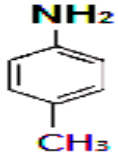
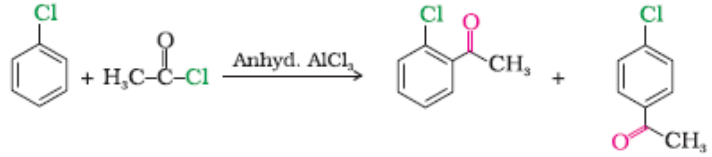
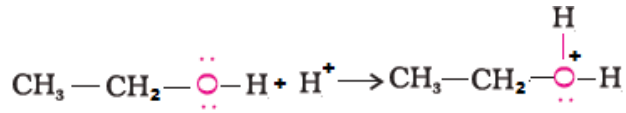
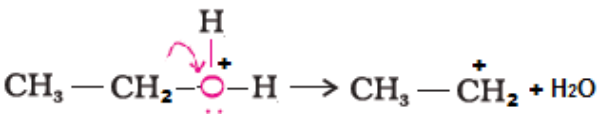
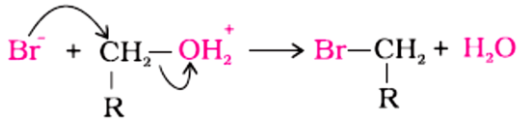
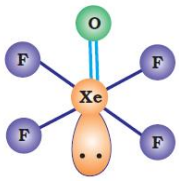
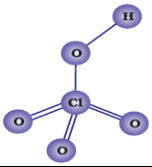
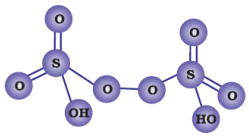
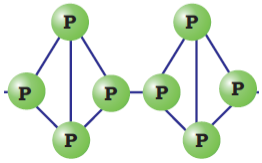
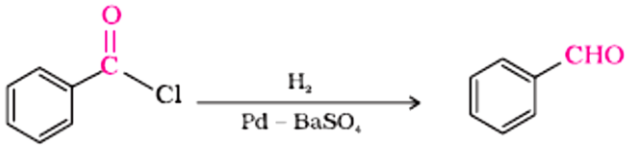
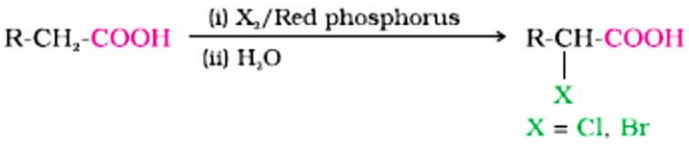
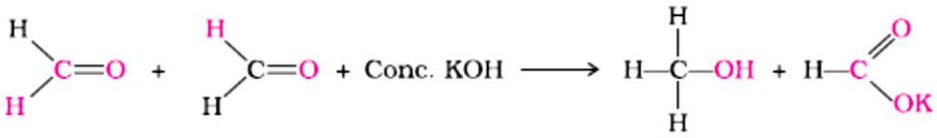
MARKING SCHEME
Chemistry – 2014
FOREIGN – SET (56/2/3)

1	NaCN	1
2	Associated colloids	1
3	$BiH_3 < SbH_3 < AsH_3 < PH_3 < NH_3$	1
4	Linkage isomerism	1
5	Propane – 1, 2, 3 – triol	1
6	 ; because of electron donating (+I effect) CH_3 group	½+½
7	Enzymes/ They increase the rate of chemical reactions in living organisms. Eg: Lipase(or any other)	½+½
8	$r=\frac{\sqrt{3}}{4}a$ or $4r=\sqrt{3}\,a$	1
9	(i) Iodine reacts with Zr to form volatile compound ZrI_4 which on further heating at higher temperature decomposes to give pure Zr. (ii) It acts as a flux to remove FeO impurity in the form of slag.	1 1
10	Rhombic and Monoclinic Rhombic Sulphur Rhombic sulphur changes to monoclinic sulphur	1 ½ ½
	Or	
10	a) High pressure and low temperature b) Because ionization of $HSO^-_4$is difficult / removal of proton from negatively charged $HSO^-_4$is difficult.	1 1
11	(i) $2MnO_4^- + 5SO_3^{2-} + 6H^+ \rightarrow 2Mn^{2+} + 5SO_4^{2-} + 3H_2O$ (ii) $2CrO_4^{2-} + 2H^+ \rightarrow Cr_2O_7^{2-} + H_2O$	1 1
12	d^2sp^3, Octahedral Hexaamminecobalt (III)	½+½ 1
13	(i) $CH_3\text{-}CH_2\text{-}Cl + alc\ KOH \rightarrow CH_2 = CH_2 + KCl + H_2O$ (ii) 	1 1
14	$\mathbf{HBr \rightarrow H^+ + Br^-}$  	½ ½

