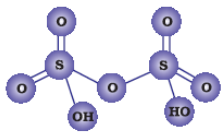
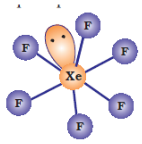
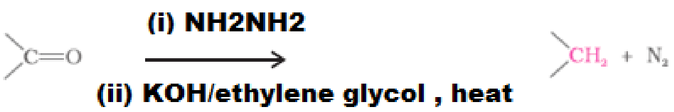
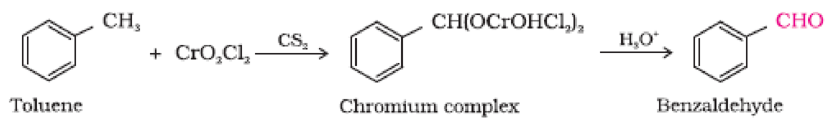
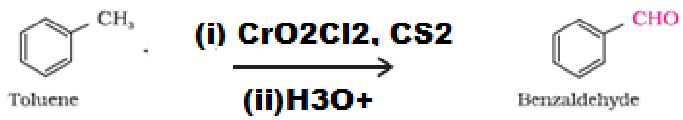
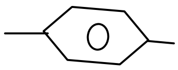
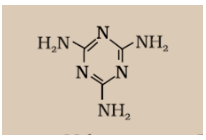
Marking scheme – 2017

CHEMISTRY (043)/ CLASS XII

Set 56/1/1

Q.No	Value Points	Marks
1	MnO_4^- / $KMnO_4$	1
2	N-Ethyl-N-methylethanamine	1
3	First order	1
4	$BrCH_2CH=CHCH_2Cl$	1
5	Both are surface phenomenon / both increase with increase in surface area (or any other correct similarity)	1
6	(i)$NH_3 + 3\ Cl_2$ (excess) $\rightarrow NCl_3 + 3HCl$ (ii)$XeF_6 + 2H_2O \rightarrow XeO_2F_2 + 4HF$	1 1
	OR	
6	(i) $(NH_4)_2Cr_2O_7 \rightarrow N_2 + 4H_2O + Cr_2O_3$ (ii) $4H_3PO_3 \rightarrow 3H_3PO_4 + PH_3$	1 1
7	(i) Properties that are independent of nature of solute and depend on number of moles of solute only. (ii) Number of moles of solute dissolved per kg of the solvent .	1 1
8	(i)  (ii) 	1 1
9	$\Lambda^o_{CH3COOH} = \lambda^o_{CH3COO-} + \lambda^o_{H+}$ $= 40.9 + 349.6 = 390.5\ S\ cm^2/mol$ Now, $\alpha = \Lambda_m / \Lambda^o_m$ $= 39.05 / 390.5 = 0.1$	½ ½ ½ ½
10.	(i)  or  (ii)	1

	 or  	1
11	$\Delta T_f = K_f m$ 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)	½ 1 ½ 1
12	(i)m = ZIt = $\frac{108x2x15\ x60}{1\times 96500}$ = 2.01 g (or any other correct method) (ii) Cells that converts the energy of combustion of fuels directly into electrical energy.	½ 1 ½ 1
13	(i) Coordination isomerism (ii) Unpaired electrons in $[Ni(H_2O)_6]^{2+}$ / d-d transition (iii) Pentaamminecarbonatocobalt(III) Chloride	1 1 1
14	(i) Lyophobic are liquid(dispersion medium)-hating and lyophillic are liquid(dispersion medium)-loving colloids. (ii) Solution is a Homogenous mixture while colloid is heterogenous mixture / does not show Tyndall effect -shows Tyndall effect. (iii) Homogenous catalysis : reactants and catalyst are in same phase - Heterogeneous catalysis: reactants and catalyst are not in same phase. (or any other correct difference)	1 1 1
15	(a) $k = \frac{2.303}{t} \log \frac{[A]o}{[A]}$ $= \frac{2.303}{300} \log \frac{1.6 \times 10^{-2}}{0.8 \times 10^{-2}}$ $= \frac{2.303}{300} \log 2 = 2.31 x10^{-3}\ s^{-1}$ At 600 s, $k = \frac{2.303}{t} \log \frac{[A]o}{[A]}$ $= \frac{2.303}{600} \log \frac{1.6 \times 10^{-2}}{0.4 \times 10^{-2}}$ $= 2.31x10^{-3}\ s^{-1}$ k is constant when using first order equation therefore it follows first order kinetics. or	½ ½ ½ ½

