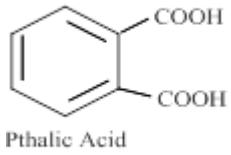
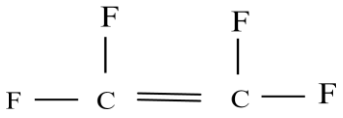
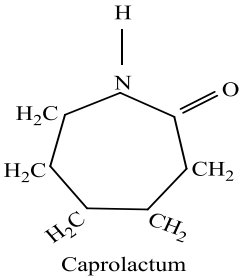
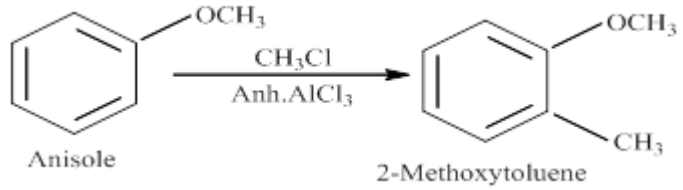
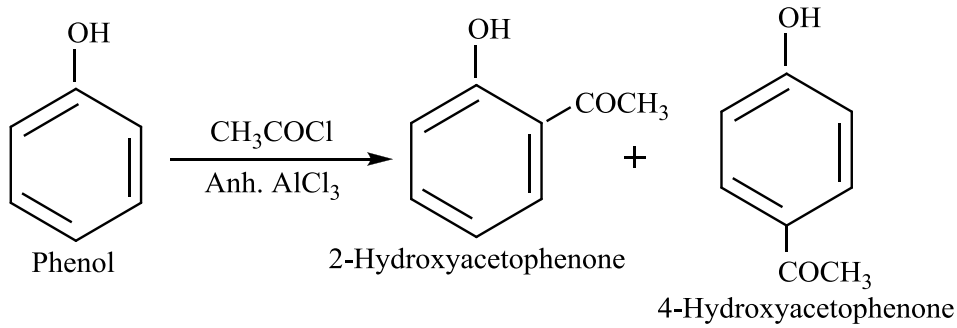
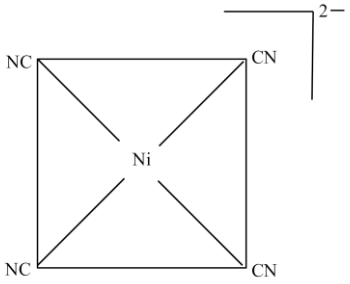
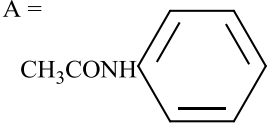
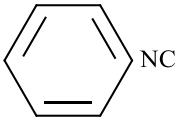
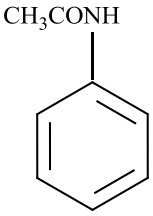
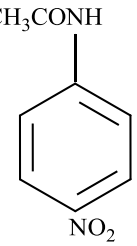
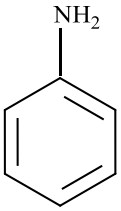
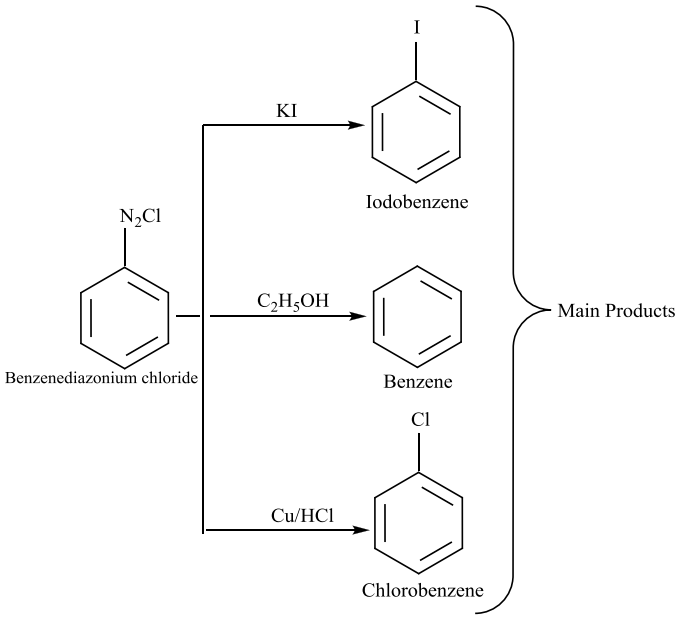
CHEMISTRY MARKING SCHEME
Bhubaneswar – 2015
Set 3 - Code No. 56/3/B

