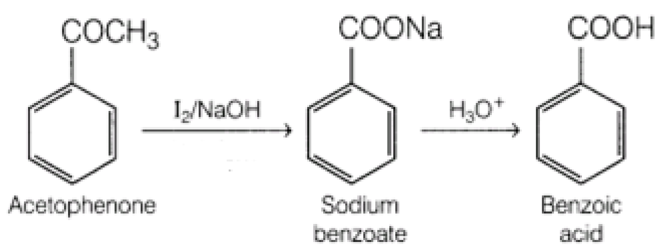
Or

$$RCN \xrightarrow[\text{(ii) } H_3O^+]{\text{(i) } SnCl_2 + HCl} RCHO$$

(b) (i)



(ii)



(c) $CH_3COOH \xrightarrow{Cl_2/P} \underset{\displaystyle |\atop Cl}{CH_2}COOH \xrightarrow{KOH(Aq)} \underset{\displaystyle |\atop OH}{CH_2}COOH$

(or any other correct method)

</td><td>1

1

1

1

1</td></tr>
<tr><td>26</td><td>a. (i) Availability of partially filled d-orbitals / comparable energies of ns and (n-1) d orbitals</td><td>1</td></tr>
</table>

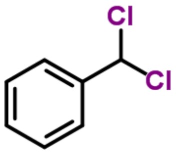
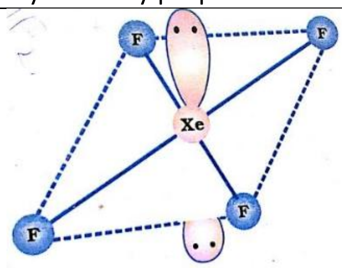
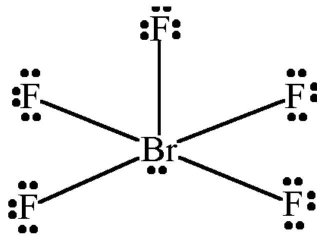
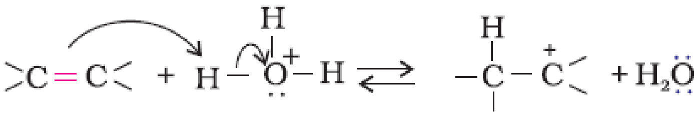
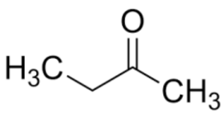
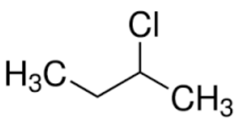
	(ii) Completely filled d-orbitals / absence of unpaired d electrons cause weak metallic bonding (iii) Because Mn^{2+} has d^5 as a stable configuration whereas Cr^{3+} is more stable due to stable t^3_{2g} b) Similarity-both are stable in +3 oxidation state/ both show contraction/ irregular electronic configuration (or any other suitable similarity) Difference- actinoids are radioactive and lanthanoids are not / actinoids show wide range of oxidation states but lanthanoids don't (or any other correct difference)	1 1 1 1
	OR	
26	a. (i) Cr^{3+} , half filled t^3_{2g} (ii) Mn^{3+} , due to stable d^5 configuration in Mn^{2+} (iii) Ti^{4+} , No unpaired electrons b. (i) $2MnO_4^- + 16H^+ + 5S^{2-} \rightarrow 5S + 2Mn^{2+} + 8H_2O$ (ii) $2KMnO_4 \rightarrow K_2MnO_4 + MnO_2 + O_2$	½ + ½ ½ + ½ ½ + ½ 1 1

1	Dr. (Mrs.) Sangeeta Bhatia		12	Sh. S. Vallabhan	
2	Dr. K.N. Uppadhya		13	Dr. Bhagyabati Nayak	
3	Prof. R.D. Shukla		14	Ms. Anila Mechur Jayachandran	
4	Sh. S.K. Munjal		15	Mrs. Deepika Arora	
5	Sh. D.A. Mishra		16	Ms. Seema Bhatnagar	
6	Sh. Rakesh Dhawan		17	Mrs. Sushma Sachdeva	
7	Dr. (Mrs.) Sunita Ramrakhiani		18	Dr. Azhar Aslam Khan	
8	Mrs. Preeti Kiran		19	Mr. Roop Narain Chauhan	
9	Ms. Neeru Sofat		20	Mr. Mukesh Kumar Kaushik	
10	Sh. Pawan Singh Meena		21	Ms. Abha Chaudhary	
11	Mrs. P. Nirupama Shankar		22	Ms. Garima Bhutani	

