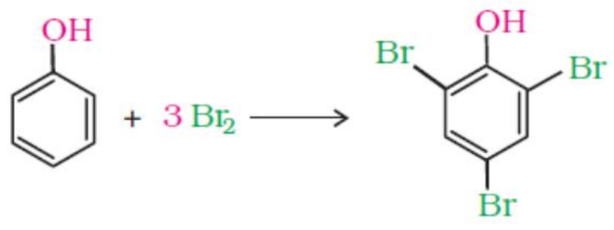
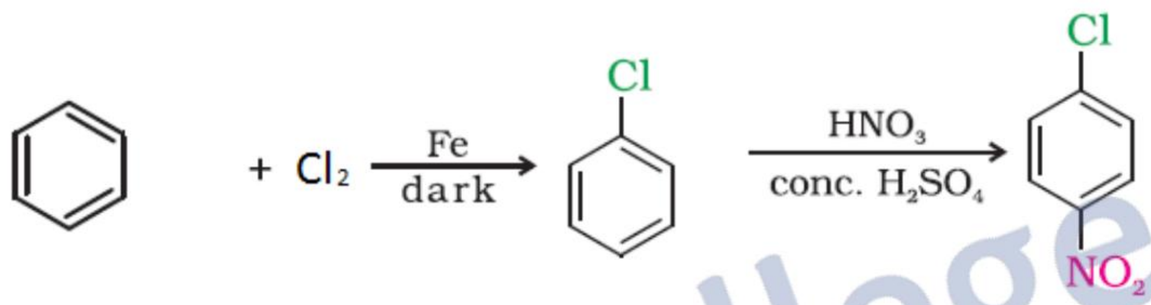
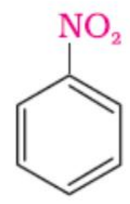
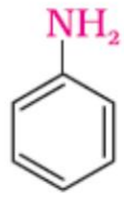
Marking scheme – 2017 (Compartment)

CHEMISTRY (043)/ CLASS XII

Set 56/3

Q.No	Value Points	Marks
1	 / 2,4,6-Tribromophenol is formed	1
2	Dichloridobis(ethane-1,2-diamine)cobalt(III) ion	1
3	AgBr	1
4	N,N-dimethylbutan-1-amine	1
5	Dispersed phase - liquid/ water ; Dispersion medium – liquid/ oil	1
6	a) CH_3-CH(Br)-CH_3 $\xrightarrow{\text{alc KOH}}$ CH_3-CH=CH_2 $\xrightarrow{\text{HBr, Peroxide}}$ CH_3-CH_2-CH_2-Br b) . 	1 1
7	i) Due to absence of unpaired electrons ii) Due to high $\Delta_a H^\ominus$ and low $\Delta_{hyd} H^\ominus$	1 1
8	Hypophosphorous acid is a good reducing agent as it contains two P-H bonds. There is no P-H bond in orthophosphoric acid , so it is not a reducing agent Example : It reduces $AgNO_3$ to metallic silver/ chemical equation	1 1
9	Cu^{2+} (aq) + $2e^-$ → Cu (s) Because it has higher reduction potential	1 1
10.	i) Zero Order ii) Pseudo-first Order	1 1
11	a) i)The impurities are more soluble in the melt than in the solid state of the metal. ii)The more basic / reactive metal gets deposited at the cathode and the less basic / reactive ones go to the anode mud. b) i)Ni ii) Ti/Zr	1 1 ½ , ½
12	i) High energy of activation is needed ii) Blood being a colloidal solution, it gets coagulated by alum (an electrolyte). iii) Dust particles along with water suspended in air scatter blue light which reaches our eyes.	1 1 1
13	A: Na_2CrO_4 ; B: $Na_2Cr_2O_7$ $4\ FeCr_2O_4 + 8\ Na_2CO_3 + 7\ O_2 \rightarrow 8\ Na_2CrO_4 + 2\ Fe_2O_3 + 8\ CO_2$ $2Na_2CrO_4 + 2\ H^+ \rightarrow Na_2Cr_2O_7 + 2\ Na^+ + H_2O$	½ , ½ 1 1
	OR	
13	a) i)Due to d-d transition ii)Due to higher oxidation state of Mn in Mn_2O_7 / Due to high polarizing power of Mn(VII). b) $\mu = \sqrt{4(4+2)} = 4.90$ B.M	1 1 1
14	$\Delta rG^\circ = -nFE^\circ_{cell}$, n=6	½