Ques.	Value points	Marks
1.	1-Phenylpropan-2-ol	1
2.	HOCl , HOClO, $HOClO_2$, $HOClO_3$ (Any two)	½ +½
3.	$CH_3 - CH(CH_3) - CH_2 - CH_2 - Br$	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 > π 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, Δ **OR**	1 1
8.	(i) $C_6H_5 CO C_6H_5 < CH_3COCH_3 < CH_3CHO$ (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)	1
	(ii) **Teflon:** Monomer: 1,1,2,2-Tetrafluoroethene  1,1,2,2-Tetrafluoroethene	1
	(iii) **Nylon-6** Monomer: Caprolactum  Caprolactum (Note : half mark for structure/s and half mark for name/s)	1
12.	(i) Because of higher oxidation state of Mn in Mn_2O_7.	1
	(ii) Due to almost similar atomic size / comparable size.	1
	(iii) $2MnO_2 + 4KOH + O_2 \longrightarrow 2K_2MnO_4 + 2H_2O$	1
13.	(i) Maltose	1
	(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)	1
	(iii) Beri-Beri	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)  Anisole 2-Methoxytoluene (Or any correct method)	1 1 1

20.	**OR** (i) $CH_3 - CH_2 - CH_2OH \xrightarrow[Dehydrogenation/Oxidation]{Cu/573K} CH_3CHO + H_2$ (ii)  Phenol 2-Hydroxyacetophenone 4-Hydroxyacetophenone (iii) $C_2H_5Cl + NaOCH_3 \rightarrow C_2H_5\text{-}O\text{-}CH_3 + NaCl$	1 1 1
21.	(ii) $t_{2g}^3 e_g^1$ (iii) Hybridization dsp^2, Shape → Square planar or diagram  (Marks of (i) part is merged into (ii) and (iii) part)	1 ½ 1 ½
22.	(i) Stoichiometric Defect (ii) Frenkel Defect (iii) Due to small size of Ag^+ ion	1 1 1
23.	(i) Concern for students health, Application of knowledge of chemistry to daily life, empathy , caring or any other (Any two) (ii) Through posters, nukkad natak in community, social media, play in assembly or any other (Any two) (iii) Tranquilizers are drugs used for treatment of stress or mild and severe mental disorders . Eg: equanil (or any other suitable example) (iv) Aspartame is unstable at cooking temperature.	½, ½ 1 ½ , ½ 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
	b) $(CH_3)_3N < CH_3NH_2 < (CH_3)_2NH$	1
	c) **Dye Test:** 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 1
25	(a) Formula: $k = \frac{2.303}{t}\log\frac{[CH_3COOCH_3]_1}{[CH_3COOCH_3]_2}$	½

$$k_1 = \frac{2.303}{20s}\log\frac{0.4M}{0.2M}$$ 1

$k_1 = 0.03\ s^{-1}$ 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. ½

(b) $Av\,rate = \frac{total\ change\ in\ concentration}{total\ change\ in\ time}$ ½

or

$$Av\,rate = -\frac{[CH_3COOCH_3]\,final - [CH_3COOCH_3]initial}{Time(f) - Time(i)}$$ 1

$$Av\,rate = -\frac{0.10\,M - 0.20\,M}{40\,Sec - 20\,Sec}$$ ½

Av rate = 0.0005 M sec^{-1} or 5.0 x 10^{-3} mol L^{-1} sec^{-1}

OR

25.

a) i) **<u>Collision frequency</u>**: No of collisions taking place per second per unit volume.
ii) **<u>Rate Constant</u>**: It is the rate of reaction when the concentration of reactants is unity i.e. 1 M. It is temperature dependent 1

b) $\log\frac{k_2}{k_1} = \frac{Ea}{2.303R}\left[\frac{T_2 - T_1}{T_1T_2}\right]$ 1

$$\log\frac{k_2}{k_1} = \frac{Ea}{2.303R}\left[\frac{T_2 - T_1}{T_1T_2}\right]$$ 1

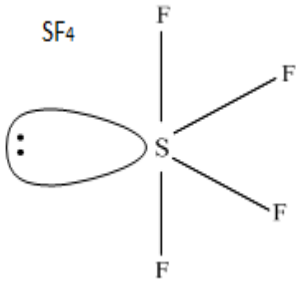
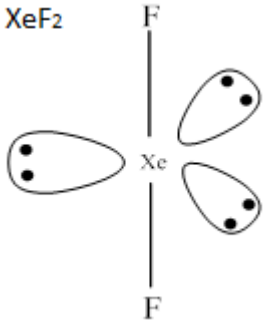
$$\log 6 = \frac{Ea}{19.147}\left[\frac{50}{105000}\right]$$

$$0.7782 = \frac{Ea}{19.147}\left[\frac{50}{105000}\right]$$ 1

$$0.7782 = \frac{Ea}{19.147}\left[0.00047619\right]$$

$$\frac{0.7782 \times 19.147}{0.00047619} = Ea = 31290.44\ J$$ 1

Ea = 31.29 kJ/mol

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	
26.	i) Due to formation of fumes of HCl or equation $PCl_5 + H_2O \rightarrow POCl_3 + 2HCl$	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: $Cl_2 + H_2O \rightarrow HOCl + HCl$ $2HOCl \rightarrow 2HCl + O_2$	1
	iv) $4H_3PO_3 \rightarrow 3H_3PO_4 + PH_3$ Oxidation state of P is +3 Oxidation state of P is +5 Oxidation state of P is – 3	1
	v) $2F_2 + 2H_2O \rightarrow 4HF + O_2$	1