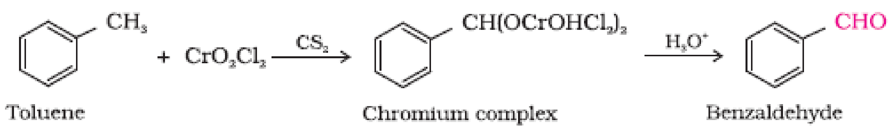
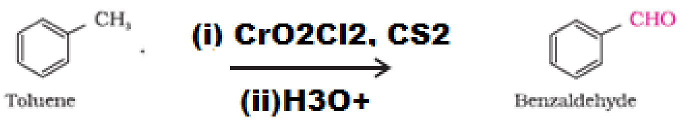
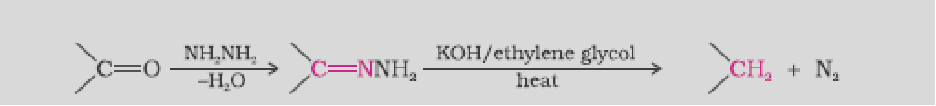
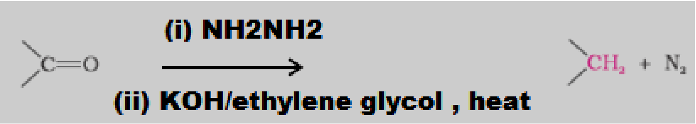
Marking scheme – 2017

CHEMISTRY (043)/ CLASS XII

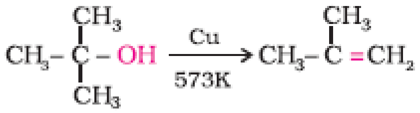
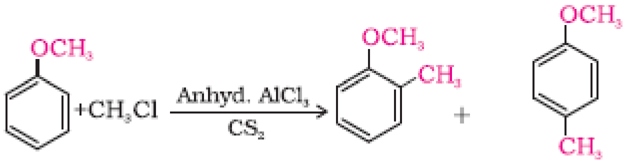
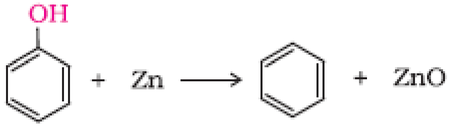
FOREIGN 2017 - Set - 56/2/1

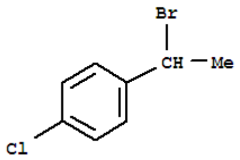
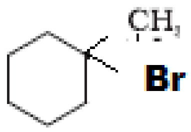
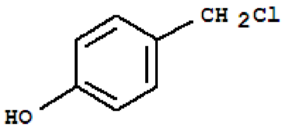
Q.NO.	VALUE POINTS	MARKS
1	P_3Q_4	1
2	$H_2Te < H_2Se < H_2S < H_2O$	1
3	To make the surface available again for more reaction to occur / To remove the product formed from the surface of the catalyst.	1
4	2 – Phenylethanol	1
5	Neopentane / **$C(CH_3)_4$**	1
6	a. $CH_3CH=CH_2 \xrightarrow[H^+]{H_20} CH_3CH(OH)CH_3 \xrightarrow[\textbf{CrO3}]{[O]} CH_3COCH_3$ b. $CH_3CH_2COOH \xrightarrow{Br2/Red\ P} CH_3CH(Br)COOH \xrightarrow[ii)H^+]{i)\ aq\ KOH\ or\ NaOH} CH_3CH\ (OH)COOH$ (or any other suitable method)	1 1
	OR	
6	a. Etard reaction:  or  b. Wolff-Kishner reduction:  or  	1 1

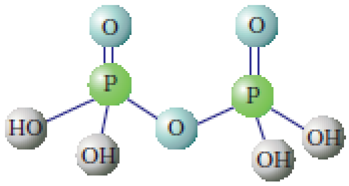
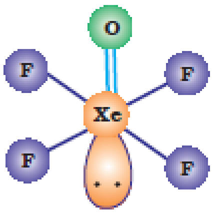
7	Properties that depend on the number of solute particles irrespective of their nature relative to the total number of particles present in the solution. Osmotic Pressure	1 1
8	a. cis/ trans-diamminedichloridoplatinum(II) b. $[Co(NH_3)_4 (H_2O)Cl] (NO_3)_2$	1 1
9	a. Zinc to silver b. Concentration of Zn^{2+} ions will increase and Ag^+ ions will decrease.	1 1
10	a. Cr^{3+} b.Mn^{3+} c. Ti^{4+} d. Mn^{3+}	½ ½ ½ ½
11	$A= \pi r^2$ $= 3.14 \times 0.5 \times 0.5\ cm^2$ $= 0.785\ cm^2$ $l= 45.5\ cm$ $\rho = R \times A/ l$ $\rho = 4.55 \times 10^3 \Omega \times 0.785\ cm^2/ 45.5\ cm$ $\rho = 78.5\ \Omega\ cm$ conductivity , $\kappa = 1/ \rho$ $= 1/78.5\ S\ cm^{-1} = 0.0127\ S\ cm^{-1}$ molar conductivity $\Lambda m = \kappa \times 1000/C$ $= 0.0127\ S\ cm^{-1} \times 1000/0.05\ mol/cm^3$ $= 254.77\ S\ cm^2\ mol^{-1}$ or $A= \pi r^2$ $= 3.14 \times 0.5 \times 0.5\ cm^2$ $= 0.785\ cm^2$ $l= 45.5\ cm$ $G^* = l/A= 45.5\ cm/ 0.785\ cm^2$ $= 57.96\ cm^{-1}$ $K= G^*/ R$ $= 57.96\ cm^{-1}/ 4.55 \times 10^3\ \Omega = 1.27 \times 10^{-2}\ S\ cm^{-1}$ $\Lambda m = \kappa \times 1000/C$ $= [1.27 \times 10^{-2}\ S\ cm^{-1}]\times 1000 / 0.05\ mol/cm^3$	½ (for 0.785 cm²) ½ (for ρ = 78.5 Ω cm) ½ ½ ½ ½ ½ (for 0.785 cm²) ½ (for 57.96 cm⁻¹) ½ ½ ½

