# Marking scheme – 2017

## CHEMISTRY (043)/ CLASS XII

FOREIGN 2017 - Set - 56/2/1

Q.NO.	VALUE POINTS	MARKS
1	$P_3Q_4$	1
2	$H_2$ Te < $H_2$ Se < $H_2$ S < $H_2$ O	1
3	To make the surface available again for more reaction to occur / To	1
	remove the product formed from the surface of the catalyst.	
4	2 – Phenylethanol	1
5	Neopentane / C(CH <sub>3</sub> ) <sub>4</sub>	1
6	a.	1
	$H_2O$ [O]	
	$CH_3CH=CH_2 \longrightarrow CH_3CH(OH)CH_3 \longrightarrow CH_3COCH_3$	
	H <sup>+</sup> CrO3	
	b.	
	Br2/Red P i) aq KOH or NaOH	
	$CH_3CH_2COOH \longrightarrow CH_3CH(Br)COOH \longrightarrow CH_3CH(OH)COOH$	1
	ii)H <sup>+</sup>	
	(or any other suitable method)	
	OR	
6	a. Etard reaction:	
	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1
	or	
	Toluene (i) CrO2Cl2, CS2  (ii) H3O+  Benzaldehyde	
	b. Wolff-Kishner reduction:	
	$C = O \xrightarrow{NH_2NH_2} C = NNH_2 \xrightarrow{KOH/ethylene glycol} CH_2 + N_2$	
	or	
	c=0 (i) NH2NH2  (ii) KOH/ethylene glycol , heat	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	1
	solution.	
	Osmotic Pressure	1
8	a. cis/ trans-diamminedichloridoplatinum(II) b.	1
	[Co(NH <sub>3</sub> ) <sub>4</sub> (H <sub>2</sub> O)Cl] (NO <sub>3</sub> ) <sub>2</sub>	1
9	a. Zinc to silver	1
	b. Concentration of Zn <sup>2+</sup> ions will increase and Ag <sup>+</sup> ions will	1
10	decrease.	4.4
10	a. Cr <sup>3+</sup>	1/2
	b.Mn <sup>3+</sup>	1/2
	c. Ti <sup>4+</sup>	1/2
	d. Mn <sup>3+</sup>	1/2
11	$A = \pi r^2$	
	$= 3.14 \times 0.5 \times 0.5 \text{ cm}^2$	
	$= 0.785 \text{ cm}^2$	1/2
	<i>l</i> = 45.5 cm	
	$\rho = R \times A/I$	
	$\rho = 4.55 \times 10^3 \Omega \times 0.785 \text{ cm}^2 / 45.5 \text{ cm}$	
	$ ho$ = 78.5 $\Omega$ cm	1/2
	conductivity , κ = 1/ ρ	1/2
	$= 1/78.5 \text{ S cm}^{-1} = 0.0127 \text{ S cm}^{-1}$	1/2
	molar conductivity $\Delta m = \kappa \times 1000/C$	1/2
	= 0.0127 S cm <sup>-1</sup> x 1000/0.05 mol/cm <sup>3</sup>	
	$= 254.77  \text{S}  \text{cm}^2  \text{mol}^{-1}$	1/2
	or	
	$A = \pi r^2$	
	$= 3.14 \times 0.5 \times 0.5 \text{ cm}^2$	
	$= 0.785 \text{ cm}^2$	1/2
	<i>l</i> = 45.5 cm	
	$G^* = I/A = 45.5 \text{ cm}/0.785 \text{ cm}^2$	
	$= 57.96 \text{ cm}^{-1}$	1/2
	$K = G^*/R$	1/2
	= $57.96 \text{ cm}^{-1}/4.55 \times 10^3 \Omega = 1.27 \times 10^{-2} \text{ S cm}^{-1}$	1/2
	$\Lambda m = \kappa \times 1000/C$	1/2
	$= [1.27 \times 10^{-2} \text{ S cm}^{-1}] \times 1000 / 0.05 \text{ mol/cm}^{3}$	/ -