	$CH_3\overset{+}{C}H_2 \xrightarrow{Br^-} CH_3-CH_2-Br$ Or  (where R = $-CH_3$)	1
15	(i) Zn dust (ii) conc H_2SO_4 (iii) CH_3COCl and anhyd. $AlCl_3$ (iv) Cu at 573K	½ ×4
16	m= z It I=5 A t= 20 x 60s = 1200s m= $\frac{\text{atomic mass}}{\text{n x F}}$= x I x t m= $\frac{58.7g\ mol^{-1}}{2 \text{ x } 96500 \text{ C } mol^{-1}}$ x 5 A x 1200 s m= 1.825 g (or any other suitable method)	½ ½ 1
17	Half-life of a reaction is the time in which the concentration of a reactant is reduced to half of its initial concentration. (i) (ii) $t_{1/2} = \frac{[R]_0}{2k}$ $t_{1/2} = \frac{0.693}{k}$	1 ½+½
18	a) 1-Bromobutane / $CH_3\ CH_2\ CH_2\ CH_2Br$ Because it is a primary alkyl halide b) Because carbocation formed in S_N1 reaction is sp^2 hybridized and planar.	½+½ 1
19	$SO_2\ Cl_2 \rightarrow SO_2 + Cl_2$ At t = 0s 0.4 atm 0 atm 0 atm At t = 100s (0.4 – x) atm x atm x atm Pt = 0.4 – x + x + x Pt = 0.4 + x 0.7 = 0.4 + x x = 0.3 k = $\frac{2.303}{t}$ log $\frac{p_i}{2p_i - p_t}$ k = $\frac{2.303}{t}$ log $\frac{0.4}{0.8-0.7}$ k = $\frac{2.303}{100}$ log $\frac{0.4}{0.1}$ k = $\frac{2.303}{100}$ x 0.6021 = 1.39 x 10^{-2} s^{-1}	 1 1 1

20	(i) Schottky defect, due to similar size of K^+ and Cl^- ion (ii) n-type (iii) CO_2 (iv) Ferromagnetic	½ + ½ 1 ½ ½
21	a) (i) The fuel cell runs continuously as long as the reactants are supplied (ii) Highly efficient (iii) Pollution free (any two) b) $\log Kc = \frac{nE^0cell}{0.059}$ $\log Kc = \frac{2xE^0cell}{0.059}$ $\log 10 = \frac{2xE^0cell}{0.059}$ [log 10 = 1] $E^0_{cell} = \frac{0.059}{2} = 0.0295$ V	 ½ ½ ½ 1
22	(i) Concern towards environment / caring / socially aware / team work. (atleast two values) (ii) Polymers which can be degraded by the action of microorganisms. Eg. PHBV , Nylon -2-nylon- 6/ any natural polymer (iii) Homo polymer	1 ½+½ 1
23	(i) The drugs which are used to prevent the interaction of histamine with the receptors present in the stomach wall. Eg. Cimetidine / Ranitidine / Dimetapp (or any other) (ii) Chloramphenicol (iii) Because it is unstable at cooking temperature	½+½ 1 1
24	(i) Invert sugar: Hydrolysis of sucrose brings about a change in the sign of rotation, from dextro (+) to laevo (–) and the product is named as **invert sugar**. (ii) Vitamins: compounds required in the diet in small amounts to perform specific biological functions for the growth and health of the organisms. (iii) Nucleoside: a unit formed by the combination of nitrogen containing hetrocyclic base and pentose sugar.	1 1 1
25	a) Because of stable half filled orbitals ($3d^5$) b) Because Zn has no unpaired electrons in d orbitals. c) Because of the presence of one unpaired electron in Ti^{3+} whereas there is no unpaired electron in Sc^{+3}	1 1 1
26	a) $\frac{x}{m} = k\, p^{1/n}$ or $\log (x/m) = \log k + 1/n \log p$ b) Dispersed phase = liquid Dispersion medium = Solid c) Because of coagulation of colloidal particles	1 1 1
27	(i) A = CH_3CN B = $CH_3CH_2NH_2$ C = CH_3CH_2OH (ii) A = CH_3CONH_2 B = CH_3NH_2 C = CH_3NC	½+½+½ ½+½+½