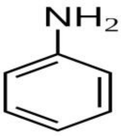
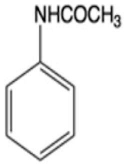
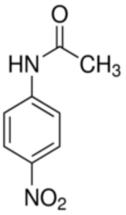
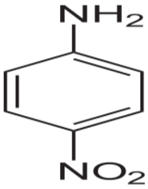
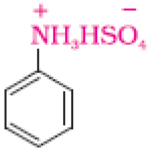
	= 254.77 S cm^2 mol^{-1}	½
12	a. The particles of the dispersed phase have no affinity for the dispersion medium/solvent repelling (hating) colloidal sols.Example: metal and their sulphides b. The reactant and the catalyst are in the same phase. $CH_3COOCH_3(l) + H_2O(l) \xrightarrow{HCl(l)} CH_3COOH(aq) + CH_3OH(aq)$ c. oil is dispersed in water/Oil is dispersed phase and water is dispersion medium. Ex- milk (or any other correct example)	½+ ½ ½ + ½ ½+ ½
	OR	
12	(see table below) (Or any other correct difference)	(1+1+1)
13	Given : T_b of glucose solution= 100.20°C $\Delta T_b = K_b.m$ m= 0.20/ 0.512 m= 0.390 mol/kg $\Delta T_f = K_f . m$ ΔT_f= 1.86 K kg/mol x 0.390 mol/kg ΔT_f = 0.725 K Freezing point of solution = 273.15K – 0.725 = 272.425K	1 ½ ½ 1
14	a. Metal is converted into a volatile compound which on strong heating decomposes to give pure metal. b. It selectively prevents one of the sulphide ores from coming to the froth. c. Coke	1 1 1
15	a. For bcc structure a = 4r /√3 or r = √3a/4 r=√3 x 400 pm /4	½

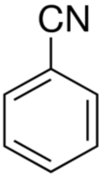
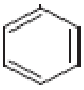
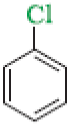
	Physisorption	Chemisorption
1	Because of van der Waals forces	Caused by chemical bond formation
2	Reversible	Irreversible
3	Enthalpy of adsorption is low(20-40 kJ/mol)	Enthalpy of adsorption is high(80-240)kJ/mol

	= 1.732 x 400 pm/4 = 173.2 pm b. (i) Impurity defect (ii) Cationic vacancies are created.	 ½ 1 1
16	a. Due to steric hindrance and +I effect caused by two alkyl groups in propanone. b. Due to electron withdrawing nature of $–NO_2$ group which increases the acidic strength and decreases the pK_a value . c. $(CH_3)_2CH$-CHO has one α -H atom whereas α- H atom is absent in $(CH_3)_3C$-CHO.	½+ ½ 1 1
17	a. Ethylene Glycol and Terephthalic acid HOH_2C-CH_2OH , p-$HOOC-C_6H_4-COOH$ b. Tetrafluoroethene , $CF_2=CF_2$ c. Hexamethylenediamine and adipic acid $H_2N(CH_2)_6NH_2$, $HOOC(CH_2)_4$ COOH	½ + ½ ½ + ½ ½ + ½
18	a. It is the magnitude of difference in energy between the two sets of d orbital i.e. t_2g and e_g **t^3_{2g} eg^1** b. In $[Ni(H_2O)_6]^{2+}$, $Ni^{+2}(3d^8)$ has two unpaired electrons which do not pair up in the presence of weak field ligand H_2O.	 1 1 1
19	a. $(CH_3)_3$ C-OH undergoes dehydration.  $CH_3-\underset{CH_3}{\overset{CH_3}{C}}-OH \xrightarrow[573K]{Cu} CH_3-\overset{CH_3}{C}=CH_2$ b. Methyl group is introduced at ortho and para positions.  c. Phenol is converted to benzene. 	½ + ½ ½+ ½ ½+ ½

20	a.  b.  C.  	1,1,1
21	a. In $CuCl_2$, Cu is in +2 oxidation state which is more stable due to high hydration enthalpy as compared to Cu_2Cl_2 in which Cu is in +1 oxidation state b. Due to lanthanoid contraction c. Because HCl is oxidised to chlorine.	1 1 1
22	a. Neurologically active drugs / chemical compounds used for treatment of stress / anxiety and mild or even severe mental diseases. b. Anionic detergents are sodium salts of sulphonated long chain alcohols or hydrocarbons / alkylbenzene sulphonate or detergents whose anionic part is involved in cleansing action. c. Disinfectants kill or prevent growth of microbes and are applied on inanimate / non living objects	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	$k= \frac{2.303}{t} \log \frac{[A]_0}{[A]}$ $= \frac{2.303}{40} \log \frac{100}{25}$ $= \frac{2.303}{40} \log 4$ $= \frac{2.303}{40} X 0.6021$ $k = 0.0347 \text{ min}^{-1}$ $t_{1/2} = \frac{0.693}{k}$	½ ½ ½ ½