	= 254.77 S ci	m² mol <sup>-1</sup>		1/2
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			1/2+1/2
	b. The reactant and the catalyst are in the same phase. $HCI(I)$ $CH_3COOCH_3(I) + H_2O(I) \rightarrow CH_3COOH(aq) + CH_3OH(aq)$			
	c. oil is dispers dispersion med Ex- milk		dispersed phase and water is	1/2+1/2
			(or any other correct example) OR	
12	Physisor		Chemisorption	(1+1+1)
12	1 Because forces	of van der Waals	Caused by chemical bond formation	(1111)
	2 Reversib		Irreversible	
	11 1	of adsorption is	Enthalpy of adsorption is	
	low(20-2	10 kJ/mol)	high(80-240)kJ/mol	
12	Circus T of ol		(Or any other correct difference)	
13	_	ucose solution= 10	0.20 C	
	$\Delta T_b = K_b.m$ m= 0.20/ 0.512	)		
	m= 0.390 mol/			1
	iii oisso iiioi,	νδ		_
	$\Delta T_f = K_f \cdot m$			1/2
	$\Delta T_f = 1.86 \text{ K kg/}$	/mol x 0.390 mol/kį	g	
	$\Delta T_f = 0.725 \text{ K}$			1/2
	Freezing point	of solution = 273.1		
4.4		= 272.4		1
14			le compound which on strong	1
	_	nposes to give pure prevents one of th	ne sulphide ores from coming to the	1
	c. Coke			1
15	a. For boo	structure		
	$a = 4r / \sqrt{3}$	or $r = \sqrt{3a/4}$		1/2
	r=√3 x 400 pm	/4		
	<u> </u>	·		

	4.702 400 /4	
	= 1.732 x 400 pm/4	4.
	= 173.2 pm	1/2
	b.	
	(i) Impurity defect	1
	(ii) Cationic vacancies are created.	1
16	a. Due to steric hindrance and +I effect caused by two alkyl groups in propanone.	1/2+ 1/2
	b. Due to electron withdrawing nature of –NO <sub>2</sub> group which	
	increases the acidic strength and decreases the pK <sub>a</sub> value.	1
	c. $(CH_3)_2CH$ -CHO has one $\alpha$ -H atom whereas $\alpha$ - H atom is absent in	
	(CH <sub>3</sub> ) <sub>3</sub> C-CHO.	1
17	a. Ethylene Glycol and Terephthalic acid	1/2 + 1/2
	HOH <sub>2</sub> C-CH <sub>2</sub> OH , p-HOOC-C <sub>6</sub> H <sub>4</sub> -COOH	
	b. Tetrafluoroethene , CF <sub>2</sub> =CF <sub>2</sub>	1/2 + 1/2
	c. Hexamethylenediamine and adipic acid	
	$H_2N(CH_2)_6NH_2$ , $HOOC(CH_2)_4$ COOH	1/2 + 1/2
18		/2 + /2
10	a. It is the magnitude of difference in energy between the two sets	1
	of d orbital i.e. t <sub>2</sub> g and e <sub>g</sub>	1
	t <sup>3</sup> <sub>2g</sub> eg <sup>1</sup>	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 <sub>2</sub> O.	1
19	a. (CH <sub>3</sub> ) <sub>3</sub> C-OH undergoes dehydration.	1/2 + 1/2
	$CH_3$	
	b. Methyl group is introduced at ortho and para positions.	1/2+ 1/2
	C. Phenol is converted to benzene.	72.72
	$+$ Zn $\longrightarrow$ $+$ ZnO	1/2+ 1/2

20	a. b. C.	1,1,1
	CH 2C1	
21	a. In CuCl <sub>2</sub> , Cu is in +2 oxidation state which is more stable due to high hydration enthalpy as compared to Cu <sub>2</sub> Cl <sub>2</sub> in which Cu is in +1 oxidation state	1
	b. Due to lanthanoid contraction c. Because HCl is oxidised to chlorine.	1 1
22	<ul> <li>a. Neurologically active drugs / chemical compounds used for treatment of stress / anxiety and mild or even severe mental diseases.</li> <li>b. Anionic detergents are sodium salts of sulphonated long chain</li> </ul>	1
	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	1
	on inanimate / non living objects	1
23	(i)Concerned, caring, socially alert, leadership (or any other 2 values)	1/2 + 1/2
	(ii)starch	1
	(iii) $\alpha$ -Helix and $\beta$ -pleated sheets	1/2 + 1/2
	(iv)Vitamin B / $B_1$ / $B_2$ / $B_6$ / $C$ (any two )	1/2 + 1/2
24	k= <u>2.303</u> log <u>[A]<sub>0</sub></u> t [A]	1/2
	= 2 <u>.303 log 100</u> 40 25	1/2
	$= 2.303 \log 4$	/2
	= <u>2.303</u> X 0.6021 40	
	k = 0.0347 min <sup>-1</sup>	
	$t_{1/2} = 0.693$	1/2
	k	1/2