Marking scheme – 2017

CHEMISTRY (043)/ CLASS XII

Outside Delhi set (56/3)

Q No.	Value Points	Marks
1.		1
2.	**a. Decreases** **b. No effect**	½ ½
3.	HIO_3	1
4.	Foam ; e.g. froth, whipped cream, soap lather(any one)	½ + ½
5.	2-Methoxy-2-methylpropane	1
6.	a.  b. 	1,1
7.	Dry Cell / Leclanche cell Anode : $Zn_{(s)} \rightarrow Zn^{2+} + 2e^-$ Cathode : $MnO_2 + NH_4^+ + e^- \rightarrow MnO(OH) + NH_3$	1 ½ ½
8.	a. p-cresol < Phenol < p-nitrophenol b. 	1 1
	OR	
8	a.  b. 	1 1
9.	a. $K_3[Al(C_2O_4)_3]$ b. $[Co\,Cl_2\,(en)_2]^+$	1 1
10.	n= given mass / molar mass = 8.1 / 27 mol Number of atoms= $\frac{8.1}{27}$ x 6.022×10^{23}	½ ½

	Number of atoms in one unit cell= 4 (fcc) Number of unit cells = $[\frac{8.1}{27}$ x $6.022\text{x}10^{23}]$ / 4 = 4.5 $\text{x}10^{22}$ Or 27g of Al contains= $6.022\text{x}10^{23}$ atoms 8.1g of Al contains =($6.022\text{x}10^{23}$ / 27) x 8.1 No of unit cells = total no of atoms /4 $=[\frac{8.1}{27}$ x $6.022\text{x}10^{23}]$ / 4 =4.5 $\text{x}10^{22}$	 ½ ½ ½ ½ ½ ½
11.	(a) Linkage isomerism (b) In $[NiCl_4]^{2-}$,due to the presence of Cl^- , a weak field ligand no pairing occurs whereas in $[Ni(CN)_4]^{2-}$, CN^- is a strong field ligand and pairing takes place / diagrammatic representation (c) Because of very low CFSE which is not able to pair up the electrons.	1 1 1

12.

(a)

Multimolecular colloid	Associated colloid
(a) Aggregation of large number of small atoms or molecules.	(a) Aggregation of large number of ions in concentrated solutions.

1

(b)

Coagulation	Peptization
(a) Settling down of colloidal particles.	(a) Conversion of precipitate into colloidal sol by adding small amount of electrolyte.

1

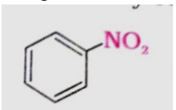
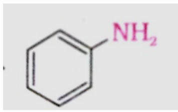
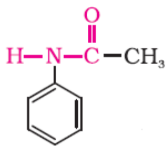
(c)

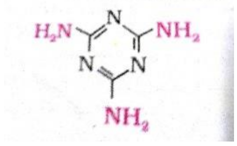
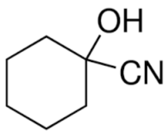
Homogenous catalysis	Heterogeneous catalysis
(a) Reactants and catalyst are in same phase.	(a) Reactants and catalyst are in different phases.

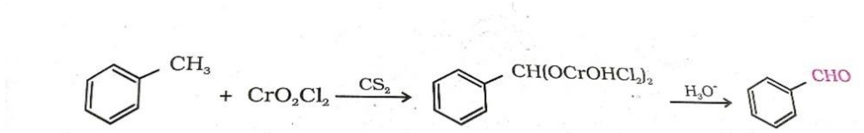
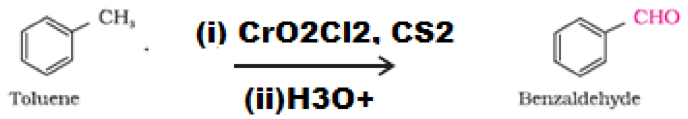
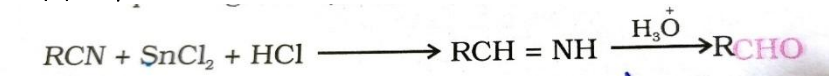
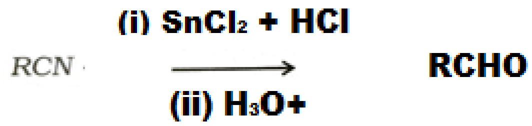
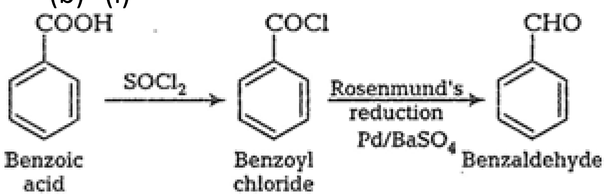
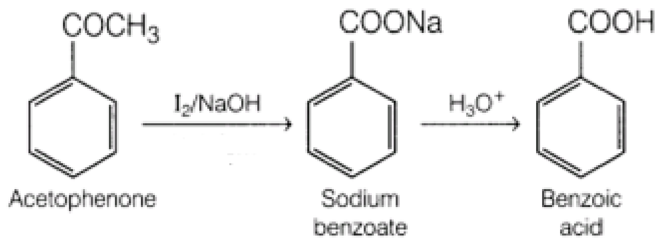
1

