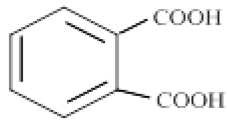
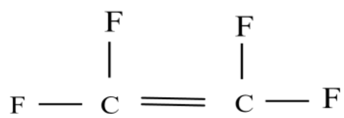
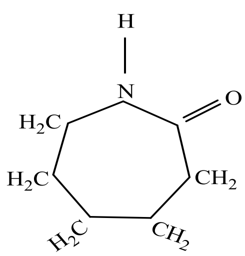
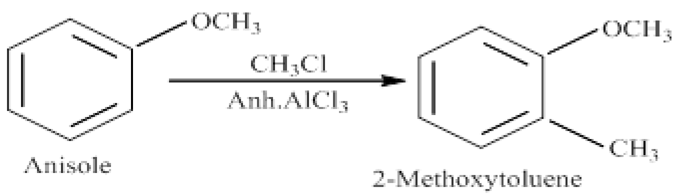
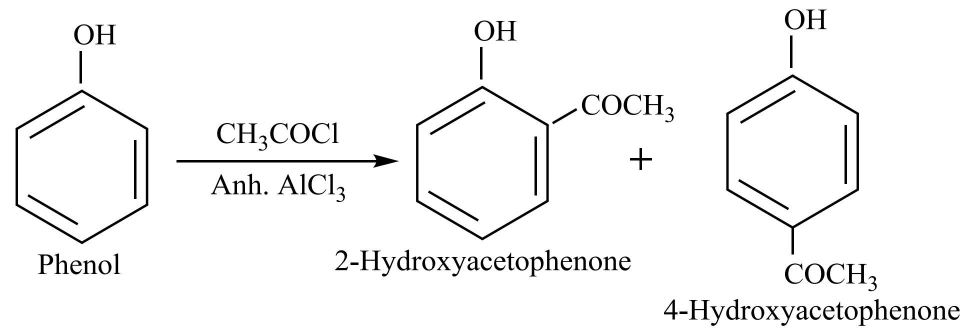
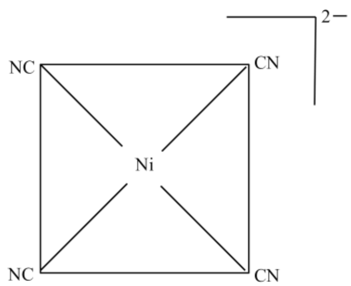
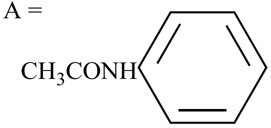
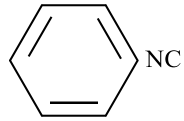
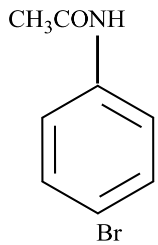
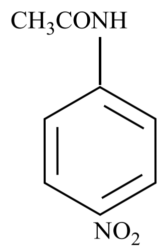
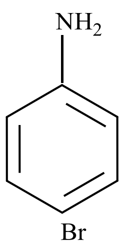
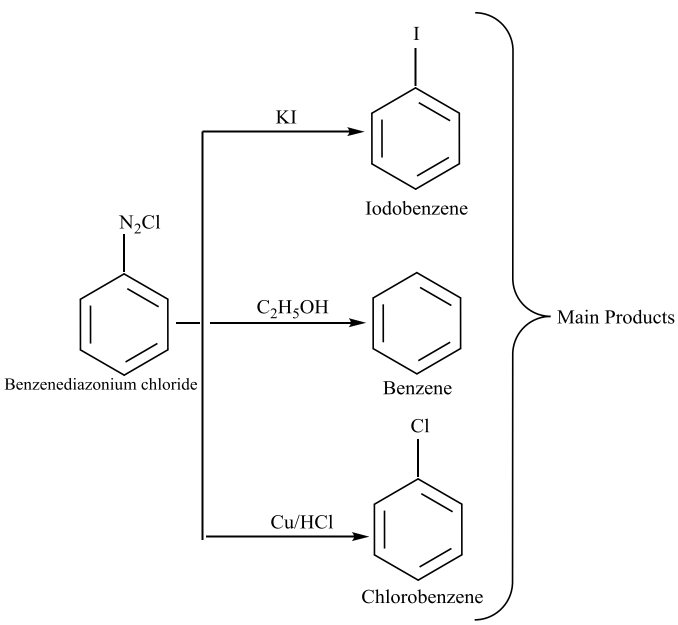
CHEMISTRY MARKING SCHEME
Bhubaneswar – 2015
Set 3 - Code No. 56/3/B