	In equal time interval, half of the reactant gets converted into product and the rate of reaction is independent of concentration of reactant, so it is a first order reaction. (b) $t_{1/2} = 0.693/k$ $= 0.693/ 2.31 \times 10^{-3}$ $= 300$ s (If student writes directly that half life is 300 s , award full marks)	1
16	(i) 1- Bromopentane (ii) 2-Bromopentane (iii) 2-Bromo-2-methylbutane	1 1 1
17	(i) The impurities are more soluble in the melt than in the solid state of the metal. (ii)PbS (iii)Impurities like SiO_2 etc are removed by using NaOH solution and pure alumina is obtained .	1 1 1
18.	(i) A : C_6H_5MgBr B : C_6H_5COOH C : C_6H_5COCl (ii)A : CH_3CHO B : $CH_3CH(OH)CH_2CHO$ C : $CH_3CH{=}CHCHO$	½ × 3 ½ × 3
	OR	
18	(i) $C_6H_5COOH \xrightarrow{SOCl_2} C_6H_5COCl \xrightarrow{H_2\ ,\ Pd - BaSO_4} C_6H_5CHO$ (ii) $C_6H_5C_2H_5 \xrightarrow{K_2Cr_2O_7 / H^+} C_6H_5COOH$ (iii)$CH_3COCH_3 \xrightarrow{NaBH_4} CH_3CH(OH)CH_3 \xrightarrow{conc.H_2SO_4} CH_3CH{=}CH_2$ (or any other correct method)	1 1 1
19.	(i) $HOCH_2CH_2OH$ + HOOC  COOH (ii)  + HCHO (iii)$CH_2{=}CH{-}CH{=}CH_2$ + $CH_2{=}CHCN$	½+ ½ ½+ ½ ½ + ½
20.	(i) Anionic detergents are sodium salts of sulphonated long chain alcohols or hydrocarbons / alkylbenzene sulphonate or detergents whose anionic part is involved in cleansing action. (ii)Broad spectrum antibiotics: Antibiotics which kill or inhibit a wide range of Gram-positive and Gram-negative bacteria. (iii) Antiseptics are the chemicals which either kill or prevent growth of microbes on living tissues.	1 1 1
21	(i) Due to the decrease in bond dissociation enthalpy / due to increase in atomic size from O to Te. (ii) Due to small size of fluoride ion / high charge density of fluoride ion / high charge size ratio of fluoride ion. (iii) Absence of d-orbitals.	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

<table>
<tr><td>23</td><td>(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)</td><td>½ + ½
1
½ + ½
½ + ½</td></tr>
<tr><td>24</td><td>a) (i) Due to small size and high ionic charge / availability of d orbitals.
(ii) Higher is the oxidation state higher is the acidic character / as the oxidation state of a metal increases, ionic character decreases
(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)</td><td>1
1

1

1

1</td></tr>
<tr><td></td><td>OR</td><td></td></tr>
<tr><td>24</td><td>a) i) In p block elements the difference in oxidation state is 2 and in transition metals the difference is 1
ii) Cu^+ , due to disproportionation reaction / low hydration enthalpy
iii) Due to formation of chromate ion / CrO_4^{2-} ion, which is yellow in colour
b) Actinoids are radioactive , actinoids show wide range of oxidation states</td><td>1

½ + ½
1
1 + 1</td></tr>
<tr><td>25</td><td>(a) $\rho = (zxM) / a^3 x N_a$
$11.5 = z \times 93 / [(300\times10^{-10})^3 \times 6.02\times10^{23}]$
Z = 2.0
Body centred cubic(bcc)
(b)
<table>
<tr><td>Amorphous solids</td><td>Crystalline solids</td></tr>
<tr><td>Short range order</td><td>Long range order</td></tr>
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</table>
(or any other correct difference)</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) n= given mass / molar mass
= 8.1 / 27 mol
Number of atoms= $\frac{8.1}{27} \times 6.022\times10^{23}$
Number of atoms in one unit cell= 4 (fcc)
Number of unit cells = $[\frac{8.1}{27} \times 6.022\times10^{23}] / 4$
$= 4.5 \times10^{22}$
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
$=[\frac{8.1}{27} \times 6.022\times10^{23}] / 4$
$=4.5 \times10^{22}$
b) i) Due to comparable size of cation and anion / large size of sodium ion
ii) P has 5 valence e^-, an extra electron results in the formation of n-type semiconductor.
iii)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 representation.</td><td>
½
½

