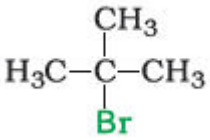
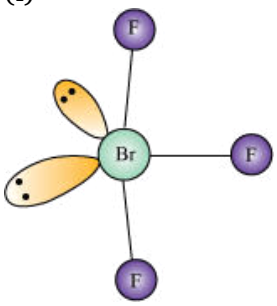
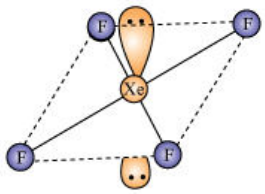
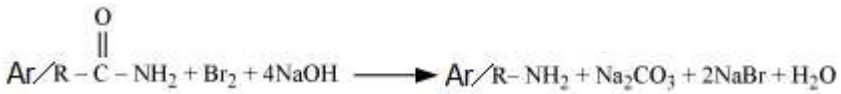
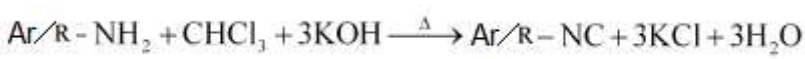
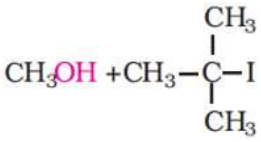
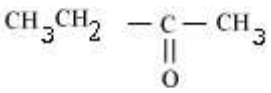
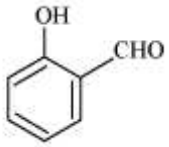
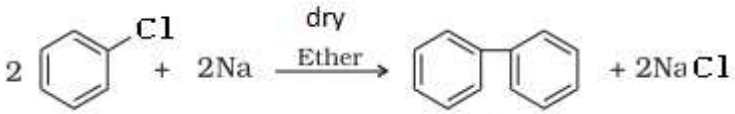
CHEMISTRY (043) MARKING SCHEME 2016

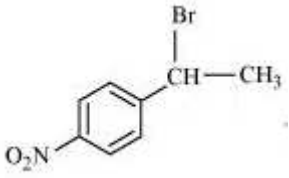
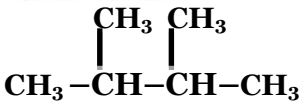
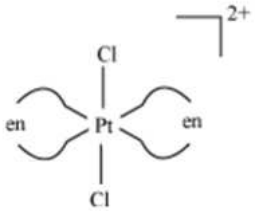
SET-56/1/C

Q	VALUES POINTS	MARKS
1		1
2	NO2	1
3	(i) Molecular Solid - I_2 (ii) Ionic Solid - NaCl (Any other suitable example)	½ + ½
4	2- Phenylethanol	1
5	Like charged particles cause repulsion / Brownian movement / solvation	1
6	(i) Gas B , Higher the value of K_H lower is the solubility of gas / $p = K_H x$ (ii) Negative deviation from Raoult's law	½ + ½ 1
7	(i)  ii) 	1+1
	OR	
7	(i) $2Fe^{3+} + SO_2 + 2H_2O \longrightarrow 2Fe^{2+} + SO_4^{2-} + 4H^+$ (ii) $XeF_4 + SbF_5 \longrightarrow [XeF_3]^+ [SbF_6]^-$	1 1
8	(i) $[Co(NH_3)_6]Cl_3$ (ii) Hexaamminecobalt(III) chloride	1 1
9	(i) Zero order reaction, Molecularity is 2 / bimolecular reaction (ii) mol L^{-1} s^{-1}	½ +½ 1