	$t_{1/2} = \frac{0.693}{0.0347 \text{ min}^{-1}} = 19.98$ min = 20min b. (i) First order reaction (ii) Zero order reaction	1 1 1
	OR	
24	(a) Rate = $k [NO]^x [O_2]^y$ $7.2 X 10^{-2} = k[0.3]^x [0.2]^y$ ---------Eqn (1) $6.0 X 10^{-3} = k[0.1]^x [0.1]^y$ ---------Eqn (2) $2.88 X 10^{-1} = k[0.3]^x [0.4]^y$ ---------Eqn (3) $2.40 X 10^{-2} = k[0.4]^x [0.1]^y$ ---------Eqn (4) Dividing eqn 4 by eqn 2 $\frac{2.40 X 10^{-2} = k[0.4]^x [0.1]^y}{6.0 X 10^{-3} = k[0.1]^x [0.1]^y}$ x=1 Dividing eqn 3 by eqn 1 $\frac{2.88 X 10^{-1} = k[0.3]^x [0.4]^y}{7.2 X 10^{-2} = k[0.3]^x [0.2]^y}$ y = 2 order w.r.t. NO = 1, order w.r.t O_2 is 2 (b) Rate law Rate = $k [NO]^1 [O_2]^2$, over all order of the reaction is 3. c. Rate constant $k = \frac{rate}{[NO]^1 [O_2]^2} = \frac{7.2 X 10^{-2}}{0.3 X (0.2)^2}$ k= 6.0 $mol^{-2} L^2 min^{-1}$	1 1 ½ , ½ ½ + ½ 1
25	a. (i) Thermal stability of hydrides decreases down the group/ Bond dissociation enthalpy decreases down the group. (ii) Because Cl_2 in presence of moisture liberates nascent oxygen. (iii) Interatomic interactions are weak b.(i)  (ii) 	1 1 1 1,1
	OR	

25	a) Size of Nitrogen is smaller than Chlorine. b) $2F_2 + 2H_2O \rightarrow 4HF + O_2$ / HF and O_2 are produced c) PH_3 /Phosphine d) XeF_2 e) $[Fe(H_2O)_6]^{2+} + NO -\rightarrow [Fe(H_2O)_5(NO)]^{2+} + H_2O$	1 1 1 1 1
26.	(A)  (B)  (C)  (D)  (E) 	1×5=5
	OR	

26	a. i)  ii)  iii)  b. $C_6H_5NH_2 < C_6H_5CH_2NH_2 < CH_3NH_2 < (CH_3)_2NH$ c. Add $NaNO_2$ + HCl to both the compounds at 273K followed by addition of phenol. Aniline gives orange dye (or any other correct test)	1,1,1 1 1

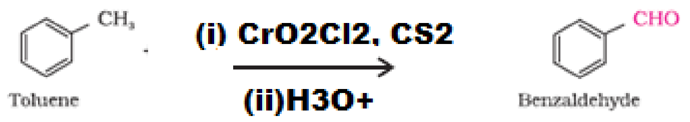
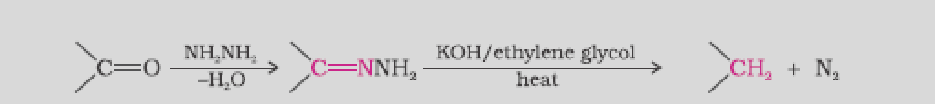
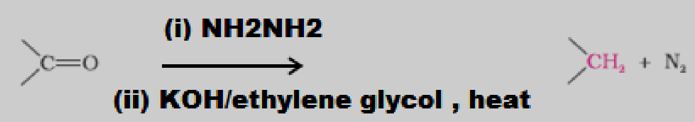
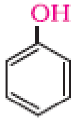
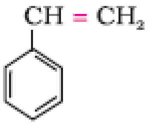
1	Dr. (Mrs.) Sangeeta Bhatia		12	Sh. S. Vallabhan	
2	Dr. K.N. Uppadhya		13	Dr. Bhagyabati Nayak	
3	Prof. R.D. Shukla		14	Ms. Anila Mechur Jayachandran	
4	Sh. S.K. Munjal		15	Mrs. Deepika Arora	
5	Sh. D.A. Mishra		16	Ms. Seema Bhatnagar	
6	Sh. Rakesh Dhawan		17	Mrs. Sushma Sachdeva	
7	Dr. (Mrs.) Sunita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

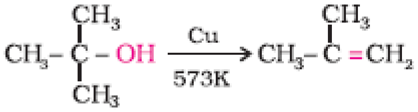
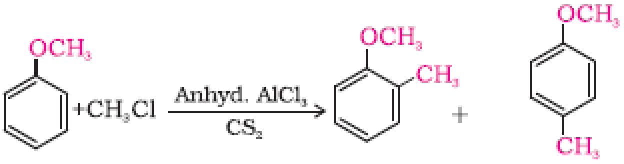
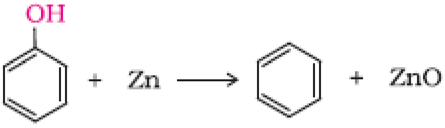
Marking scheme – 2017