Ques.	Value points	Marks
1.	1-Phenylpropan-2-ol	1
2.	$HOCl$, $HOClO$, $HOClO_2$, $HOClO_3$ (Any two)	½ +½
3.	$CH_3 - \underset{\displaystyle CH_3}{\underset{\vert}{CH}} - CH_2 - CH_2 - Br$	1
4.	Negative charge	1
5.	XY_3	1
6.	(i) Potassium hexacyanidoferrate (III) (ii) $[Co(NH_3)_5 NO_2]^{2+}$	1 1
7.	(i) Positive deviation, lowering of temperature or absorption of heat. (ii) By applying an external pressure greater than the osmotic pressure on the solution or $P > \pi$ Reverse osmosis is used in desalination of hard water / sea water.	½ ,½ ½ , ½
8.	(i) H_2 / $Pd-BaSO_4$ (ii) $NaOH/CaO, \Delta$ **OR**	1 1
8.	(i) $C_6H_5COC_6H_5 < CH_3COCH_3 < CH_3CHO$ (ii) $Cl - CH_2 - COOH < Cl_2CH - COOH < CCl_3 - COOH$	1 1
9.	Formula: $w = z \times i \times t$ $$time\,taken\,in\sec = \frac{w \times Valance \times 96500}{Mol\,Mass \times Current\,in\,Amp}$$ Substituting the values in the formula we get: $$time\,taken\,in\sec = \frac{1.17\,g \times 2 \times 96500\,C\,mol^{-1}}{58.5\,g\,mol^{-1} \times 5\,amp}$$ $$time\,taken\,in\sec = \frac{225810}{292.5}$$ t=772 s (Or by any other correct method)	½ 1 ½
10.	(i) Due to comparable energies of 5f, 6d and 7s orbitals . (ii) Because 5f electrons have poorer shielding effect than 4f electrons.	1 1

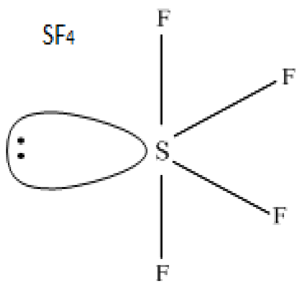
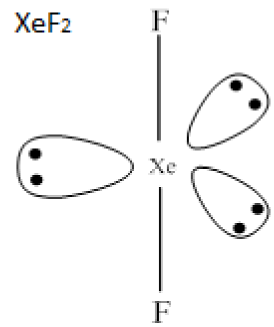
11.	(i) **Glyptal:**  Pthalic Acid and HO-CH_2- CH_2-OH (ethylene glycol) (ii) **Teflon:** Monomer: 1,1,2,2-Tetrafluoroethene  1,1,2,2-Tetrafluoroethene (iii) **Nylon-6** Monomer: Caprolactum  Caprolactum (Note : half mark for structure/s and half mark for name/s)	1 1 1
12.	(i) Because of higher oxidation state of Mn in Mn_2O_7. (ii) Due to almost similar atomic size / comparable size. (iii) $2MnO_2 + 4KOH + O_2 \longrightarrow 2K_2MnO_4 + 2H_2O$	1 1 1
13.	(i) Maltose (ii) • Sugar Present in DNA is Deoxyribose whereas in RNA it is Ribose • Thymine is present in DNA whereas in RNA Uracil is present (Any one) (iii) Beri-Beri	1 1 1
14.	$E_{cell} = E^0_{cell} - \frac{0.0591}{nF} \log \frac{[A^{2+}]}{[B^{2+}]}$ $2.6805 = E^0_{cell} - \frac{0.059}{2} V \log \frac{[0.0001]}{[0.001]}$ $2.6805 = E^0_{cell} - \frac{0.059}{2} V \log 10^{-1} = E^0_{cell} - \frac{0.059\ V}{2} (-1)$ $2.6805 = E^0_{cell} + 0.0295\ V$ $E^0_{cell} = 2.6805 - 0.0295$ $E^0_{cell} = 2.6510\ V$	1 1