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

25	a) Characteristic and the action of the first			
25	a) Size of Nitrogen is smaller than Chlorine.			
	b) $2F_2 + 2H_2O \rightarrow 4HF + O_2 / HF$ and $O_2$ are produced	1		
	c) PH <sub>3</sub> /Phosphine	1		
	d) XeF <sub>2</sub>	1		
	e) $[Fe(H_2O)_6]^{2+} + NO - \rightarrow [Fe(H_2O)_5(NO)]^{2+} + H_2O$	1		
26.	-7 1 - 1 2 - 703 - 1 - 1 2 - 1 2 - 1 3 1 - 73 2 - 1	1×5=5		
20.	0			
	AUGOOL LIN CLI			
	NHCOCH <sub>3</sub> HN CH <sub>3</sub>			
	$(A) \qquad (B) \qquad (C) \qquad NO_2$			
	(D) (E)			
	$NH_2$			
	NH <sub>3</sub> HSO <sub>4</sub>			
	NO <sub>2</sub>			
	OR			

26	a. i) iii)	
	CN CI	
		1,1,1
	b. $C_6H_5NH_2 < C_6H_5CH_2NH_2 < CH_3NH_2 < (CH_3)_2NH$	1
	c. Add NaNO <sub>2</sub> + HCl to both the compounds at 273K followed by addition of phenol. Aniline gives orange dye	1
	(or any other correct test)	1

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7	Dr. (Mrs.) Sunita Ramrakhiani	18	Dr. Azhar Aslam Khan	
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# Marking scheme – 2017

## CHEMISTRY (043)/ CLASS XII

### FOREIGN 2017 - Set - 56/2/2

Q.NO	VALUE POINTS	MARK
•		S
1	2-Methylbut-3-en-2-ol	1
2	Neopentane , C(CH₃)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	1
	occur / To remove the product formed from the surface of	
	the catalyst.	
6	a. Pentaamminesulphatocobalt(III) chloride	1
	b.[Pt(NH <sub>3</sub> ) <sub>2</sub> Cl(NO <sub>2</sub> )]	1
7	a. Zinc to silver	1
	b. Concentration of Zn <sup>2+</sup> ions will increase and Ag <sup>+</sup> ions will	1
	decrease.	
8	a. Cr <sup>3+</sup>	1/2
	b.Mn <sup>3+</sup>	1/2
	c. Ti <sup>4+</sup>	1/2
	d. Mn <sup>3+</sup>	1/2
9	a.	1
	H <sub>2</sub> 0 [O]	
	$CH_3CH=CH_2 \longrightarrow CH_3CH(OH)CH_3 \longrightarrow CH_3COCH_3$	
	H <sup>†</sup> CrO3	
	b.	
	Br2/Red P i) aq KOH or NaOH	
	CH₃CH₂COOH → CH₃CH(Br)COOH → CH₃CH (OH)COOH	1
	ii)H <sup>+</sup>	
	(or any other suitable method)	
	OR	
9	a.Etard reaction:	
	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1

	or	
	CH <sub>1</sub> (i) CrO2Cl2, CS2	
	Tohiene (ii)H3O+ Benzaldehyde	
	b.Wolff-Kishner reduction:	
	$C = O \xrightarrow{NH_2NH_2} C = NNH_2 \xrightarrow{KOH/ethylene glycol} CH_2 + N_2$	
	or	
	$c=0 \xrightarrow{\text{(i) NH2NH2}} cH_2 + N_2$	1
4.0	(ii) KOH/ethylene glycol , heat	
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	1
	temperature multiplied by its mole fraction.	1
	Negative deviation due to formation of Hydrogen bond	
	between chloroform and acetone.	1/2 + 1/2
11	a. Phenol & Formaldehyde	1/2+ 1/2
	OH	
	& HCHO	
	b.Vinyl chloride, CH <sub>2</sub> =CHCl	1/2+ 1/2
	c. 1,3-Butadiene & styrene	
	CH = CH <sub>2</sub>	
		4. 4.
	CH <sub>2</sub> =CH-CH=CH <sub>2</sub> and	1/2+1/2
12	a. It is the magnitude of difference in energy between the	1
	two sets of d orbital i.e. t₂g and e <sub>g</sub>	
	$t^4_{2g} eg^0$	1
	b. In $[Ni(CN)_4]^{2^2}$ , $CN^{-1}$ is a strong field ligand and pairing takes	
	place whereas in [NiCl <sub>4</sub> ] <sup>2</sup> , due to the presence of Cl , a weak	
	field ligand no pairing occurs / diagrammatic representation	1