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½

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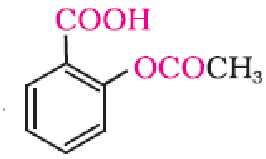
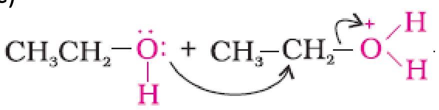
½
1
1

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

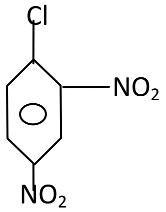
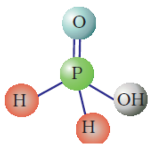
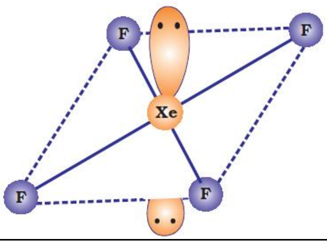
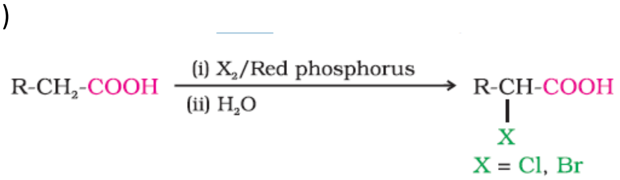
26	 a) i) ii) $(CH_3)_2CHOH$ and CH_3CH_2I iii) $CH_3CH{=}CHCHO$ b) i) Add neutral $FeCl_3$ to both the compounds, phenol gives violet complex. ii) Add anhy $ZnCl_2$ and conc. HCl to both the compounds, 2-methyl propan-2-ol gives turbidity immediately. (or any other correct test)	1 1 1 1 1
	OR	
26	a) i)Aq. Br_2 ii)B_2H_6 , H_2O_2 and OH^- b) i) ethanol<phenol<p-nitrophenol ii) propane<propanal<propanol c) 	1 1 1 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	

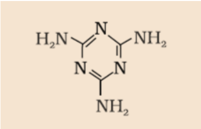
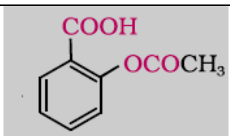
Marking scheme – 2017

CHEMISTRY (043)/ CLASS XII

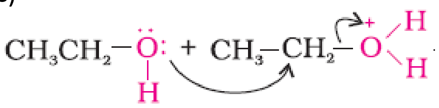
Set 56/1/2

QNo.	Value Points	Marks
1	Both are surface phenomenon / both increase with increase in surface area (or any other correct similarity)	1
2		1
3	First order	1
4	N-Methylpropan-2-amine	1
5	$Cr_2O_7^{2-}$ / CrO_4^{2-} / $K_2Cr_2O_7$/ K_2CrO_4	1
6	$\Lambda^o_{CH3COOH} = \lambda^o_{CH3COO-} + \lambda^o_{H+}$ $= 40.9 + 349.6 = 390.5\ S\ cm^2/mol$ Now, $\alpha = \Lambda_m / \Lambda^o_m$ $= 39.05 / 390.5 = 0.1$	½ ½ ½ ½
7	(i)  (ii) 	1 1
8	(i) The solution that obeys Raoults Law over the entire range of concentration (ii) Number of moles of solute dissolved per litre of solution or $M = \dfrac{w_b \times 1000}{M_b \times V\ (mL)}$	1 1
9	(i) $Cl_2 + H_2O \rightarrow 2\ HCl + [O]$ / $HCl + HOCl$ (ii) $XeF_6 + 3H_2O \rightarrow XeO_3 + 6HF$	1 1
	OR	
9	(i) $Cu + 2\ H_2SO_4 \rightarrow CuSO_4 + SO_2 + 2H_2O$ (ii)$SO_3 + H_2O \rightarrow H_2SO_4$	1 1
10.	(i) 	1