OR

	(a) Dispersed phase-liquid , Dispersion medium – liquid (b) Both are surface phenomenon / both increase with increase in surface area (or any other correct similarity) (c) Hydrolysis / $FeCl_3+3H_2O \xrightarrow{hydrolysis} Fe(OH)_3(sol)+3HCl$	1 1 1
13.	(a) $\Delta G^0 = -nFE^0_{cell}$ n= 2 ΔG^0= - 2 x 96500 C /mol x 0.236 V = - 45548 J/mol = -45.548 kJ/mol (b) Q= I t = 0.5 x 2 x 60 x 60	½ ½ ½ ½

	= 3600 C 96500 C = 6.023 x 10^{23} electrons 3600 C = 2.25 x 10^{22} electrons	 1
14.	a. Na_2 SO_4 : Ionic, H_2 : Molecular b. Impurity defect / Schottky defect c. In ferrimagnetism ,domains / magnetic moments are aligned in opposite direction in unequal numbers while in antiferromagnetic the domains align in opposite direction in equal numbers so they cancel magnetic moments completely ,net magnetism is zero / diagrammatic explanation.	½ + ½ 1 1
15.	a. On passing current through the electrolytic cell , the pure metal gets deposited on the cathode. b. Evolution of SO_2 gas c. It selectively prevents one of the sulphide ores from coming to the froth.	1 1 1
16.	(a) (A) CH_3CONH_2 (B) CH_3NH_2 (C) CH_3NC (b) (A)  (B)  (C) 	½ ½ ½ ½ ½ ½
17.	(i) Due to the resonance, the electron pair of nitrogen atom gets delocalised towards carbonyl group / resonating structures. (ii) Because of +I effect in methylamine electron density at nitrogen increases whereas in aniline resonance takes place and electron density on nitrogen decreases / resonating structures. (iii) Due to protonation of aniline / formation of anilinium ion	1 1 1
18.	(a) Red phosphorous being polymeric is less reactive than white phosphorous which has discrete tetrahedral structure. (b) They readily accept an electron to attain noble gas configuration. (c) Because of higher oxidation state(+5) of nitrogen in N_2O_5	1 1 1
19.	a. Cationic detergents are quarternary ammonium salts of amines with acetates, chlorides or bromides as anions / detergents whose cationic part is involved in cleansing action. b. Broad spectrum antibiotics: Antibiotics which kill or inhibit a wide range of Gram-positive and Gram-negative bacteria. c. Chemical compounds used for the treatment of stress and mild or severe mental diseases.	1 1 1
20.	a. CF_2=CF_2	1

	 and HCHO b.	1
	c.  	1
21.	(i) 1- Bromopentane (ii) 2-Bromopentane (iii) 2-Bromo-2-methylbutane	1 1 1
22.	$t = \frac{2.303}{k} \log \frac{[A]o}{[A]}$ 20 min $= \frac{2.303}{k} \log \frac{100}{75}$ - (i) $t = \frac{2.303}{k} \log \frac{100}{25}$ -(ii) Divide (i) equation by (ii) $\frac{20}{t} = \frac{\frac{2.303}{k} \log \frac{100}{75}}{\frac{2.303}{k} \log \frac{100}{25}}$ $= \frac{\log 4/3}{\log 4}$ 20/ t = 0.1250/ 0.6021 t= 96.3 min (or any other correct procedure)	½ ½ ½ ½ 1
23.	(i) Concerned , caring, socially alert, leadership (or any other 2 values) (ii) Starch (iii) α -Helix and β-pleated sheets (iv) Vitamin B / B_1 / B_2/ B_6 / C (any two)	½ + ½ 1 ½ + ½ ½ + ½
24.	a. (i)  (ii)  (iii) CH_3-CH=CH-CHO b. (i) Tollen's reagent test: Add ammoniacal solution of silver nitrate (Tollen's Reagent) in both the solutions. Butanal gives silver mirror whereas Butan-2-one does not. (ii) Add neutral $FeCl_3$ in both the solutions, phenol forms violet colour	1 1 1 1