13.	a. (CH <sub>3</sub> ) <sub>3</sub> C-OH undergoes dehydration.	1/2 + 1/2
	$CH_3$ $CH_3$ $CH_3$ $CH_3$ $CH_3$ $CH_3$ $CH_4$ $CH_5$	
	b. Methyl group is introduced at ortho and para positions.	
	OCH,	1/2+1/2
	OCH <sub>3</sub> OCH <sub>3</sub>	
	+CH <sub>3</sub> Cl Anhyd. AlCl <sub>3</sub> + CH <sub>3</sub> + CH <sub>3</sub>	
	c. Phenol is converted to benzene.	
	OH	1/2+1/2
	$+$ Zn $\longrightarrow$ $+$ ZnO	, , , , ,
14	a. Eu <sup>2+</sup> (4f <sup>7</sup> ) is a strong reducing agent because Eu <sup>3+</sup> is more	1
	stable than Eu <sup>2+</sup> .	
	b. Dichromate ion changes to chromate ion /	
	OH <sup>-</sup>	1
	$Cr_2O_7^{2-}$ (orange) $\rightarrow$ $CrO_4^{2-}$ (yellow)	
	c. Due to the irregular variation in ionisation enthalpies (sum	
	of 1 <sup>st</sup> and 2 <sup>nd</sup> ionisation enthalpies), heat of sublimation and	1
	enthalpy of hydration/ due to irregular electronic	
	configurations from left to right in a period which changes the	
15	ionisation potential.  a. Antiseptics are the chemicals which either kill or prevent	
13	growth of microbes on living tissues.	1
	b. Cationic detergents are quarternary ammonium salts of amines	*
	with acetates, chlorides or bromides as anions / detergents whose	1
	cationic part is involved in cleansing action. c. Antibiotics which kill or inhibit a wide range of Gram-positive	
	and Gram-negative bacteria.	1
16	$A = \pi r^2$	
	$= 3.14 \times 0.5 \times 0.5 \text{ cm}^2$	
	$= 0.785 \text{ cm}^2$	1/2
	<i>I</i> = 45.5 cm	
	$\rho = R \times A / I$	
	$\rho = 4.55 \times 10^{3} \Omega \times 0.785 \text{ cm}^{2} / 45.5 \text{ cm}$	1/
	$ ho$ = 78.5 $\Omega$ cm	1/2
	conductivity , κ = 1/ ρ	1/2
	$= 1/78.5 \text{ S cm}^{-1} = 0.0127 \text{ S cm}^{-1}$	1/2

	molar conductivity $\Lambda m = \kappa \times 1000$	•	1/2	
	= 0.0127 S cm <sup>-1</sup> x 1000/0.05 mol/cm <sup>3</sup>			
	$= 254.77  \text{S cm}^2  \text{mol}^{-1}$		1/2	
	or			
	$A = \pi r^2$			
	$= 3.14 \times 0.5 \times 0.5 \text{ cm}^2$			
	$= 0.785 \text{ cm}^2$		1/2	
	<i>l</i> = 45.5 cm			
	$G^* = I/A = 45.5 \text{ cm} / 0.785 \text{ cm}^2$			
	= 57.96 cm <sup>-1</sup>		1/2	
	$K = G^*/R$		1/2	
	$= 57.96 \text{ cm}^{-1} / 4.55 \times 10^3 \Omega = 1.27$	$\times 10^{-2}  \text{S cm}^{-1}$	1/2	
	$\Lambda$ m = $\kappa$ x 1000/C		1/2	
	= $[1.27 \times 10^{-2} \mathrm{S cm^{-1}}] \times 1000 /$	0.05 mol/cm <sup>3</sup>		
	= 254.77 S cm <sup>2</sup> mol <sup>-1</sup>		1/2	
17	a. The particles of the dispersed	phase have no affinity for the		
	dispersion medium/solvent repelling (hating) colloidal			
	sols.Example: metal and their su	phides		
	b. The reactant and the catalyst a	are in the same phase.		
	HCI(I)		1/2 + 1/2	
	$CH_3COOCH_3(I) + H_2O(I) \rightarrow CH_3$	COOH(aq) + CH₃OH(aq)		
	c. Oil is dispersed in water/Oil is dispersed phase and water is			
	c. Oil is dispersed in water/Oil is dispersed phase and water is dispersion medium.			
	Ex- milk		1/2+ 1/2	
		or any other correct example)		
	OR	•		
17	Physisorption	Chemisorption	1+1+1	
	1 Because of van der Waals	Caused by chemical		
	forces	bond formation		
	2 Reversible	Irreversible		
	3 Enthalpy of adsorption is	Enthalpy of adsorption is		
	low(20-40 kJ/mol)	high(80-240)kJ/mol		
	(Or	any other correct difference)		
18	Given: T <sub>b</sub> of glucose solution= 10	00.20°C		
	$\Delta T_b = K_b.m$			