	(ii) $R\text{-}COONa \xrightarrow[\text{Heat}]{\text{NaOH \& CaO}} R\text{-}H + Na_2CO_3$	1
11	(i) Lyophobic are liquid (dispersion medium) - hating and lyophillic are liquid (dispersion medium) - loving colloids. (ii) Solution is a Homogenous mixture while colloid is heterogenous mixture / does not show Tyndall effect -shows Tyndall effect. (iii) Homogenous catalysis : reactants and catalyst are in same phase -Heterogeneous catalysis: reactants and catalyst are not in same phase. (or any other correct difference)	1 1 1
12	(i) 1- Bromopentane (ii) 2-Bromopentane (iii) 2-Bromo-2-methylbutane	1 1 1
13.	(i) Metal is converted into its volatile compound and collected elsewhere. It is then decomposed at high temperature to give pure metal. (ii) The impurities are more soluble in the melt than in the solid state of the metal. (iii) Different components of a mixture are differently adsorbed on an adsorbent.	1 1 1
14	$\Delta T_f = K_f m$ Here , $m = w_2 x\ 1000/ M_2 X M_1$ $273.15\text{-}269.15 = K_f \times 10 \times 1000/ 342 \times 90$ $K_f = 12.3$ K kg/mol $\Delta T_f = K_f m$ $= 12.3 \times 10 \times 1000/ 180 \times 90$ = 7.6 K $T_f = 273.15 - 7.6 = 265.55$ K (or any other correct method)	½ 1 ½ 1
15.	(i) Cationic detergents are quarternary ammonium salts of amines with acetates, chlorides or bromides as anions, cationic part has long chain hydrocarbon / detergents whose cationic part is involved in cleansing action. (ii)Narrow spectrum antibiotics are effective mainly against Gram-positive or Gram-negative bacteria (iii) Disinfectants kill or prevent growth of microbes and are applied on inanimate / non living objects	1 1 1
16	(i)m = ZIt $= \frac{108 \times 2 \times 15 \times 60}{1 \times 96500}$ = 2.01 g (or any other correct method) (ii) Cells that converts the energy of combustion of fuels directly into electrical energy.	½ 1 ½ 1
17	(i) Coordination isomerism (ii) Unpaired electrons in $[Ni(H_2O)_6]^{2+}$ / d-d transition (iii) Pentaamminecarbonatocobalt(III) Chloride	1 1 1
18	(i) A : C_6H_5MgBr B : C_6H_5COOH C : C_6H_5COCl (ii)A : CH_3CHO B : $CH_3CH(OH)CH_2CHO$ C : $CH_3CH{=}CHCHO$	½ × 3 ½ × 3
	OR	
18	(i) $C_6H_5COOH \xrightarrow{SOCl_2} C_6H_5COCl \xrightarrow{H_2\ ,\ Pd - BaSO_4} C_6H_5CHO$ (ii) $C_6H_5C_2H_5 \xrightarrow{K_2Cr_2O_7 / H^+} C_6H_5COOH$ (iii)$CH_3COCH_3 \xrightarrow{NaBH_4} CH_3CH(OH)CH_3 \xrightarrow{conc.H_2SO_4} CH_3CH{=}CH_2$ (or any other correct method)	1 1 1

19.	(i) $CH_2=C(Cl)CH=CH_2$ (ii)  + HCHO (iii) $CH_2=CHCH=CH_2 + CH_2=CHC_6H_5$	1 1 1
20	(a) $k = \frac{2.303}{t} \log \frac{[A]o}{[A]}$ $= \frac{2.303}{300} \log \frac{1.6 \times 10^{-2}}{0.8 \times 10^{-2}}$ $= \frac{2.303}{300} \log 2 = 2.31 \times 10^{-3}\ s^{-1}$ At 600 s, $k = \frac{2.303}{t} \log \frac{[A]o}{[A]}$ $= \frac{2.303}{600} \log \frac{1.6 \times 10^{-2}}{0.4 \times 10^{-2}}$ $= 2.31 \times 10^{-3}\ s^{-1}$ k is constant when using first order equation therefore it follows first order kinetics. or In equal time interval, half of the reactant gets converted into product and the rate of reaction is independent of concentration of reactant, so it is a first order reaction. (b) $t_{1/2} = 0.693/k$ $= 0.693/ 2.31 \times 10^{-3}$ = 300 s (If student writes directly that half life is 300 s , award full marks)	½ ½ ½ ½ 1
21	(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
22	(i) Due to the decrease in bond dissociation enthalpy / due to increase in atomic size from O to Te. (ii) Due to small size of fluoride ion / high charge density of fluoride ion / high charge size ratio of fluoride ion. (iii) Absence of d-orbitals.	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)  ii) $(CH_3)_2CHOH$ and CH_3CH_2I iii) $CH_3CH=CHCHO$ b) i) Add neutral $FeCl_3$ to both the compounds, phenol gives violet complex. ii) Add anhy $ZnCl_2$ and conc.HCl to both the compounds,	1 1 1 1 1