*These answers are meant to be used by evaluators

	= - 6 × 96500 C/ mol × 2.02V = -1169580 J /mol or -116.958 kJ/mol E^{o}_{cell}= 0.059V / n × log Kc log Kc = 2.02 V ×6 / 0.059V = 205.42	 1 ½ 1
15	In bcc, z=2 ; d = (zxM) /a^3x N_A (i) Putting values of M in equation (i) M= 7.2g/ cm^3 x(288 x10^{-10} cm)^3 N_A / 2 = 51.8 g/ mol (or any other correct method)	 1 1 1
16	a) i)Due to –I effect of X , the ring gets deactivated ii)They fail to form Hydrogen bonds with water/ more energy is required to break hydrogen bonds in water and less energy is released when new attractions are set up. b)2-Bromo-2-methylbutane < 2-Bromopentane < 1-Bromopentane	1 1 1
17	i) A: CH_3- CH_2CN ; B: CH_3- CH_2- CH_2NH_2 ; C: CH_3- CH_2- CH_2-NH-$COCH_3$ ii) A: $Ar-\overset{+}{N}_2B\overset{-}{F}_4$; B:  C : 	½ ×3 ½ ×3
18.	a) Because they are excreted in urine and cannot be stored in body; Vitamin C / B_1 / B_2/ B_6 b) i) Essential amino acids are those which cannot be synthesized in the body and are supplied through diet whereas non-essential amino acid can be synthesized in the body ii) In fibrous proteins , the polypeptide chains run parallel and are held together by hydrogen or disulphide bonds while in globular, polypeptide chains coil around to give a spherical shape	½ , ½ 1 1
19.	i) Phenol / 0.2 % phenol is antiseptic while 1% is disinfectant. ii) Aspartame iii) Cationic detergents are quaternary ammonium salts of amines with acetates, chlorides or bromides as anions/ Cationic part has a long chain hydrocarbon which is involved in cleansing action.	1 1 1
20.	i) $[Cr(H_2O)_6]$ Cl_3 ii) Hexaaquachromium(III) chloride iii) Paramagnetic and high spin	1 1 ½ , ½
21	$t_{1/2}= \frac{0.693}{k}$ k= = $\frac{0.693}{693\ s}$ = 0.001 s^{-1} k= $\frac{2.303}{t}$ log [R]o/[R] t= $\frac{2.303}{k}$ log [R]o/[R] =$\frac{2.303}{0.001}$ log 100/10 k = 2303 s	½ 1 ½ 1
22	a) Due to resonance, phenoxide ion is more stable than phenol whereas there is no resonance in alkoxide ion / explained with the help of resonating structures. b) .	1