	m= 0.20/ 0.512	
	m= 0.390 mol/kg	1
	$\Delta T_f = K_f \cdot m$	1/2
	$\Delta T_f$ = 1.86 K kg/mol x 0.390 mol/kg	
	$\Delta T_f = 0.725 \text{ K}$	1/2
	Freezing point of solution = 273.15K – 0.725	
	= 272.425K	1
19	a) Zone Refining – Impurities are more soluble in the melt than in the solid metal.	1
	b) Collectors enhance non- wettability of the mineral	1
	particles.Ex Pine oil/ fatty acids	
	c) Carbon monoxide (CO)	1
20	a. For bcc structure	1/
	$a = 4r / \sqrt{3}$ or $r = \sqrt{3}a/4$	1/2
	$r=\sqrt{3} \times 400 \text{ pm } /4$	
	= 1.732 x 400 pm/4	
	= 173.2 pm	1/2
	b.	/2
	(i) Impurity defect	1
	(ii) Cationic vacancies are created.	1
21	a. b. C.	1,1,1
	CH CH CH 2C1	
22	a. Due to steric hindrance and +I effect caused by two alkyl	1/2+ 1/2
	groups in propanone.	
	b. Due to electron withdrawing nature of −NO <sub>2</sub> group which	
	increases the acidic strength and decreases the pK <sub>a</sub> value.	1
	c. $(CH_3)_2CH$ -CHO has one $\alpha$ -H atom whereas $\alpha$ - H atom is	
20	absent in (CH <sub>3</sub> ) <sub>3</sub> C-CHO.	1 1/ + 1/
23	(i)Concerned, caring, socially alert, leadership (or any other 2 values)	1/2 + 1/2
	(ii)starch	1

	(iii) $\alpha$ -Helix and $\beta$ -pleated sheets	1/2 + 1/2
	(iv)Vitamin B / $B_1$ / $B_2$ / $B_6$ / $C$ (any two )	1/2 + 1/2
24	a. (i) Thermal stability of hydrides decreases down the	1
	group/ Bond dissociation enthalpy decreases down the group. (ii) Because Cl <sub>2</sub> in presence of moisture liberates nascent oxygen.	1
	(iii) Interatomic interactions are weak	1
	b.(i) (ii)	
	P P Xe F	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
25	O II	1×5=5
	NHCOCH₃ HN CH₃	
	(A) (B) (C) NO <sub>2</sub>	
	(D) (E) + -	
	NH <sub>3</sub> HSO <sub>4</sub>	
	OR	

25		
	a. i) iii)	
	CN 	
		1,1,1
	b. $C_6H_5NH_2 < C_6H_5CH_2NH_2 < CH_3NH_2 < (CH_3)_2NH$	1
	c. Add NaNO <sub>2</sub> + HCl to both the compounds at 273K followed	
	by addition of phenol. Aniline gives orange dye	1
	(or any other correct test)	
26.	k= <u>2.303</u> log <u>[A]</u> <sub>0</sub>	1/2
	t [A]	
	2 202 1 400	1/
	= 2 <u>.303 log 100</u> 40 25	1/2
	= 2.303 log 4	
	40	
	= <u>2.303</u> X 0.6021	
	40	1/
	k = 0.0347 min <sup>-1</sup>	1/2
	$t_{1/2} = 0.693$	
	k	1/2
	$t_{1/2} = 0.693$ = 19.98 min = 20min	
	0.0347 min <sup>-1</sup>	1
	b. (i) first order reaction	1
	(ii) zero order reaction	1
26	OR	
26	(a) Rate = $k [NO]^x [O_2]^y$	
	7.2 X $10^{-2} = k[0.3]^{x}[0.2]^{y}$ Eqn (1)	
	$6.0 \times 10^{-3} = k[0.1]^{x} [0.1]^{y}$ Eqn (2)	
	2.88 X $10^{-1} = k[0.3]^{x}[0.4]^{y}$ Eqn (3)	
	$2.40 \times 10^{-2} = k[0.4]^{x} [0.1]^{y}$ Eqn (4)	