<table>
<tr><td></td><td>2-methyl propan-2-ol gives turbidity immediately. (or any other correct test)</td><td></td></tr>
<tr><td></td><td>OR</td><td></td></tr>
<tr><td>24</td><td>a) i) Aq. Br_2
ii) B_2H_6 , H_2O_2 and OH^-
b) i) ethanol < phenol < p-nitrophenol
ii) propane < propanal < propanol

c)
</td><td>1
1
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<tr><td>25</td><td>a) (i) Due to small size and high ionic charge / availability of d orbitals.
(ii) Higher is the oxidation state higher is the acidic character / as the oxidation state of a metal increases, ionic character decreases
(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)</td><td>1
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iii) Due to formation of chromate ion / CrO_4^{2-} ion, which is yellow in colour
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<tr><td>26</td><td>(a) $\rho = (zxM) / a^3 x N_a$
$11.5 = z \times 93 / [(300x10^{-10})^3 \times 6.02x10^{23}]$
Z = 2.0
Body centred cubic(bcc)
(b)
<table><tr><td>Amorphous solids</td><td>Crystalline solids</td></tr><tr><td>Short range order</td><td>Long range order</td></tr><tr><td>Isotropic</td><td>Anisotropic</td></tr></table>(or any other correct difference)</td><td>½
1
½
1

1+1</td></tr>
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<tr><td>26</td><td>a) n= given mass / molar mass
= 8.1 / 27 mol
Number of atoms= $\frac{8.1}{27}$ x $6.022x10^{23}$
Number of atoms in one unit cell= 4 (fcc)
Number of unit cells = $[\frac{8.1}{27}$ x $6.022x10^{23}]$ / 4
= $4.5 x10^{22}$
Or
27g of Al contains= $6.022x10^{23}$ atoms
8.1g of Al contains =($6.022x10^{23}$ / 27) x 8.1
No of unit cells = total no of atoms /4
=$[\frac{8.1}{27}$ x $6.022x10^{23}]$ / 4
=$4.5 x10^{22}$
b) i) Due to comparable size of cation and anion / large size of sodium ion
ii) P has 5 valence e^-, an extra electron results in the formation of n-type semiconductor.</td><td>
½
½

½
½

½
½

½
½
1
1</td></tr>
</table>

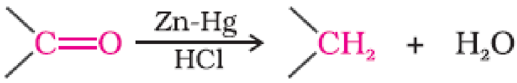
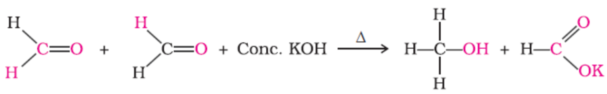
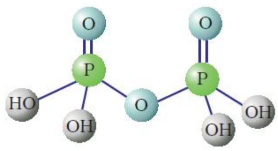
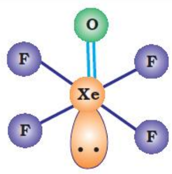
	iii) In ferrimagnetism ,domains / magnetic moments are aligned in opposite direction in unequal numbers while in antiferromagnetic the domains align in opposite direction in equal numbers so they cancel magnetic moments completely ,net magnetism is zero / diagrammatic representation.	1

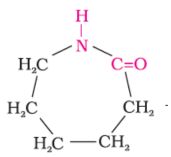
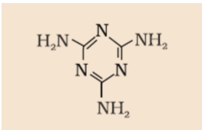
1	Dr. (Mrs.) Sangeeta Bhatia		12	Sh. S. Vallabhan	
2	Dr. K.N. Uppadhya		13	Dr. Bhagyabati Nayak	
3	Prof. R.D. Shukla		14	Ms. Anila Mechur Jayachandran	
4	Sh. S.K. Munjal		15	Mrs. Deepika Arora	
5	Sh. D.A. Mishra		16	Ms. Seema Bhatnagar	
6	Sh. Rakesh Dhawan		17	Mrs. Sushma Sachdeva	
7	Dr. (Mrs.) Sunita 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