10	(i)  (ii)  (where R=alkyl group , Ar=aryl group)	1 1
11	z= 2 d = $\frac{z \times M}{a^3 \times N_o}$ N= z × M/ d × a^3 N= 2× 300 g / [7.5 g cm^{-3} (5 × 10^{-8} cm)^3] N= 6.4 × 10^{23} atoms OR d = $\frac{z \times M}{a^3 \times N_o}$ 7.5 = $\frac{2 \times M}{(500)^3 \times 10^{-30} \times 6.022 \times 10^{23}}$ M = $\frac{7.5 \times 125 \times 10^{-24} \times 6.022 \times 10^{23}}{2}$ = 282.3g/mol 282.3 g = 6.022 × 10^{23} atoms 300 g = $\frac{6.022 \times 10^{23} \times 300}{282.3}$ = 6.4 × 10^{23} atoms	½ ½ 1 1 ½ 1 ½ 1
12	Given: Initial pressure, P_o = 0.30 atm P_t = 0.50 atm t = 300 s Rate constant, k = $\frac{2.303}{t}$ log $\frac{P_o}{2P_o - P_t}$ = $\frac{2.303}{300\ s}$ log $\frac{0.30}{2 \times 0.30 - 0.50}$ = $\frac{2.303}{300\ s}$ log $\frac{0.30}{0.60 - 0.50}$ = $\frac{2.303}{300\ s}$ log $\frac{0.30}{0.10}$ = $\frac{2.303}{300\ s}$ log 3	1 1

	$= \frac{2.303}{300\ s} \times 0.4771$ $= \frac{1.099}{300\ s}$ $=0.0036\ s^{-1}$ / $3.66 \times 10^{-3}\ s^{-1}$ (deduct ½ mark if unit is not written)	1
13	i) Liquid loving/ solvent loving. ii) Potential difference between the fixed layer and diffused / double layer of opposite charges iii) Some substances at higher concentration exhibit colloidal behaviour due to formation of aggregates. The aggregated particles thus formed are called associated colloids or micelles	1 1 1
14	(i) Mond's Process (ii) The melting point of alumina is very high. It is dissolved in cryolite which lowers the melting point and brings conductivity / acts as a solvent. (iii) Limestone is decomposed to CaO ,which removes silica impurity of the ore as slag. OR $CaCO_3 \xrightarrow{\Delta} CaO + CO_2$ $C\ aO + SiO_2 \longrightarrow CaSiO_3$ Slag	1 1 1
15	$\Delta T_b = i\ K_b.m$ $i=2$ $= i \times K_b \times \frac{w_2 \times 1000}{M \times W_1}$ $= 2 \times 0.52K\ kg\ mol^{-1} \times \frac{4\ g \times 1000\ g/kg}{120\ g/mol \times 100g}$ $= \frac{2 \times 0.52}{3}$ $= 0.346\ K$ Boiling point of water = 373.15 K / 373 K $T_b = T_b^o + \Delta T_b$ = 373.15 K + 0.346 K / 373 K + 0.346 K = 373.496 K / 373.346 K	½ 1 ½ 1
16	i) Because stability of higher oxidation state decreases as we move down the group / S is more stable in higher (+6) oxidation state whereas Te is more stable in +4 oxidation state. (ii) Due to absence of d orbital.	1 1

	(iii)Because I – Cl bond is weaker than I-I bond.	1
17	(a)  (b)  (c) 	1 1 1
18	(i) Aniline is a Lewis base while $AlCl_3$ is lewis acid. They combine to form a salt. (ii) Due to combined + I and solvation effects. (iii) Due to presence of H-bonding in primary amines.	1 1 1
19	(i)  (ii) $CH_3CH{=}CH_2 \xrightarrow{HBr\ /\ peroxide} CH_3CH_2CH_2Br \xrightarrow{NaI/acetone} CH_3CH_2CH_2I$ (iii) 	1 1 1

	OR	
19	(i) 	1
	(ii) 	1
	(iii) CH_3CH_2NC	1
20	(i) On vulcanization , sulphur forms cross links at the reactive sites of double bond, the rubber gets stiffened.	1
	(ii) Ethylene glycol / HO – CH_2 CH_2 – OH, Terephthalic acid / 	1
	(iii) Neoprene < Polythene < Terylene	1
21	(i) Starch - Polymer of α –D- glucose units / Polymer of α - glucose units. Cellulose – polymer of β-D -glucose units / polymer of β -glucose units.	1
	(ii) Phosphodiester linkage	1
	(iii) Fibrous protein – Keratin / myosin / collagen Globular protein - haemoglobin / insulin	½ +½
22	(i) sp^3d^2 , paramagnetic, high spin	1+½+½
	(ii) 	1
23	(i) Caring nature, supportive, aware (or any other two suitable values)	½ + ½