Dividing eqn 4 by eqn 2	
$2.40 \times 10^{-2} = k[0.4]^{x} [0.1]^{y}$	
$6.0 \times 10^{-3} = k[0.1]^{x} [0.1]^{y}$	1
x=1	
Dividing eqn 3 by eqn 1	
$2.88 \times 10^{-1} = k[0.3]^{x} [0.4]^{y}$	
$7.2 \times 10^{-2} = k[0.3]^{x} [0.2]^{y}$	1
y = 2	
order w.r.t. NO = 1, order w.r.t $O_2$ is 2	1/2 , 1/2
(b) Rate law	
Rate = $k [NO]^1 [O_2]^2$ ; The overall order of the reaction is 3.	1/2 + 1/2
c. rate constant $k = \frac{rate}{} = 7.2 \times 10^{-2}$	
$[NO]^{1}[O_{2}]^{2}$ 0.3 $X(0.2)^{2}$	
k= 6.0 mol <sup>-2</sup> L <sup>2</sup> min <sup>-1</sup>	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	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	MARK
•		S
1	$H_2Te > H_2Se > H_2S > H_2O$	1
2	To make the surface available again for more reaction to	1
	occur / To remove the product formed from the surface of	
	the catalyst.	
3	2-Phenylpropan-2-ol	1
4	Neopentane , C(CH <sub>3</sub> ) <sub>4</sub>	1
5	$P_3Q_2$	1
6	a. Zinc to silver	1
	b. Concentration of Zn <sup>2+</sup> ions will increase and Ag <sup>+</sup> ions will	1/2+1/2
	decrease.	
7	a. Cr <sup>3+</sup>	1/2
	b.Mn <sup>3+</sup>	1/2
	c. Ti <sup>4+</sup>	1/2
	d. Mn <sup>3+</sup>	1/2
8	a.	1
	H <sub>2</sub> 0 [O]	
	$CH_3CH=CH_2$ $\longrightarrow$ $CH_3CH(OH)CH_3$ $\longrightarrow$ $CH_3COCH_3$ $CrO3$	
	H <sup>+</sup> Cros	
	b.	
	Br2/Red P i) aq KOH or NaOH	
	CH₃CH₂COOH → CH₃CH(Br)COOH	1
	ii)H <sup>+</sup>	
	(or any other suitable method)	
0	OR Stand reactions	
8	a.Etard reaction:	
	CH <sub>3</sub> CH(OCrOHCl <sub>2</sub> ) <sub>2</sub> CHO	
	$+ \text{CrO}_{3}\text{Cl}_{3} \xrightarrow{\text{CS}_{2}} \longrightarrow \longrightarrow \xrightarrow{\text{H}_{3}\text{O}^{*}} \longrightarrow$	1
	Toluene Chromium complex Benzaldehyde	1
	or	

b.Wolff-Kishner reduction:  (i) NH2NH2 (ii) KOH/ethylene glycol heat  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/ ΔT <sub>b</sub> ∝ m  10  a. Tetraamminechloridonitrito-N-cobalt(III) chloride b.[CoCl <sub>2</sub> (en) <sub>2</sub> ]Cl  11  a. In CuCl <sub>2</sub> , Cu is in +2 oxidation state which is more stable due to high hydration enthalpy as compared to Cu <sub>2</sub> Cl <sub>2</sub> in which Cu is in +1 oxidation state b. Due to lanthanoid contraction c. Because HCl is oxidised to chlorine.  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.			
b.Wolff-Kishner reduction:    Column		CH, (i) CrO2Cl2, CS2	
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$13 \qquad A = \pi r^2$		·	1
		the data ment of excess dotal produced in the stermach	
	13	$A = \pi r^2$	
		$= 3.14 \times 0.5 \times 0.5 \text{ cm}^2$	
$= 0.785 \text{ cm}^2$ $\frac{1}{2}$			1/2
/= 45.5 cm			
$\rho = R \times A / I$ $\rho = A \Gamma \Gamma \times 10^3 \Omega \times 0.78\Gamma \text{ cm}^2 / A \Gamma \Gamma \text{ cm}$			
$\rho = 4.55 \times 10^{3} \Omega \times 0.785 \text{ cm}^{2} / 45.5 \text{ cm}$ $\rho = 78.5 \Omega \text{ cm}$ ½			1/4
		p = 70.5 \$2 (iii	/2
conductivity , $\kappa = 1/\rho$		conductivity , $\kappa = 1/\rho$	1/2

