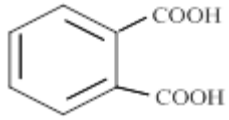
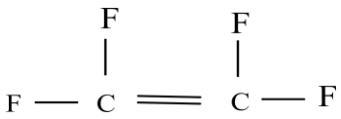
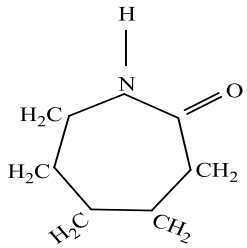
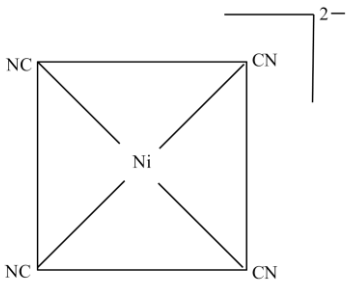
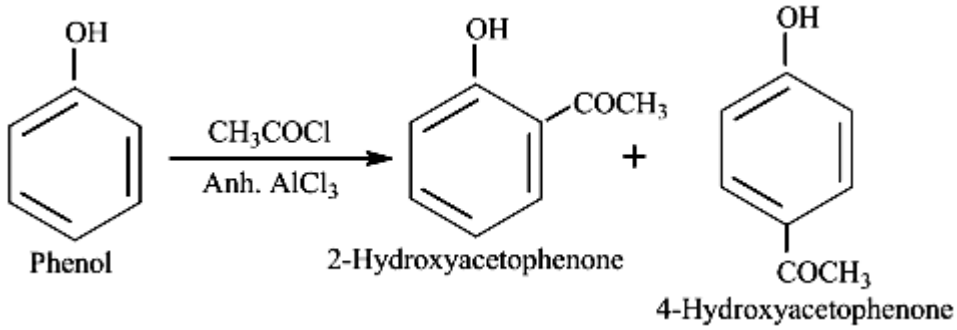
CHEMISTRY MARKING SCHEME
Bhubaneswar – 2015
Set 1 - Code No. 56/1/B

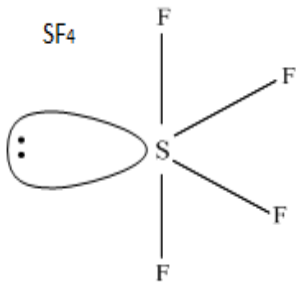
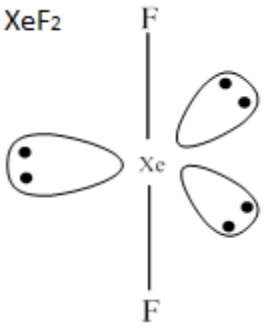
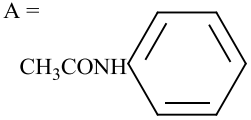
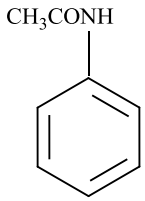
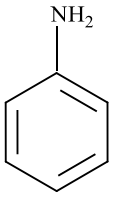
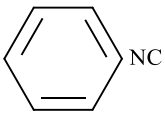
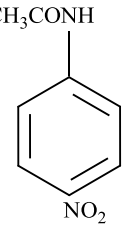
Ques.	Value points	Marks
1.	Negative charge	1
2.	XY_3	1
3.	HOCl , HOClO, $HOClO_2$, $HOClO_3$ (Any two)	½ +½
4.	1-Phenylpropan-2-ol	1
5.	$CH_3 - CH(CH_3) - CH_2 - CH_2 - Br$	1
6.	(i) H_2 / Pd-$BaSO_4$ (ii) NaOH/CaO , Δ **OR**	1 1
6.	(i) C_6H_5 CO C_6H_5 < CH_3COCH_3< CH_3CHO (ii) $Cl - CH_2 - COOH < Cl_2CH - COOH < CCl_3 - COOH$	1 1
7.	(i) Due to comparable energies of 5f, 6d and 7s orbitals . (ii) Because 5f electrons have poorer shielding effect than 4f electrons.	1 1
8.	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
9.	(i) Potassium hexacyanidoferrate (III) (ii) $[Co(NH_3)_5\,NO_2]^{2+}$	1 1
10.	(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	½ ,½ ½ ,