	(ii) Antacids are the medicines used to control acidity in stomach. Ex – mixture of aluminium and magnesium hydroxide / sodium hydrogen carbonate / Zantac / Ranitidine (or any other suitable example) (iii) No, Excessive antacid can make the stomach alkaline and trigger the production of more acid.	1+ ½ ½ + 1
24	a) $E_{cell} = E^0_{cell} - \frac{0.0591\ V}{n} \log \frac{[Al^{3+}]^2}{[Cu^{2+}]^3}$ $E^0_{cell} = E_{cell} + \frac{0.0591\ V}{n} \log \frac{[Al^{3+}]^2}{[Cu^{2+}]^3}$ $E^0_{cell} = 1.98\ V + \frac{0.0591\ V}{6} \log \frac{(0.01)^2}{(0.01)^3}$ $E^0_{cell} = 1.98\ V + \frac{0.0591\ V}{6} \log 10^2$ $E^0_{cell} = 1.98\ V + \frac{0.0591\ V}{6} \times 2 \times \log 10 \quad [\because \log 10 = 1]$ $E^0_{cell} = 1.98\ V + \frac{0.0591\ V}{6} \times 2$ $E^0_{cell} = 1.98\ V + 0.0197\ V$ $E^0_{cell} = 1.9997\ V$ (b) A , because its E^0 value is more negative.	1 1 1 1+1
	OR	
24	**(a)** $\Lambda_m{}^c = \kappa \times 1000/C$ $= 3.905 \times 10^{-5} \times 1000/ 0.001$ $= 39.05\ S\ cm^2/mol$ $CH_3COOH \rightarrow CH_3COO^- + H^+$ $\Lambda^o\ CH_3COOH = \lambda^o\ CH_3COO^- + \lambda^o\ H^+$ $= 40.9 + 349.6$ $\Lambda^o\ CH_3COOH = 390.5\ S\ cm^2/mol$	½ 1

	$\alpha = \frac{\Lambda_m}{\Lambda_m^0}$	½
	= 39.05/ 390.5	1
	= 0.1	
	(b) Device used for the production of electricity from energy released during spontaneous chemical reaction and the use of electrical energy to bring about a chemical change.	1
	The reaction gets reversed / It starts acting as an electrolytic cell & vice – versa.	1
25	**(a)**	
	i) Ability of oxygen to form multiple bond with Mn metal.	1
	ii) Cr^{2+} is oxidized to Cr^{3+} which has stable d^3 / t^3_{2g} orbital configuration	1
	iii) Cu^{2+} has unpaired electron while Zn^{2+} has no unpaired electron.	1
	(b)	
	i) $2MnO_2 + 4KOH + O_2 \xrightarrow{\triangle} 2K_2MnO_4 + 2H_20$	1
	ii) $Cr_2O_7^{2-} + 14\ H^+ + 6\ I^- \longrightarrow 2Cr^{3+} + 7H_2O + 3\ I_2$	1
	(balanced equation is required)	
	OR	
25	i) Mn. It has maximum unpaired electrons.	½ +1
	ii) Cr	1
	iii) Sc	1
	iv) Manganese. Mn^{3+} to Mn^{2+} results in the stable half filled (d^5) configuration.	½ +1
26	**(a)**	
	(i) A: CH_3CHO , B: $CH_3CH{=}N{-}OH$	½ + ½
	(ii) A: CH_3COOH , B: CH_3COCl	½ + ½
	(b)	
	(i) Heat both compounds with NaOH and I_2, $C_6H_5COCH_3$ forms yellow ppt of CHI_3 whereas C_6H_5CHO does not.	1
	(ii) Add ammonical solution of silver nitrate (Tollen's reagent) to both the compounds, HCOOH gives silver mirror but CH_3COOH does not.	1
	(or any other suitable test)	
	(C) $CH_3CHO < CH_3CH_2OH < CH_3COOH$	1

	OR	
26	**(a)** 	1
	(b) $C_6H_5COCH_3 < CH_3COCH_3 < CH_3CHO$	1
	(c) Because of resonance in carboxylic group the carbonyl group loses a double bond character.	1
	(d) $CH_3CH_2CH=CH-CH_2CHO$	1
	(e) A : CH_3CH_2CHO B : CH_3COCH_3	½ + ½

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