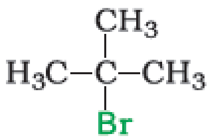
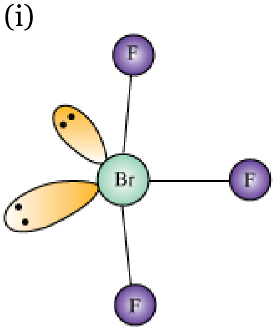
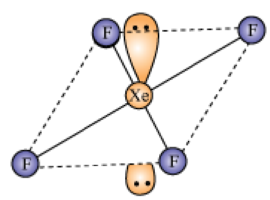
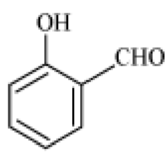
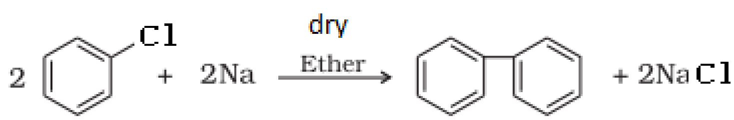
CHEMISTRY (043) MARKING SCHEME 2016

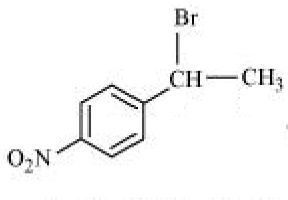
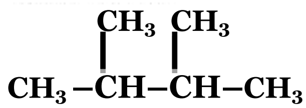
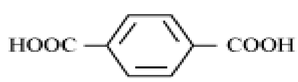
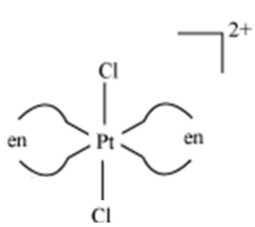
SET-56/1/C

Q	VALUES POINTS	MARKS
1		1
2	NO_2	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) $$Ar/R-\overset{\overset{O}{\parallel}}{C}-NH_2 + Br_2 + 4NaOH \longrightarrow Ar/R-NH_2 + Na_2CO_3 + 2NaBr + H_2O$$ (ii) $$Ar/R-NH_2 + CHCl_3 + 3KOH \xrightarrow{\Delta} Ar/R-NC + 3KCl + 3H_2O$$ (where R=alkyl group , Ar=aryl group)	1 1
11	z= 2 $d = \frac{z \times M}{a^3 \times N_o}$ $N = z \times M / d \times a^3$ $N = 2 \times 300\ g / [7.5\ g\ cm^{-3} (5 \times 10^{-8}\ cm)^3]$ $N = 6.4 \times 10^{23}$ 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 = $\frac{6.022 \times 10^{23} \times 300}{282.3}$ $= 6.4 \times 10^{23}$ 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 $CaCO_3 \xrightarrow{\triangle} CaO + CO_2$ $CaO + SiO_2 \longrightarrow CaSiO_3$ (Slag)	1 1 1
15	$\Delta T_b = i\ K_b.m$ $i=2$ $= i \times K_b \times \frac{w_2 \times 1000}{M \times W_1}$ $= 2 \times 0.52K\ kg\ mol^{-1} \times \frac{4\ g \times 1000\ g/kg}{120\ g/mol \times 100 g}$ $= \frac{2 \times 0.52}{3}$ $= 0.346\ K$ 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) $CH_3OH + CH_3-C(CH_3)_2-I$	1
	(b) $CH_3CH_2-C(=O)-CH_3$	1
	(c) 	1
18	(i) Aniline is a Lewis base while $AlCl_3$ is lewis acid. They combine to form a salt.	1
	(ii) Due to combined + I and solvation effects.	1
	(iii) Due to presence of H-bonding in primary amines.	1
19	(i) 	1
	(ii) $CH_3CH=CH_2 \xrightarrow{\text{HBr / peroxide}} CH_3CH_2CH_2Br \xrightarrow{\text{NaI/acetone}} CH_3CH_2CH_2I$	1
	(iii) $CH_3CH_2CH(Br)CH_3 \xrightarrow{\text{Alc.KOH}} CH_3CH=CHCH_3$	1