Set 56/1/3

Q.No	Value Points	Marks
1	i) No effect ii) Decreases	½ ½
2	Both are surface phenomenon / both increase with increase in surface area (or any other correct similarity)	1
3	MnO_4^- / $KMnO_4$	1
4	$BrCH_2(CH_3)C=CH_2$	1
5	N,N-Dimethylethanamine	1
6	(i)  (ii) 	1 1
7.	(i)  (ii) 	1 1
8	(i) If the molar mass calculated by using any of the colligative properties to be different than theoretically expected molar mass (ii) Extent of dissociation or association or ratio of the observed colligative property to calculated colligative property	1 1
9	$\Lambda^o_{CH3COOH} = \lambda^o_{CH3COO-} + \lambda^o_{H+}$ $= 40.9 + 349.6 = 390.5$ S cm^2/mol Now, $\alpha = \Lambda_m / \Lambda^o_m$ $= 39.05 / 390.5 = 0.1$	½ ½ ½ ½
10	(i) $F_2 + 2Cl^- \rightarrow 2F^- + Cl_2$ (ii) $2XeF_2 + 2H_2O \rightarrow 2Xe + 4HF + O_2$	1 1
	OR	
10	(i) $MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$ (ii) $PCl_5 \xrightarrow{\Delta} PCl_3 + Cl_2$	1 1

11	(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
12	(i) Due to the decrease in bond dissociation enthalpy / due to increase in atomic size from O to Te. (ii) Due to small size of fluoride ion / high charge density of fluoride ion / high charge size ratio of fluoride ion. (iii) Absence of d-orbitals.	1 1 1
13	(i) Anionic detergents are sodium salts of sulphonated long chain alcohols or hydrocarbons / detergents whose anionic part is involved in cleansing action. (ii) Limited spectrum antibiotics are effective against a single organism or disease. (iii) Tranquilizers are class of chemicals used for treatment of stress or mild or severe mental diseases.	1 1 1
14	(i)  / $NH_2(CH_2)_5$-COOH (ii)  + HCHO (iii)CF_2=CF_2	1 1 1
15	(i) A : C_6H_5MgBr B : C_6H_5COOH C : C_6H_5COCl (ii)A : CH_3CHO B : $CH_3CH(OH)CH_2CHO$ C : $CH_3CH{=}CHCHO$	½ × 3 ½ × 3
	OR	
15	(i) $C_6H_5COOH \xrightarrow{SOCl_2} C_6H_5COCl \xrightarrow{H_2\ ,\ Pd-BaSO_4} C_6H_5CHO$ (ii) $C_6H_5C_2H_5 \xrightarrow{K_2Cr_2O_7/\,H^+} C_6H_5COOH$ (iii)$CH_3COCH_3 \xrightarrow{NaBH_4} CH_3CH(OH)CH_3 \xrightarrow{conc.H_2SO_4} CH_3CH{=}CH_2$ (or any other correct method)	1 1 1
16	(i) The impurities are more soluble in the melt than in the solid state of the metal. (ii) PbS (iii) Impurities like SiO_2 etc are removed by using NaOH solution and pure alumina is obtained .	1 1 1
17	(i) 1- Bromopentane (ii) 2-Bromopentane (iii) 2-Bromo-2-methylbutane	1 1 1
18	(a) $k = \frac{2.303}{t} \log \frac{[A]o}{[A]}$	½