	$= 1/78.5 \text{ S cm}^{-1} = 0.0127 \text{ S cm}^{-1}$		1/2	
	molar conductivity $\Lambda$ m = $\kappa$ x 1000		1/2	
	= 0.0127 S cm <sup>-1</sup> x 1000/0.05 mol/cm <sup>3</sup>			
	= 254.77 S cm <sup>2</sup> mol <sup>-1</sup>			
	or			
	$A = \pi r^2$			
	$= 3.14 \times 0.5 \times 0.5 \text{ cm}^2$			
	$= 0.785 \text{ cm}^2$		1/2	
	<i>l</i> = 45.5 cm			
	$G^* = I/A = 45.5 \text{ cm}/0.785 \text{ cm}^2$			
	= 57.96 cm <sup>-1</sup>		1/2	
	K= G*/ R		1/2	
	= 57.96 cm <sup>-1</sup> / $4.55 \times 10^3 \Omega = 1.27$	× 10 <sup>-2</sup> S cm <sup>-1</sup>	1/2	
	$\Lambda m = \kappa \times 1000/C$		1/2	
	= $[1.27 \times 10^{-2}  \text{S cm}^{-1}] \times 1000 / ($	0.05 mol/cm³		
	= 254.77 S cm <sup>2</sup> mol <sup>-1</sup>		1/2	
14	a. The particles of the dispersed	phase have no affinity for the		
	dispersion medium/solvent repel	ling (hating) colloidal sols.	1/2+1/2	
	Example: metal and their sulphid	es		
	h The reactant and the catalyst s	ura in the came phace		
	b. The reactant and the catalyst a	ire in the same phase.	1/2 + 1/2	
	CH <sub>3</sub> COOCH <sub>3</sub> (I) + H <sub>2</sub> O(I) $\rightarrow$ CH <sub>3</sub>	COOH(3a) + CH-OH(3a)	/2 T /2	
	C113C00C113(1) 1 1120(1) 7 C113			
	c. oil is dispersed in water/Oil is	dispersed phase and water is		
	dispersion medium.		1/2+1/2	
	Ex- milk			
	(0	or any other correct example)		
	OR			
14	Physisorption	Chemisorption	1+1+1	
	1 Because of van der Waals	Caused by chemical		
	forces	bond formation		
	2 Reversible	Irreversible		
	3 Enthalpy of adsorption is	Enthalpy of adsorption is		
	low(20-40 kJ/mol)	high(80-240)kJ/mol		
	(Or any other correct difference)			

15	a. b. C.	1,1,1
	EH,	
	CH -Me Br	
	C1 HO HO	
16	Given: T <sub>b</sub> of glucose solution= 100.20°C	
10	$\Delta T_b = K_b.m$	
	m = 0.20 / 0.512	
	m= 0.390 mol/kg	1
	$\Delta T_f = K_f \cdot m$	1/2
	$\Delta T_f$ = 1.86 K kg/mol x 0.390 mol/kg	
	$\Delta T_f = 0.725 \text{ K}$	1/2
	Freezing point of solution = 273.15K – 0.725	
	= 272.425K	1
17	a.(i) Vapour phase refining/ van Arkel method	1/2
	(ii) Zone refining	1/2
	(iii) Electrolytic refining	1/2
	b.(i) Froth floation process	1/2
	(ii) Magnetic separation	1/2
	(iii) Leaching	1/2
18	a. For bcc structure	
	$a = 4r/\sqrt{3}$ or $r = \sqrt{3}a/4$	1/2
	r=√2 × 400 pm /4	
	$r=\sqrt{3} \times 400 \text{ pm } /4$ = 1.732 x 400 pm/4	
	= 173.2 pm	1/2
	b.	/2
	(i) Impurity defect	1
	(ii) Cationic vacancies are created.	1
19	a. Due to steric hindrance and +I effect caused by two alkyl	1/2+1/2
	groups in propanone.	
	b. Due to electron withdrawing nature of –NO₂ group which	
	increases the acidic strength and decreases the pK <sub>a</sub> value.	1
	c. $(CH_3)_2CH$ -CHO has one $\alpha$ -H atom whereas $\alpha$ - H atom is	
20	absent in (CH <sub>3</sub> ) <sub>3</sub> C-CHO.	1 1/. 1/
20	a. Chloroprene, CH <sub>2</sub> =C(Cl)-CH=CH <sub>2</sub>	1/2+1/2
	b. 1,3- Butadiene & Acrylonitrile	1/2+ 1/2
	$CH_2=CH-CH=CH_2$ & $CH_2=CHCN$	, - , , 2
		1