28	a) (i) Because Bi is more stable in +3 oxidation state. (ii) Because of the availability to d orbital in P which is not in N/ nitrogen cannot extend its covalency beyond 4 (iii) Because of the formation of $H_2(g)$ which prevents the oxidation of Fe^{+2} to Fe^{+3}/ HCl is only a mild oxidising agent b) (i) (ii)   	1x3=3 1+1
	OR	
28	a) (i)  (ii)  Polymeric b) (i) Because of the presence of two unpaired electrons . (ii) Because of high ionization enthalpy of He. (iii) Because of the presence of two P-H bonds in H_3PO_2 whereas in H_3PO_3 one P-H bond is present.	1 1 1 1 1
29	a) (i) $CH_3\text{-}CHO \xrightarrow{CH_3MgBr} CH_3CH(CH_3)\text{-}OMgBr \xrightarrow{H_3O^+} CH_3CH(OH)\text{-}CH_3$ (ii) $CH_3CHO \xrightarrow[\text{Conc HCl}]{\text{Zn-Hg}} CH_3\text{-}CH_3$ (iii) $C_6H_5CHO + CH_3\text{-}CHO \xrightarrow{\text{dil NaOH}} C_6H_5CH(OH)\,CH_2CHO$ (Award full marks even if only products are given) b) (i) Add $NaHCO_3$, benzoic acid will give brisk effervescence whereas ethyl benzoate will not give this test. (or any other test) (ii) Add tollen's reagent , propanal will give silver mirror whereas Butan-2-one will not give this test. (or any other test)	1 1 1 1 1
	OR	
29	a) (i) Because the positve charge on carbonyl carbon of CH_3 CHO decreases to a lesser extent due to one electron releasing (+I effect) CH_3 group as compared to CH_3 $COCH_3$	1

	(two electron releasing CH_3 groups) and hence more reactive. (ii) because one of the $-NH_2$ is involved in resonance with carbonyl group and hence acquires positive charge. (b) (i)  (ii)  (iii)  (or any other suitable reaction)	1 1 1 1
30	(i) Raoult's law : state that for a solution containing volatile components, the partial vapour pressure of each component is directly proportional to its mole fraction. Ideal solution. (ii) $\Delta T_b = i K_b \times \frac{W_{CaCl_2}}{M_{CaCl_2}} \times \frac{1000}{w_{H_2O}}$ $= 3 \times 0.512\ K\ kg\ mol^{-1} \times \frac{10g}{111\ gmol^{-1}} \times \frac{1000}{200\ kg}$ $= 0.69K$ or 0.69^0C	1 1 1 1 1
	OR	
30	a) (i) Azeotrope is a liquid mixture which boils at constant temperature with constant composition. (ii) Osmotic pressure : is the pressure applied on the solution side to stop the flow of solvent across the semi permeable membrane from lower concentration of the solution to higher concentration. (iii) Colligative properties : are the properties of solution which depend upon the no of moles of solute or concentration of solute and not on the nature of solute. b) $M = \frac{n_B}{V(L)} = \frac{w_B}{m_B} \times \frac{1000}{V(mL)}$ (B→ Solute) $M = \frac{9.8\ g}{98\ g\ mol^{-1}} \times \frac{1000}{100} \times 1.02$ $M = 1.02M$	1 1 1 ½ ½ 1

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