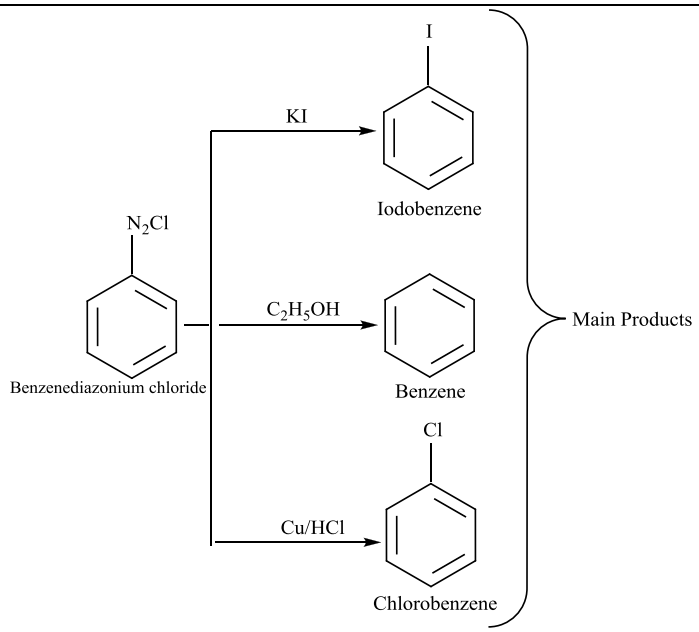
	Reverse osmosis is used in desalination of hard water / sea water.	½
11.	(i) Maltose	1
	(ii) • Sugar Present in DNA is Deoxyribose whereas in RNA it is Ribose • Thymine is present in DNA whereas in RNA Uracil is present (Any one)	1
	(iii) Beri-Beri	1
12.	$E_{cell} = E^0_{cell} - \frac{0.0591}{nF} \log \frac{[A^{2+}]}{[B^{2+}]}$	1
	$2.6805 = E^0_{cell} - \frac{0.059}{2} V \log \frac{[0.0001]}{[0.001]}$	1
	$2.6805 = E^0_{cell} - \frac{0.059}{2} V \log 10^{-1} = E^0_{cell} - \frac{0.059\ V}{2} (-1)$ $2.6805 = E^0_{cell} + 0.0295\ V$ $E^0_{cell} = 2.6805 - 0.0295$	
	$E^0_{cell} = 2.6510\ V$	1
13.	(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)	1
	(ii) In homogeneous catalysis the reactant and catalyst are in the same phase whereas in heterogeneous catalysis they are in different phase.	1
	(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
14.	Formula $\frac{p_1^0 - p_1}{p_1^0} = \frac{w_2 \times M_1}{M_2 \times w_1}$	1
	$\frac{23.75\,mm - 23.375\,mm}{23.75\,mm} = \frac{5.0\,g \times 18\,g/mol}{M_2 \times 95.0\,g}$ $M_2 = \frac{5.0\,g \times 18.0\,g/mol \times 23.75\,mm}{95\,g \times 0.375\,mm}$	1
	M_2 = 60.0 g/mol	1
15.	(i) Distillation	1
	(ii) Collector / enhancing the non-wettability of mineral particles.	1
	(iii) As ΔS is positive /ΔG is more negative	1
16.	(i) Stoichiometric Defect	1
	(ii) Frenkel Defect	1
	(iii) Due to small size of Ag^+ ion	1

17.	(i)	$CH_3 – CH(OH) – CN$	1
	(ii)	$C_6H_5 – COOH$	1
	(iii)	$CH_3 – CH_2NH_2$	1
18.	(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	1
		(Note : half mark for structure/s and half mark for name/s)	
19.	(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
20.	(ii)	$t_{2g}^3\ e_g^1$	1 ½
	(iii)	Hybridization dsp^2, Shape → Square planar or diagram 	1 ½
		(Marks of (i) part is merged into (ii) and (iii) part)	

21.	(i)	Due to the stability of benzyl carbocation/resonance/Diagram	1
	(ii)	Because 2-Bromobutane has a chiral centre.	1
	(iii)	Due to **– I effect of halogen.**	1
22.	(i)	$C_6H_5NH_2 \xrightarrow[0^o-5^oC]{NaNO_2+HCl} C_6H_5N_2Cl \xrightarrow[Or\ Hydrolysis]{H_2O+H^+} C_6H_5OH$	1
	(ii)	$CH_3 - CH = CH_2 \xrightarrow[Organic\ peroxide]{HBr} CH_3 - CH_2 - CH_2Br \xrightarrow{KOH_{Aq}} CH_3CH_2CH_2OH$	1
	(iii)	 Anisole 2-Methoxytoluene	1
		(Or any correct method)	
		OR	
22.	(i)	$CH_3 - CH_2 - CH_2OH \xrightarrow[Dehydrogenation/Oxidation]{Cu/573K} CH_3CHO + H_2$	1
	(ii)	 Phenol 2-Hydroxyacetophenone 4-Hydroxyacetophenone	1
	(iii)	$C_2H_5Cl + NaOCH_3 \rightarrow C_2H_5\text{-}O\text{-}CH_3 + NaCl$	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)		
	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
		$k_1 = 0.03\ s^{-1}$	
		$k_2 = \frac{2.303}{40s}\log\frac{0.4M}{0.1M}$	

	$k_2 = 0.03\ s^{-1}$	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 $5.0 \times 10^{-3}\ mol\ L^{-1}\ sec^{-1}$	
	OR	
24	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	1 1
	b) $\log\frac{k_2}{k_1} = \frac{Ea}{2.303R}\left[\frac{T_2 - T_1}{T_1T_2}\right]$	1
	$\log\frac{k_2}{k_1} = \frac{Ea}{2.303R}\left[\frac{T_2 - T_1}{T_1T_2}\right]$	
	$\log 6 = \frac{Ea}{19.147}\left[\frac{50}{105000}\right]$	1
	$0.7782 = \frac{Ea}{19.147}\left[\frac{50}{105000}\right]$	
	$0.7782 = \frac{Ea}{19.147}[0.00047619]$	
	$\frac{0.7782 \times 19.147}{0.00047619} = Ea$ =31290.44 J/mol	
	Ea = 31.29 kJ/mol	1
25.	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
	.	

25.	(b)  	1+1
		1
		1
	OR	
	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	
	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 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	
	v) $2F_2 + 2H_2O \rightarrow 4HF + O_2$	
26.	A =  Acetanilide B=  4-Bromo-N-phenylacetamide C=  4-Bromoaniline D=  Phenyl Isocyanide E =  4-Nitro-N-Phenylacetamide OR	1 x 5

26.		1 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.	1
	(or any other correct distinguishing test)	