CHEMISTRY (043)/ CLASS XII

FOREIGN 2017 - Set - 56/2/2

Q.NO.	VALUE POINTS	MARKS
1	2-Methylbut-3-en-2-ol	1
2	Neopentane , **$C(CH_3)_4$**	1
3	$H_2Te > H_2Se > H_2S > H_2O$	1
4	P_3Q_2	1
5	To make the surface available again for more reaction to occur / To remove the product formed from the surface of the catalyst.	1
6	a. Pentaamminesulphatocobalt(III) chloride b.$[Pt(NH_3)_2Cl(NO_2)]$	1 1
7	a. Zinc to silver b. Concentration of Zn^{2+} ions will increase and Ag^+ ions will decrease.	1 1
8	a. Cr^{3+} b.Mn^{3+} c. Ti^{4+} d. Mn^{3+}	½ ½ ½ ½
9	a. $CH_3CH=CH_2 \xrightarrow[H^+]{H_20} CH_3CH(OH)CH_3 \xrightarrow[\textbf{CrO3}]{[O]} CH_3COCH_3$ b. $CH_3CH_2COOH \xrightarrow{Br2/Red\ P} CH_3CH(Br)COOH \xrightarrow[ii)H^+]{i)\ aq\ KOH\ or\ NaOH} CH_3CH\ (OH)COOH$ (or any other suitable method)	1 1
	OR	
9	a.Etard reaction: 	1

	or  b.Wolff-Kishner reduction:  or 	1
10	The relative lowering of vapour pressure of a solution is equal to the mole fraction of the solute. / The vapour pressure of a solution of a non- volatile solute is equal to the vapour pressure of the pure solvent at that temperature multiplied by its mole fraction. Negative deviation due to formation of Hydrogen bond between chloroform and acetone.	1 ½ + ½
11	a. Phenol & Formaldehyde  & HCHO b.Vinyl chloride , CH_2=CHCl c. 1,3-Butadiene & styrene CH_2=CH-CH=CH_2 and 	½+ ½ ½+ ½ ½+ ½
12	a. It is the magnitude of difference in energy between the two sets of d orbital i.e. t_2g and e_g **t^4_{2g} eg^0** b. In $[Ni(CN)_4]^{2-}$, CN^- is a strong field ligand and pairing takes place whereas in $[NiCl_4]^{2-}$,due to the presence of Cl^- , a weak field ligand no pairing occurs / diagrammatic representation	1 1 1

13.	a. $(CH_3)_3$ C-OH undergoes dehydration.  $CH_3-C(CH_3)_2-OH \xrightarrow[573K]{Cu} CH_3-C(CH_3)=CH_2$ b. Methyl group is introduced at ortho and para positions.  c. Phenol is converted to benzene. 	½ + ½ ½+ ½ ½+ ½
14	a. Eu^{2+} $(4f^7)$ is a strong reducing agent because Eu^{3+} is more stable than Eu^{2+}. b. Dichromate ion changes to chromate ion / $Cr_2O_7{}^{2-}$ (orange) $\xrightarrow{OH^-}$ $CrO_4{}^{2-}$ (yellow) c. Due to the irregular variation in ionisation enthalpies (sum of 1st and 2nd ionisation enthalpies), heat of sublimation and enthalpy of hydration/ due to irregular electronic configurations from left to right in a period which changes the ionisation potential.	1 1 1
15	a. **Antiseptics** are the chemicals which either kill or prevent growth of microbes on living tissues. b. Cationic detergents are quarternary ammonium salts of amines with acetates, chlorides or bromides as anions / detergents whose cationic part is involved in cleansing action. c. Antibiotics which kill or inhibit a wide range of Gram-positive and Gram-negative bacteria.	1 1 1
16	$A= \pi r^2$ $= 3.14 \times 0.5 \times 0.5\ cm^2$ $= 0.785\ cm^2$ $l= 45.5\ cm$ $\rho = R \times A/ l$ $\rho = 4.55 \times 10^3 \Omega \times 0.785\ cm^2/ 45.5\ cm$ $\rho = 78.5\ \Omega\ cm$ conductivity , $\kappa = 1/ \rho$ $= 1/78.5\ S\ cm^{-1} = 0.0127\ S\ cm^{-1}$	½ ½ ½ ½

<table>
<tr><td></td><td>molar conductivity $\Lambda m = \kappa \times 1000/C$
$= 0.0127\ S\ cm^{-1} \times 1000/0.05\ mol/cm^{3}$
$= 254.77\ S\ cm^{2}\ mol^{-1}$

or
$A = \pi r^{2}$
$= 3.14 \times 0.5 \times 0.5\ cm^{2}$
$= 0.785\ cm^{2}$
$l = 45.5\ cm$
$G^{*} = l/A = 45.5\ cm/\ 0.785\ cm^{2}$
$= 57.96\ cm^{-1}$
$K = G^{*}/\ R$
$= 57.96\ cm^{-1}/\ 4.55 \times 10^{3}\ \Omega = 1.27 \times 10^{-2}\ S\ cm^{-1}$
$\Lambda m = \kappa \times 1000/C$
$= [1.27 \times 10^{-2}\ S\ cm^{-1}] \times 1000\ /\ 0.05\ mol/cm^{3}$
$= 254.77\ S\ cm^{2}\ mol^{-1}$</td><td>½

½

½

½
½
½
½

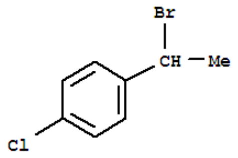
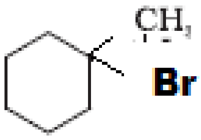
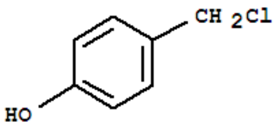
½</td></tr>
<tr><td>17</td><td>a. The particles of the dispersed phase have no affinity for the dispersion medium/solvent repelling (hating) colloidal sols.Example: metal and their sulphides