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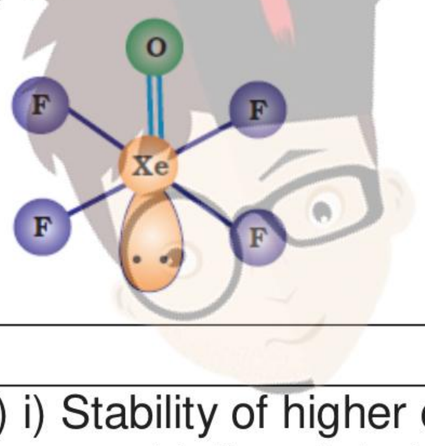
	(i) $CH_3–CH_2–\ddot{O}–H + H^+ \longrightarrow CH_3–CH_2–\overset{+}{\underset{H}{\ddot{O}}}–H$	½
	(ii) $CH_3CH_2–\ddot{O}(H):\ + CH_3–CH_2–\overset{+}{O}(H)H \rightarrow CH_3CH_2–\overset{+}{O}(H)–CH_2CH_3 + H_2O$	1
	(iii) $CH_3CH_2–\overset{+}{O}(H)–CH_2CH_3 \longrightarrow CH_3CH_2–O–CH_2CH_3 + H^+$	½
23	a) ***Poly β-hydroxybutyrate – co-β-hydroxyvalerate / (PHBV)***	½
	Monomers : $CH_3–\underset{OH}{CH}–CH_2–COOH$, $CH_3–CH_2–\underset{OH}{CH}–CH_2–COOH$	½ , ½
	Repeating unit : $\left(O–\underset{CH_3}{CH}–CH_2–\underset{O}{C}–O–\underset{CH_2CH_3}{CH}–CH_2–\underset{O}{C}\right)_n$	½
	b) PHBV is used in speciality packaging, orthopaedic devices and in controlled release of drugs.(any two)	½ , ½
	c) Concern for environment , caring (or any other)	½ , ½
24	a) A: NO_2 ; B: N_2O_4	½ , ½ ,
	$NaNO_3$ + conc. $H_2SO_4 \longrightarrow NaHSO_4 + HNO_3$ (or any other nitrate)	1
	$Cu + 4\ HNO_3 \longrightarrow Cu(NO_3)_2 + 2\ NO_2 + 2\ H_2O$	1
	$2NO_2 \xrightarrow{cool} N_2O_4$	1
	b) . 	1
	OR	
24	a) i) Stability of higher oxidation state decreases down the group from S to Te/ Stability of lower oxidation state increases down the group from S to Te.	1
	ii) ClO_3^- is more stable than ClO^- / ClO_3^- is a weak conjugate base than than ClO^- / Due to higher oxidation state of chlorine in $HClO_3$	1
	iii) Fluorine and oxygen are most electronegative and very reactive.	1
	b)	
	i) . $4NaCl + MnO_2 + 4H_2SO_4 \rightarrow MnCl_2 + 4NaHSO_4 + 2H_2O + Cl_2$	1
	ii). $6XeF_4 + 12\ H_2O \rightarrow 4Xe + 2XeO_3 + 24\ HF + 3\ O_2$	1
25	a) i) Due to steric and + I effect of two methyl groups in propanone.	1
	ii) Because it is a deactivating group / Due to electron withdrawing carboxylic group resulting in decreased electron density at o- and p- position.	1
	iii) Due to resonance, electrophilicity of carbonyl carbon is reduced.	1
	b) i) Add NaOH and I_2 to both the compounds and heat, acetophenone forms yellow ppt of iodoform.	1
	ii) Add $NaHCO_3$ solution to both the compounds, Benzoic acid will give effervescence and liberates CO_2.	1
	(Or any other suitable test)	

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	OR	
25	a) A: CH_3CHO ; B: CH_3-CH(OH)-CH_2-CHO ; C: CH_3-CH=CH-CHO ; D: CH_3-CH(CH_3)-OH b) CH_3-O-CH_3 < CH_3CHO < CH_3-CH_2-OH < CH_3-COOH	1×4 1
26	a) Vapour pressure of the solvent decreases in the presence of non – voilatile solute (glucose) hence boiling point increases b) $p_{CO2} = K_H X_{CO2}$ $X_{CO2} = p_{CO2}/ K_H$ $= 2.53 \times 10^5$ Pa / 1.67×10^8 Pa = 1.51×10^{-3} n_{H2O} = 500g / 18 g/mol = 27.77 mol Let n_{CO2} = n mol X_{CO2} = n/ (27.77 +n) = 1.51×10^{-3} n_{CO2} = $1.51 \times 10^{-3} \times 27.77$ mol = 0.042 mol	2 ½ 1 ½ 1
	OR	
26	a) i) The solutions which obey Raoult's law over the entire range of concentration. ii) It is the excess pressure that must be applied to a solution to prevent osmosis. **b)** $\Delta T_b = i K_b m$ Here , $m = w_B x 1000/ M_B X w_A$ ΔT_b =[3 x 0.512 K kg $mol^{-1} \times 1000 \times 10$ g] / [111 g mol^{-1} x200g] = 0.69K	1 1 1 1 1

1	Dr. (Mrs.) Sangeeta Bhatia		6	Sh. Rakesh Dhawan	
2	Dr. K.N. Uppadhya		7	Dr. (Mrs.) SunitaRamrakhiani	
3	Prof. R.D. Shukla		8	Mrs. Preeti Kiran	
4	Sh. S.K. Munjal		9	Dr. Azhar Aslam Khan	
5	Sh. D.A. Mishra		10	Ms. GarimaBhutani	

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