	c. 3-Hydroxybutanoic acid & 3-Hydroxypentanoic acid CH <sub>3</sub> CH(OH)CH <sub>2</sub> COOH & CH <sub>3</sub> CH <sub>2</sub> CH(OH)CH <sub>2</sub> COOH	1/2+1/2
21	a) It is the magnitude of difference in energy between the	1
	two sets of d orbital i.e. t <sub>2</sub> g and e <sub>g</sub>	
	$t_{2g}^4 eg^0$	1
	<b>b)</b> sp <sup>3</sup> d <sup>2</sup> , paramagnetic	1/2 + 1/2
22	a. Methanol and 2-methyl-2-iodopropane are formed.	
	CH <sub>3</sub> CH <sub>3</sub>	
	$CH_3$ - $\dot{C}$ - $O$ - $CH_3$ + $HI$ $\longrightarrow$ $CH_3OH$ + $CH_3$ - $\dot{C}$ - $I$	1
	ĊH <sub>3</sub> ĊH <sub>3</sub>	1
	b. 2-Methoxy acetophenone and 4 -Methoxy	
	acetophenone are formed	
	OCH <sub>3</sub> OCH <sub>3</sub>	
	+ CH <sub>3</sub> COCl Anhyd. AlCl <sub>3</sub> + COCH <sub>3</sub> + CH <sub>3</sub> COCl	
	Y	1
	COCH <sub>3</sub>	
	c. o-Bromophenol and p-Bromophenol are formed.	
	ОН ОН	
	Br in CS Br	
	$ \begin{array}{c c} & \text{Br}_2 \text{ in CS}_2 \\ \hline 273 \text{ K} \end{array} + $	1
	V V	_
	DI	
	(Award full marks if the student writes only equation)	
23	(i)Concerned , caring, socially alert, leadership ( or any other	1/2 + 1/2
	2 values)	
	(ii)starch	1
	(ii)starch	1
	(iii) $\alpha$ -Helix and $\beta$ -pleated sheets	1/2 + 1/2
	(iv)Vitamin B / $B_1$ / $B_2$ / $B_6$ / $C$ (any two )	1/2 + 1/2
2.4		4. 5. 5
24	0	1×5=5
	NHCOCH3 HN CH3	
	NH <sub>2</sub>	
	(A) (B) (C) NO <sub>2</sub>	
	(0)	

	(D) (E) NH <sub>2</sub> NH <sub>3</sub> HSO <sub>4</sub>	
	NO <sub>2</sub>	
	OR	
24	a. i) iii) iii) CN	
		1,1,1
	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	1
	by addition of phenol. Aniline gives orange dye  (or any other correct test)	1
25.	k= <u>2.303</u> log <u>[A]</u> t [A]	1/2
	$= 2.303 \log_{100} 100$ $= 2.303 \log_{100} 4$ $= 2.303 \log_{100} 4$ $= 2.303 \times 0.6021$	1/2
	$k = 0.0347 \text{ min}^{-1}$	1/2
	$t_{1/2} = 0.693$ k	1/2

	t <sub>1/2</sub> = <u>0.693</u> = 19.98 min = 20min	
	0.0347 min <sup>-1</sup>	1
	b. (i) first order reaction	1
	(ii) zero order reaction	1
	OR	
25	(a)	
	Rate = $k [NO]^x [O_2]^y$	
	$7.2 \times 10^{-2} = k[0.3]^{x} [0.2]^{y}$ Eqn (1)	
	$6.0 \times 10^{-3} = k[0.1]^{x} [0.1]^{y}$ Eqn (2)	
	$2.88 \times 10^{-1} = k[0.3]^{x}[0.4]^{y}$ Eqn (3)	
	$2.40 \times 10^{-2} = k [0.4]^{x} [0.1]^{y}$ Eqn (4)	
	Dividing eqn 4 by eqn 2	
	$\frac{2.40 \times 10^{-2} = k[0.4]^{x} [0.1]^{y}}{2.24 \times 10^{-3}}$	
	$6.0 \times 10^{-3} = k[0.1]^{x} [0.1]^{y}$	
	x=1	1
	Dividing eqn 3 by eqn 1	
	$\frac{2.88 \times 10^{-1} = k[0.3]^{x} [0.4]^{y}}{2.88 \times 10^{-2}}$	
	$7.2 \times 10^{-2} = k[0.3]^{x} [0.2]^{y}$	
	y = 2	1
	order w.r.t. NO = 1, order w.r.t $O_2$ is 2	1/2 , 1/2
	(b) Rate law	
	Rate = $k [NO]^1 [O_2]^2$ , The overall order of the reaction is 3.	1/2 + 1/2
	c. rate constant $k = \frac{rate}{rate} = \frac{7.2 \times 10^{-2}}{rate}$	/2 T /2
	$[NO]^{1}[O_{2}]^{2} = 0.3 \times (0.2)^{2}$	
	$k = 6.0 \text{ mol}^{-2} \text{ L}^2 \text{ min}^{-1}$	1
26.	a. (i) Thermal stability of hydrides decreases down the	1
20.	group/ Bond dissociation enthalpy decreases down the group.	_
	(ii) Because Cl <sub>2</sub> in presence of moisture liberates nascent	1
	oxygen.	_
	(iii) Interatomic interactions are weak	1
	(iii) interactions are weak	_
	b.(i) (ii)	
	~·(·)	L

	P P Xc F	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 <sub>3</sub> /Phosphine	1	
	d) XeF <sub>2</sub>	1	
	e) $[Fe(H_2O)_6]^{2+} + NO - \rightarrow [Fe(H_2O)_5(NO)]^{2+} + H_2O$	1	

			T	
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