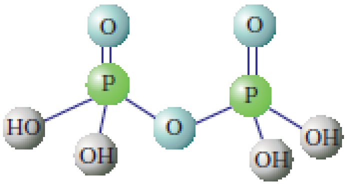
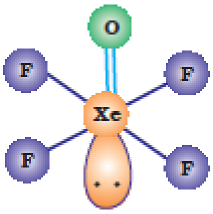
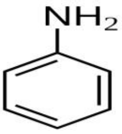
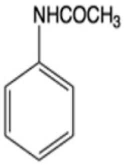
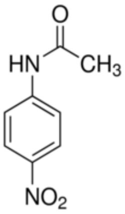
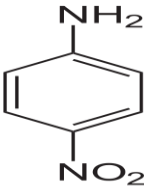
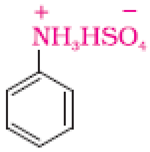
b. The reactant and the catalyst are in the same phase.
$CH_3COOCH_3(l) + H_2O(l) \xrightarrow{HCl(l)} CH_3COOH(aq) + CH_3OH(aq)$

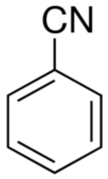
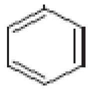
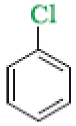
c. Oil is dispersed in water/Oil is dispersed phase and water is dispersion medium.
Ex- milk
(or any other correct example)</td><td>½+ ½

½ + ½

½+ ½</td></tr>
<tr><td></td><td>OR</td><td></td></tr>
<tr><td>17</td><td><table>
<tr><th></th><th>Physisorption</th><th>Chemisorption</th></tr>
<tr><td>1</td><td>Because of van der Waals forces</td><td>Caused by chemical bond formation</td></tr>
<tr><td>2</td><td>Reversible</td><td>Irreversible</td></tr>
<tr><td>3</td><td>Enthalpy of adsorption is low(20-40 kJ/mol)</td><td>Enthalpy of adsorption is high(80-240)kJ/mol</td></tr>
</table>
(Or any other correct difference)</td><td>1+1+1</td></tr>
<tr><td>18</td><td>Given : T_b of glucose solution= $100.20^{o}C$
$\Delta T_b = K_b.m$</td><td></td></tr>
</table>

	m= 0.20/ 0.512 m= 0.390 mol/kg $\Delta T_f = K_f . m$ ΔT_f= 1.86 K kg/mol x 0.390 mol/kg ΔT_f = 0.725 K Freezing point of solution = 273.15K – 0.725 = 272.425K	1 ½ ½ 1
19	a) Zone Refining – Impurities are more soluble in the melt than in the solid metal. b) Collectors enhance non- wettability of the mineral particles.Ex Pine oil/ fatty acids c) Carbon monoxide (CO)	1 1 1
20	a. For bcc structure a = 4r /$\sqrt{3}$ or r = $\sqrt{3}$a/4 r=$\sqrt{3}$ x 400 pm /4 = 1.732 x 400 pm/4 = 173.2 pm b. (i) Impurity defect (ii) Cationic vacancies are created.	½ ½ 1 1
21	a.  b.  C. 	1,1,1
22	a. Due to steric hindrance and +I effect caused by two alkyl groups in propanone. b. Due to electron withdrawing nature of –NO_2 group which increases the acidic strength and decreases the pK_a value . c. $(CH_3)_2CH$-CHO has one α -H atom whereas α- H atom is absent in $(CH_3)_3C$-CHO.	½+ ½ 1 1
23	(i)Concerned , caring, socially alert, leadership (or any other 2 values) (ii)starch	½ + ½ 1

	(iii)α -Helix and β-pleated sheets (iv)Vitamin B / B_1 / B_2/ B_6 / C (any two)	½ + ½ ½ + ½
24	a. (i) Thermal stability of hydrides decreases down the group/ Bond dissociation enthalpy decreases down the group. (ii) Because Cl_2 in presence of moisture liberates nascent oxygen. (iii) Interatomic interactions are weak b.(i)  (ii) 	1 1 1 1,1
	OR	
24	a) Size of nitrogen is smaller than Chlorine. b) $2F_2 + 2H_2O \rightarrow 4HF + O_2$ / HF and O_2 are produced c) PH_3 /Phosphine d) XeF_2 e) $[Fe(H_2O)_6]^{2+} + NO \rightarrow [Fe(H_2O)_5(NO)]^{2+} + H_2O$	1 1 1 1 1
25	(A)  (B)  (C)  (D)  (E) 	1×5=5
	OR	

25	a. i)  ii)  iii) 	1,1,1
	b. $C_6H_5NH_2 < C_6H_5CH_2NH_2 < CH_3NH_2 < (CH_3)_2NH$	1
	c. Add $NaNO_2 + HCl$ to both the compounds at 273K followed by addition of phenol. Aniline gives orange dye (or any other correct test)	1
26.	$k = \frac{2.303}{t} \log \frac{[A]_0}{[A]}$	½
	$= \frac{2.303}{40} \log \frac{100}{25}$	½
	$= \frac{2.303}{40} \log 4$ $= \frac{2.303}{40} X 0.6021$ $k = 0.0347 \text{ min}^{-1}$	½
	$t_{1/2} = \frac{0.693}{k}$	½
	$t_{1/2} = \frac{0.693}{0.0347 \text{ min}^{-1}} = 19.98 \text{ min} = 20\text{min}$	1
	b. (i) first order reaction	1
	(ii) zero order reaction	1
	OR	
26	(a) Rate = $k [NO]^x [O_2]^y$ $7.2 X 10^{-2} = k[0.3]^x [0.2]^y$ ---------Eqn (1) $6.0 X 10^{-3} = k[0.1]^x [0.1]^y$ ---------Eqn (2) $2.88 X 10^{-1} = k[0.3]^x [0.4]^y$ ---------Eqn (3) $2.40 X 10^{-2} = k[0.4]^x [0.1]^y$ ---------Eqn (4)	