	but benzoic acid does not. (or any other correct test)	1
	OR	
24	(a) (i)Étard reaction  or 	1
	(ii)Stephen reaction  Or 	1
	(b) (i) 	1
	(ii) 	1
	(c) $CH_3COOH \xrightarrow{Cl_2/P} CH_2(Cl)COOH \xrightarrow{KOH(Aq)} CH_2(OH)COOH$ (or any other correct method)	1
25.	a. (i) Availability of partially filled d-orbitals / comparable energies of ns and (n-1) d orbitals	1
	(ii) Completely filled d-orbitals / absence of unpaired d electrons cause weak metallic bonding	1

	(iii) Because Mn^{2+} has d^5 as a stable configuration whereas Cr^{3+} is more stable due to stable t^3_{2g} b) Similarity-both are stable in +3 oxidation state/ both show contraction/ irregular electronic configuration (or any other suitable similarity) Difference- actinoids are radioactive and lanthanoids are not / actinoids show wide range of oxidation states but lanthanoids don't (or any other correct difference)	1 1 1
	OR	
	a. (i) Cr^{3+} , half filled t^3_{2g} (ii) Mn^{3+} , due to stable d^5 configuration in Mn^{2+} (iii) Ti^{4+} , No unpaired electrons b. (i) $2MnO_4^- + 16H^+ + 5S^{2-} \rightarrow 5S + 2Mn^{2+} + 8H_2O$ (ii) $2KMnO_4 \rightarrow K_2MnO_4 + MnO_2 + O_2$	½ + ½ ½ + ½ ½ + ½ 1 1
26.	a) $\Delta T_f = K_f m$ Here , $m = w_2 x 1000/ M_2 X M_1$ 273.15-269.15 = K_f x 10 x1000/ 342 x90 K_f = 12.3 K kg/mol $\Delta T_f = K_f m$ = 12.3 x 10 x1000/ 180x90 = 7.6 K T_f = 273.15 – 7.6 = 265.55 K (or any other correct method) b) (i) Number of moles of solute dissolved in per kilo gram of the solvent. (ii) Abnormal molar mass: If the molar mass calculated by using any of the colligative properties to be different than theoretically expected molar mass.	½ 1 ½ 1 1 1
	OR	
	(a) $(P_A^0 - P_A)/P_A^0 = (w_B \times M_A)/(M_B \times w_A)$ $\frac{23.8 - P_A}{23.8} = (30 \times 18)/60 \times 846$ $23.8 - P_A = 23.8 \times [(30 \times 18)/60 \times 846]$ $23.8 - P_A = 0.2532$ $P_A = 23.55\ mm\ Hg$	½ 1 ½ 1

	(b) | Ideal solution | Non ideal solution | (a) It obeys Raoult's law over the entire range of concentration. / (a) Does not obey Raoult's law over the entire range of concentration. (b) $\Delta_{mix} H = 0$ / (b) $\Delta_{mix} H$ is not equal to 0. (c) $\Delta_{mix} V = 0$ / (c) $\Delta_{mix} V$ is not equal to 0. (any two correct difference)	1 +1

Ideal solution	Non ideal solution
(a) It obeys Raoult's law over the entire range of concentration.	(a) Does not obey Raoult's law over the entire range of concentration.
(b) $\Delta_{mix} H = 0$	(b) $\Delta_{mix} H$ is not equal to 0.
(c) $\Delta_{mix} V = 0$	(c) $\Delta_{mix} V$ is not equal to 0.

(any two correct difference)

1	Dr. (Mrs.) Sangeeta Bhatia		12	Sh. S. Vallabhan	
2	Dr. K.N. Uppadhya		13	Dr. Bhagyabati Nayak	
3	Prof. R.D. Shukla		14	Ms. Anila Mechur Jayachandran	
4	Sh. S.K. Munjal		15	Mrs. Deepika Arora	
5	Sh. D.A. Mishra		16	Ms. Seema Bhatnagar	
6	Sh. Rakesh Dhawan		17	Mrs. Sushma Sachdeva	
7	Dr. (Mrs.) Sunita Ramrakhiani		18	Dr. Azhar Aslam Khan	
8	Mrs. Preeti Kiran		19	Mr. Roop Narain Chauhan	
9	Ms. Neeru Sofat		20	Mr. Mukesh Kumar Kaushik	
10	Sh. Pawan Singh Meena		21	Ms. Abha Chaudhary	
11	Mrs. P. Nirupama Shankar		22	Ms. Garima Bhutani	