		1
15.	(i) Solution is homogeneous colloid is heterogeneous In solution the size of particles (solute) is less than 1 nm whereas in colloids the range of size of particles is 1 – 1000 nm (10^{-9} to 10^{-6} m)(Any one point) (ii) In homogeneous catalysis the reactant and catalyst are in the same phase whereas in heterogeneous catalysis they are in different phase. (iii) In O/W emulsion oil is the dispersed phase while in W/O water is dispersed in oil The O/W type emulsion can be diluted with water whereas the W/O emulsion can't be diluted with water. (Any one point)	1 1 1
16.	(i) $CH_3 - CH(OH) - CN$ (ii) $C_6H_5 - COOH$ (iii) $CH_3 - CH_2NH_2$	1 1 1
17.	Formula $\frac{p_1^0 - p_1}{p_1^0} = \frac{w_2 \times M_1}{M_2 \times w_1}$ $\frac{23.75\,mm - 23.375\,mm}{23.75\,mm} = \frac{5.0\,g \times 18\,g/mol}{M_2 \times 95.0\,g}$ $M_2 = \frac{5.0\,g \times 18.0\,g/mol \times 23.75\,mm}{95\,g \times 0.375\,mm}$ M_2 = 60.0 g/mol	1 1 1
18.	(i) Distillation (ii) Collector / enhancing the non-wettability of mineral particles. (iii) As ΔS is positive /ΔG is more negative	1 1 1
19.	(i) Due to the stability of benzyl carbocation/resonance/Diagram (ii) Because 2-Bromobutane has a chiral centre. (iii) Due to **– I effect of halogen.**	1 1 1
20.	(i) $C_6H_5NH_2 \xrightarrow[0^o - 5^o C]{NaNO_2 + HCl} C_6H_5N_2Cl \xrightarrow[Or\ Hydrolysis]{H_2O + H^+} C_6H_5OH$ (ii) $CH_3 - CH = CH_2 \xrightarrow[Organic\ peroxide]{HBr} CH_3 - CH_2 - CH_2Br \xrightarrow{KOH_{Aq}} CH_3CH_2CH_2OH$ (iii)  (Or any correct method)	1 1 1

20.	**OR** (i) $CH_3-CH_2-CH_2OH \xrightarrow[\text{Dehydrogenation/Oxidation}]{Cu/573K} CH_3CHO + H_2$	1
	(ii) 	1
	(iii) $C_2H_5Cl + NaOCH_3 \rightarrow C_2H_5\text{-}O\text{-}CH_3 + NaCl$	1
21.	(ii) $t_{2g}^{3}\ e_g^{1}$	1 ½
	(iii) Hybridization *dsp²*, Shape → Square planar or diagram  (Marks of (i) part is merged into (ii) and (iii) part)	1 ½
22.	(i) Stoichiometric Defect	1
	(ii) Frenkel Defect	1
	(iii) Due to small size of Ag^+ ion	1
23.	(i) Concern for students health, Application of knowledge of chemistry to daily life, empathy , caring or any other (Any two)	½, ½
	(ii) Through posters, nukkad natak in community, social media, play in assembly or any other (Any two)	1
	(iii) Tranquilizers are drugs used for treatment of stress or mild and severe mental disorders . Eg: equanil (or any other suitable example)	½ , ½
	(iv) Aspartame is unstable at cooking temperature.	1