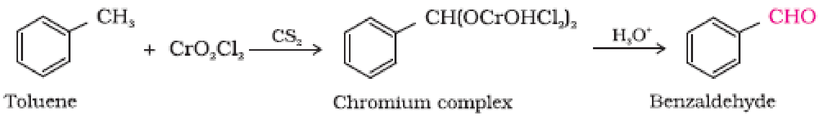
	Dividing eqn 4 by eqn 2 $\frac{2.40 \text{ X } 10^{-2}}{6.0 \text{ X } 10^{-3}} = \frac{k[0.4]^x [0.1]^y}{k[0.1]^x [0.1]^y}$ $x=1$	1
	Dividing eqn 3 by eqn 1 $\frac{2.88 \text{ X } 10^{-1}}{7.2 \text{ X } 10^{-2}} = \frac{k[0.3]^x [0.4]^y}{k[0.3]^x [0.2]^y}$ $y = 2$	1
	order w.r.t. NO = 1, order w.r.t O_2 is 2	½ , ½
	(b) Rate law Rate = $k [NO]^1 [O_2]^2$;The overall order of the reaction is 3.	½ + ½
	c. rate constant $k = \frac{\text{rate}}{[NO]^1 [O_2]^2} = \frac{7.2 \text{ X } 10^{-2}}{0.3 \text{ X} (0.2)^2}$ $k= 6.0 \text{ mol}^{-2} \text{ L}^2 \text{ min}^{-1}$	1

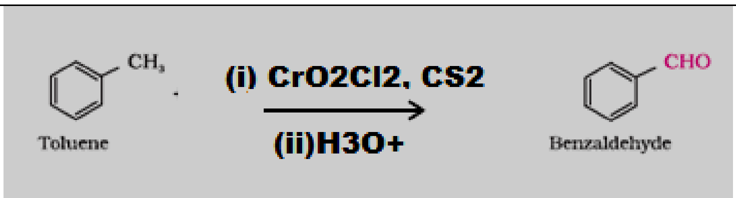
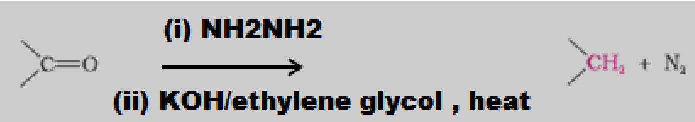
1	Dr. (Mrs.) Sangeeta Bhatia		12	Sh. S. Vallabhan	
2	Dr. K.N. Uppadhya		13	Dr. Bhagyabati Nayak	
3	Prof. R.D. Shukla		14	Ms. Anila Mechur Jayachandran	
4	Sh. S.K. Munjal		15	Mrs. Deepika Arora	
5	Sh. D.A. Mishra		16	Ms. Seema Bhatnagar	
6	Sh. Rakesh Dhawan		17	Mrs. Sushma Sachdeva	
7	Dr. (Mrs.) Sunita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

FOREIGN 2017 - Set - 56/2/3

Q.NO.	VALUE POINTS	MARKS
1	$H_2Te > H_2Se > H_2S > H_2O$	1
2	To make the surface available again for more reaction to occur / To remove the product formed from the surface of the catalyst.	1
3	2-Phenylpropan-2-ol	1
4	Neopentane , **$C(CH_3)_4$**	1
5	P_3Q_2	1
6	a. Zinc to silver b. Concentration of Zn^{2+} ions will increase and Ag^+ ions will decrease.	1 ½+ ½
7	a. Cr^{3+} b. Mn^{3+} c. Ti^{4+} d. Mn^{3+}	½ ½ ½ ½
8	a. $CH_3CH{=}CH_2 \xrightarrow[H^+]{H_20} CH_3CH(OH)CH_3 \xrightarrow[CrO3]{[O]} CH_3COCH_3$ b. $CH_3CH_2COOH \xrightarrow{Br2/Red\ P} CH_3CH(Br)COOH \xrightarrow[ii)H^+]{i)\ aq\ KOH\ or\ NaOH} CH_3CH\ (OH)COOH$ (or any other suitable method)	1 1
	OR	
8	a.Etard reaction:  or	1

	 b.Wolff-Kishner reduction:  or 	1
9	The increase in boiling point of the solvent in a solution when a non-volatile solute is added. Because it depends upon molality / the number of solute particles rather than their nature/ $\Delta T_b \propto m$	1 1
10	a. Tetraamminechloridonitrito-N-cobalt(III) chloride b.$[CoCl_2(en)_2]Cl$	1 1
11	a. In $CuCl_2$, Cu is in +2 oxidation state which is more stable due to high hydration enthalpy as compared to Cu_2Cl_2 in which Cu is in +1 oxidation state b. Due to lanthanoid contraction c. Because HCl is oxidised to chlorine.	1 1 1
12	a. Drugs that reduce or abolish pain without causing impairment of consciousness , mental confusion or paralysis. b. Anionic detergents are sodium salts of sulphonated long chain alcohols or hydrocarbons / alkylbenzene sulphonate or detergents whose anionic part is involved in cleansing action. c. Antacids are chemical compounds which are used for the treatment of excess acid produced in the stomach.	1 1 1
13	$A= \pi r^2$ $= 3.14 \times 0.5 \times 0.5\ cm^2$ $= 0.785\ cm^2$ $l= 45.5$ cm $\rho = R \times A/ l$ $\rho = 4.55 \times 10^3 \Omega \times 0.785\ cm^2/ 45.5$ cm $\rho = 78.5\ \Omega$ cm conductivity , $\kappa = 1/ \rho$	½ ½ ½