	$= \frac{2.303}{300} \log \frac{1.6 \times 10^{-2}}{0.8 \times 10^{-2}}$ $= \frac{2.303}{300} \log 2 = 2.31 \times 10^{-3}\ s^{-1}$ At 600 s, $k = \frac{2.303}{t} \log \frac{[A]o}{[A]}$ $= \frac{2.303}{600} \log \frac{1.6 \times 10^{-2}}{0.4 \times 10^{-2}}$ $= 2.31 \times 10^{-3}\ s^{-1}$ k is constant when using first order equation therefore it follows first order kinetics. or In equal time interval, half of the reactant gets converted into product and the rate of reaction is independent of concentration of reactant, so it is a first order reaction. (b) $t_{1/2} = 0.693/k$ $= 0.693/ 2.31 \times 10^{-3}$ = 300 s (If student writes directly that half life is 300 s , award full marks)	 ½ ½ ½ 1
19.	(i) Multimolecular colloid : a large number of atoms or smaller molecules of a substance aggregate together to form species having size in the colloidal range. Macromolecular: Large sized molecules whose particle size lies in the colloidal range. (ii) Sol are solid dispersed in liquid while gel are liquid dispersed in solid (iii) In O/W emulsion, water acts as dispersion medium while in W/O oil acts as dispersion medium	1 1 1
20	(i)Optical isomerism (ii)d^2sp^3 , diamagnetic (iii)Triamminetrichloridochromium(III)	1 ½ + ½ 1
21	(i)m = ZIt $= \frac{108 \times 2 \times 15 \times 60}{1 \times 96500}$ = 2.01 g (or any other correct method) (ii) Cells that converts the energy of combustion of fuels directly into electrical energy.	½ 1 ½ 1
22	$\Delta T_f = K_f m$ 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)	½ 1 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

<table>
<tr><td>24</td><td>(a) $\rho = (zxM) / a^3 x N_a$

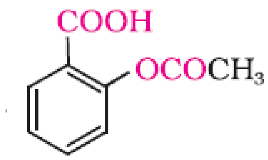
$11.5 = z \times 93 / [(300\times10^{-10})^3 \times 6.02\times10^{23}]$
Z = 2.0
Body centred cubic(bcc)

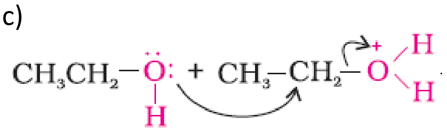
(b)
<table><tr><td>Amorphous solids</td><td>Crystalline solids</td></tr><tr><td>Short range order</td><td>Long range order</td></tr><tr><td>Isotropic</td><td>Anisotropic</td></tr></table>(or any other correct difference)</td><td>½
1
½
1

1+1</td></tr>
<tr><td></td><td>OR</td><td></td></tr>
<tr><td>24</td><td>a) n= given mass / molar mass
= 8.1 / 27 mol
Number of atoms= $\frac{8.1}{27} \times 6.022\times10^{23}$
Number of atoms in one unit cell= 4 (fcc)
Number of unit cells = $[\frac{8.1}{27} \times 6.022\times10^{23}] / 4$
$= 4.5 \times10^{22}$
Or
27g of Al contains= 6.022×10^{23} atoms
8.1g of Al contains =$(6.022\times10^{23} / 27) \times 8.1$
No of unit cells = total no of atoms /4
$=[\frac{8.1}{27} \times 6.022\times10^{23}] / 4$
$=4.5 \times10^{22}$

b) i) Due to comparable size of cation and anion / large size of sodium ion
ii) P has 5 valence e^-, an extra electron results in the formation of n-type semiconductor.
iii) 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 representation.</td><td>½
½
½
½
½
½
½
½

1
1

1</td></tr>
<tr><td>25</td><td>a) i) 

ii) $(CH_3)_2CHOH$ and CH_3CH_2I
iii) $CH_3CH=CHCHO$
b) i) Add neutral $FeCl_3$ to both the compounds, phenol gives violet complex.
ii) Add anhy $ZnCl_2$ and conc. HCl to both the compounds,
2-methyl propan-2-ol gives turbidity immediately. (or any other correct test)</td><td>1
1
1
1
1</td></tr>
<tr><td></td><td>OR</td><td></td></tr>
<tr><td>25</td><td>a) i) Aq. Br_2
ii) B_2H_6 , H_2O_2 and OH^-
b) i) ethanol < phenol < p-nitrophenol
ii) propane < propanal < propanol
c)

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

26	a) (i) Due to small size and high ionic charge / availability of d orbitals. (ii) Higher is the oxidation state higher is the acidic character / as the oxidation state of a metal increases, ionic character decreases (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	
26	a) i) In p block elements the difference in oxidation state is 2 and in transition metals the difference is 1 ii) Cu^+ , due to disproportionation reaction / low hydration enthalpy iii) Due to formation of chromate ion / CrO_4^{2-} ion, which is yellow in colour b) Actinoids are radioactive , actinoids show wide range of oxidation states.	1 ½ + ½ 1 1 + 1

1	Dr. (Mrs.) Sangeeta Bhatia		12	Sh. S. Vallabhan	
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