24.	A =  Acetanilide D=  Phenyl Isocyanide B=  4-Bromo-N-phenylacetamide E =  4-Nitro-N-Phenylacetamide C=  4-Bromoaniline	1 x 5
	OR	
24.		1 1 1
	b) $(CH_3)_3N < CH_3NH_2 < (CH_3)_2NH$	1
	c) **<u>Dye Test:</u>** On treating with benzene diazonium Chloride at low temperature $C_6H_5\text{-}NH_2$ will form coloured dye while $CH_3\text{-}NH_2$ will not form. (or any other correct distinguishing test)	1
25	(a) Formula: $k = \frac{2.303}{t}\log\frac{[CH_3COOCH_3]_1}{[CH_3COOCH_3]_2}$	½

	$$k_1 = \frac{2.303}{20s}\log\frac{0.4M}{0.2M}$$ $k_1 = 0.03\ s^{-1}$ $$k_2 = \frac{2.303}{40s}\log\frac{0.4M}{0.1M}$$ $k_2 = 0.03\ s^{-1}$ Since constant values of rate constants are obtained by applying 1st Order integrated rate law, the reaction is pseudo first order reaction. (b) $Av\,rate = \frac{total\ change\ in\ concentration}{total\ change\ in\ time}$ or $$Av\,rate = -\frac{[CH_3COOCH_3]final - [CH_3COOCH_3]initial}{Time(f) - Time(i)}$$ $$Av\,rate = -\frac{0.10\,M - 0.20\,M}{40\,Sec - 20\,Sec}$$ *Av rate* = 0.0005 M sec^{-1} or 5.0×10^{-3} mol L^{-1} sec^{-1} **OR**	1 1 ½ ½ 1 ½
25.	a) i) **Collision frequency**: No of collisions taking place per second per unit volume. ii) **Rate Constant**: It is the rate of reaction when the concentration of reactants is unity i.e. 1 M. It is temperature dependent b) $$\log\frac{k_2}{k_1} = \frac{Ea}{2.303R}\left[\frac{T_2 - T_1}{T_1T_2}\right]$$ $$\log\frac{k_2}{k_1} = \frac{Ea}{2.303R}\left[\frac{T_2 - T_1}{T_1T_2}\right]$$ $$\log 6 = \frac{Ea}{19.147}\left[\frac{50}{105000}\right]$$ $$0.7782 = \frac{Ea}{19.147}\left[\frac{50}{105000}\right]$$ $$0.7782 = \frac{Ea}{19.147}[0.00047619]$$ $$\frac{0.7782 \times 19.147}{0.00047619} = Ea = 31290.44\ J$$ Ea = 31.29 kJ/mol	1 1 1 1 1

26.	a)	
	(i) The +3 Oxidation state of Bi is more stable than Sb(III) .	1
	(ii) Because the electronegativity of Cl is greater than that of I.	1
	(iii) Due to decrease in electronegativity and increase in the atomic size.	1
	.	
	(b)  	1+1
	OR	
	i) Due to formation of fumes of HCl or equation	
26.	$PCl_5 + H_2O \rightarrow POCl_3 + 2HCl$	1
	ii) Rhombic sulphur or α-Sulphur	1
	iii) Due of loss of Chlorine. The yellow colour is due to dissolved Cl_2. On standing the Cl_2 is consumed in reacting with water to form colourless products:	1
	$Cl_2 + H_2O \rightarrow HOCl + HCl$	
	$2HOCl \rightarrow 2HCl + O_2$	
	iv) $4H_3PO_3 \rightarrow 3H_3PO_4 + PH_3$	1
	Oxidation state of P is +3 Oxidation state of P is +5 Oxidation state of P is – 3	
	v) $2F_2 + 2H_2O \rightarrow 4HF + O_2$	1