<table>
<tr>
<td></td>
<td>= 1/78.5 S cm^{-1} = 0.0127 S cm^{-1}

molar conductivity $\Lambda m = \kappa \times 1000/C$
= 0.0127 S cm^{-1} x 1000/0.05 mol/cm^3
= 254.77 S cm^2 mol^{-1}

or
A= πr^2
= 3.14 x 0.5 x 0.5 cm^2
= 0.785 cm^2
l= 45.5 cm
G^* = l/A= 45.5 cm/ 0.785 cm^2
= 57.96 cm^{-1}
K= G^*/ R
= 57.96 cm^{-1}/ 4.55 × 10^3 Ω = 1.27 × 10^{-2} S cm^{-1}
$\Lambda m = \kappa \times 1000/C$
= [1.27 × 10^{-2} S cm^{-1}]× 1000 / 0.05 mol/cm^3
= 254.77 S cm^2 mol^{-1}</td>
<td>½

½

½

½

½
½
½
½

½</td>
</tr>
<tr>
<td>14</td>
<td>a. The particles of the dispersed phase have no affinity for the dispersion medium/solvent repelling (hating) colloidal sols.
Example: metal and their sulphides

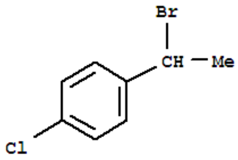
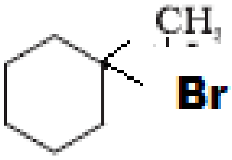
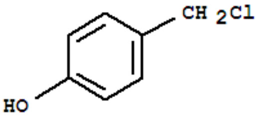
b. The reactant and the catalyst are in the same phase.

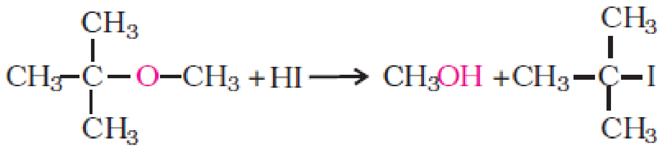
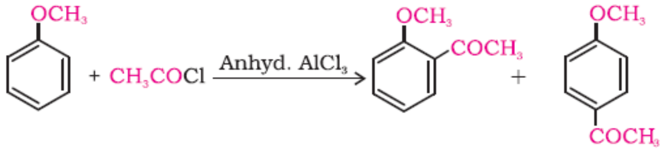
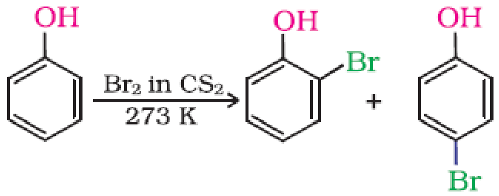
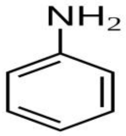
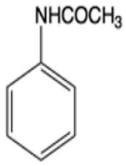
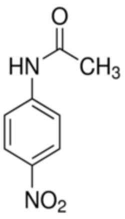
$CH_3COOCH_3(l) + H_2O(l) \xrightarrow{HCl(l)} CH_3COOH(aq) + CH_3OH(aq)$

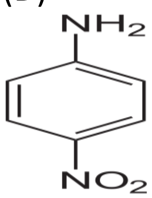
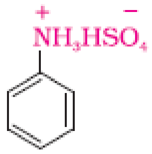
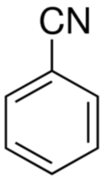
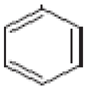
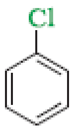
c. oil is dispersed in water/Oil is dispersed phase and water is dispersion medium.
Ex- milk
(or any other correct example)</td>
<td>½+ ½

½ + ½

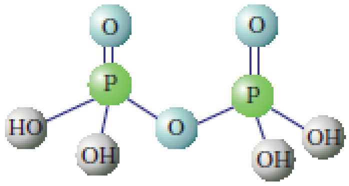
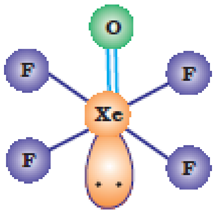
½+ ½</td>
</tr>
<tr>
<td></td>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>
<table>
<tr><th></th><th>Physisorption</th><th>Chemisorption</th></tr>
<tr><td>1</td><td>Because of van der Waals forces</td><td>Caused by chemical bond formation</td></tr>
<tr><td>2</td><td>Reversible</td><td>Irreversible</td></tr>
<tr><td>3</td><td>Enthalpy of adsorption is low(20-40 kJ/mol)</td><td>Enthalpy of adsorption is high(80-240)kJ/mol</td></tr>
</table>
(Or any other correct difference)</td>
<td>1+1+1</td>
</tr>
</table>