	OR	
19	(i)  (ii)  (iii) CH_3CH_2NC	1 1 1
20	(i) On vulcanization , sulphur forms cross links at the reactive sites of double bond, the rubber gets stiffened. (ii) Ethylene glycol / HO – CH_2 CH_2 – OH, Terephthalic acid /  (iii) Neoprene < Polythene < Terylene	1 1 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. (ii) Phosphodiester linkage (iii) Fibrous protein – Keratin / myosin / collagen Globular protein - haemoglobin / insulin	1 1 ½ +½
22	(i) sp^3d^2 , paramagnetic, high spin (ii) 	1+½+½ 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) $E_{cell} = E^0_{cell} - \frac{0.0591\ V}{n} \log \frac{[Al^{3+}]^2}{[Cu^{2+}]^3}$ $E^0_{cell} = E_{cell} + \frac{0.0591\ V}{n} \log \frac{[Al^{3+}]^2}{[Cu^{2+}]^3}$ $E^0_{cell} = 1.98\ V + \frac{0.0591\ V}{6} \log \frac{(0.01)^2}{(0.01)^3}$ $E^0_{cell} = 1.98\ V + \frac{0.0591\ V}{6} \log 10^2$ $E^0_{cell} = 1.98\ V + \frac{0.0591\ V}{6} \times 2 \times \log 10$ [∵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

	$\alpha = \frac{\Lambda_m}{\Lambda_m^0}$ $= 39.05/ 390.5$ $= 0.1$ **(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. The reaction gets reversed / It starts acting as an electrolytic cell & vice – versa.	½ 1 1 1
25	**(a)** i) Ability of oxygen to form multiple bond with Mn metal. ii) Cr^{2+} is oxidized to Cr^{3+} which has stable d^3 / t^3_{2g} orbital configuration iii) Cu^{2+} has unpaired electron while Zn^{2+} has no unpaired electron. **(b)** i) $2MnO_2 + 4KOH + O_2 \xrightarrow{\triangle} 2K_2MnO_4 + 2H_20$ ii) $Cr_2O_7^{2-} + 14 H^+ + 6 I^- \longrightarrow 2Cr^{3+} + 7H_2O + 3 I_2$ (balanced equation is required)	1 1 1 1 1
	OR	
25	i) Mn. It has maximum unpaired electrons. ii) Cr iii) Sc iv) Manganese. Mn^{3+} to Mn^{2+} results in the stable half filled (d^5) configuration.	½ +1 1 1 ½ +1
26	**(a)** (i) A: CH_3CHO , B: $CH_3CH=N-OH$ (ii) A: CH_3COOH , B: CH_3COCl **(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. (ii) Add ammonical solution of silver nitrate (Tollen's reagent) to both the compounds, HCOOH gives silver mirror but CH_3COOH does not. (or any other suitable test) (C) $CH_3CHO < CH_3CH_2OH < CH_3COOH$	½ + ½ ½ + ½ 1 1 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) $CH_3CH_2CH{=}CH\text{-}CH_2CHO$	1
	(e) A : CH_3CH_2CHO B : CH_3COCH_3	½ + ½

Name	**Signature**	Name	**Signature**
Dr. (Mrs.) Sangeeta Bhatia		Sh. S.K. Munjal	
Dr. K.N. Uppadhya		Sh. D.A. Mishra	
Prof. R.D. Shukla		Sh. Rakesh Dhawan	
Dr. (Mrs.) Sunita Ramrakhiani		Ms. Nirmala Venkateswaran	
Sh. S. Vallabhan, Principal		Mrs. Deepika Arora	
Mr. K.M. Abdul Raheem		Ms. Minakshi Gupta	
Mrs. Sushma Sachdeva		Sh. Mukesh Kaushik	
Ms. Seema Bhatnagar		Mr. Roop Narayan	
Sh. Pawan Singh Meena		Ms. Garima Bhutani	
Sh. Praveen Kumar Agrawal			