15	a.  b.  C. 	1,1,1
16	Given : T_b of glucose solution= 100.20^oC	
	$\Delta T_b = K_b.m$	
	m= 0.20/ 0.512	
	m= 0.390 mol/kg	1
	$\Delta T_f = K_f . m$	½
	ΔT_f= 1.86 K kg/mol x 0.390 mol/kg	
	ΔT_f = 0.725 K	½
	Freezing point of solution = 273.15K – 0.725	
	= 272.425K	1
17	a.(i) Vapour phase refining/ van Arkel method	½
	(ii) Zone refining	½
	(iii) Electrolytic refining	½
	b.(i) Froth floation process	½
	(ii) Magnetic separation	½
	(iii) Leaching	½
18	a. For bcc structure	
	a = 4r /√3 or r = √3a/4	½
	r=√3 x 400 pm /4	
	= 1.732 x 400 pm/4	
	= 173.2 pm	½
	b.	
	(i) Impurity defect	1
	(ii) Cationic vacancies are created.	1
19	a. Due to steric hindrance and +I effect caused by two alkyl groups in propanone.	½+ ½
	b. Due to electron withdrawing nature of $–NO_2$ group which increases the acidic strength and decreases the pK_a value .	1
	c. $(CH_3)_2CH-CHO$ has one α -H atom whereas α- H atom is absent in $(CH_3)_3C-CHO$.	1
20	a. Chloroprene , $CH_2=C(Cl)-CH=CH_2$	½+ ½
	b. 1,3- Butadiene & Acrylonitrile	½+ ½
	$CH_2=CH-CH=CH_2$ & $CH_2=CHCN$	

	c. 3-Hydroxybutanoic acid & 3-Hydroxypentanoic acid $CH_3CH(OH)CH_2COOH$ & $CH_3CH_2CH(OH)CH_2COOH$	½+ ½
21	a) It is the magnitude of difference in energy between the two sets of d orbital i.e. t_2g and e_g **t^4_{2g} eg^0** **b)** sp^3d^2 , paramagnetic	1 1 ½ + ½
22	a. Methanol and 2-methyl-2-iodopropane are formed.  $\mathrm{CH_3-\overset{CH_3}{\underset{CH_3}{C}}-O-CH_3+HI\longrightarrow CH_3OH+CH_3-\overset{CH_3}{\underset{CH_3}{C}}-I}$ b. 2-Methoxy acetophenone and 4 -Methoxy acetophenone are formed  c. o-Bromophenol and p-Bromophenol are formed.  (Award full marks if the student writes only equation)	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)  (B)  (C) 	1×5=5

	(D)  (E) 	
	OR	
24	a. i)  ii)  iii)  b. $C_6H_5NH_2 < C_6H_5CH_2NH_2 < CH_3NH_2 < (CH_3)_2NH$ c. Add $NaNO_2 + HCl$ to both the compounds at 273K followed by addition of phenol. Aniline gives orange dye (or any other correct test)	1,1,1 1 1
25.	$k = \frac{2.303}{t} \log \frac{[A]_0}{[A]}$ $= \frac{2.303}{40} \log \frac{100}{25}$ $= \frac{2.303}{40} \log 4$ $= \frac{2.303}{40} \times 0.6021$ $k = 0.0347 \text{ min}^{-1}$ $t_{1/2} = \frac{0.693}{k}$	½ ½ ½ ½

	$t_{1/2} = \frac{0.693}{0.0347\ min^{-1}} = 19.98\ min = 20min$	1
	b. (i) first order reaction	1
	(ii) zero order reaction	1
	OR	
25	(a)	
	Rate = k $[NO]^x [O_2]^y$	
	$7.2 X 10^{-2} = k[0.3]^x [0.2]^y$ ---------Eqn (1)	
	$6.0 X 10^{-3} = k[0.1]^x [0.1]^y$ ---------Eqn (2)	
	$2.88 X 10^{-1} = k[0.3]^x [0.4]^y$ ---------Eqn (3)	
	$2.40 X 10^{-2} = k [0.4]^x [0.1]^y$ ---------Eqn (4)	
	Dividing eqn 4 by eqn 2	
	$\frac{2.40 X 10^{-2} = k[0.4]^x [0.1]^y}{6.0 X 10^{-3} = k[0.1]^x [0.1]^y}$	
	x=1	1
	Dividing eqn 3 by eqn 1	
	$\frac{2.88 X 10^{-1} = k[0.3]^x [0.4]^y}{7.2 X 10^{-2} = k[0.3]^x [0.2]^y}$	
	y = 2	1
	order w.r.t. NO = 1, order w.r.t O_2 is 2	½ , ½
	(b) Rate law	
	Rate = k $[NO]^1 [O_2]^2$, The overall order of the reaction is 3.	½ + ½
	c. rate constant $k = \frac{rate}{[NO]^1 [O_2]^2} = \frac{7.2 X 10^{-2}}{0.3 X(0.2)^2}$	
	k= 6.0 $mol^{-2}\ L^2\ min^{-1}$	1
26.	a. (i) Thermal stability of hydrides decreases down the group/ Bond dissociation enthalpy decreases down the group.	1
	(ii) Because Cl_2 in presence of moisture liberates nascent oxygen.	1
	(iii) Interatomic interactions are weak	1
	b.(i) (ii)	

	 	1,1
	OR	
26	a) Size of nitrogen is smaller than Chlorine. b) $2F_2 + 2H_2O \rightarrow 4HF + O_2$ / HF and O_2 are produced c) PH_3 /Phosphine d) XeF_2 e) $[Fe(H_2O)_6]^{2+} + NO -\rightarrow [Fe(H_2O)_5(NO)]^{2+} + H_2O$	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	