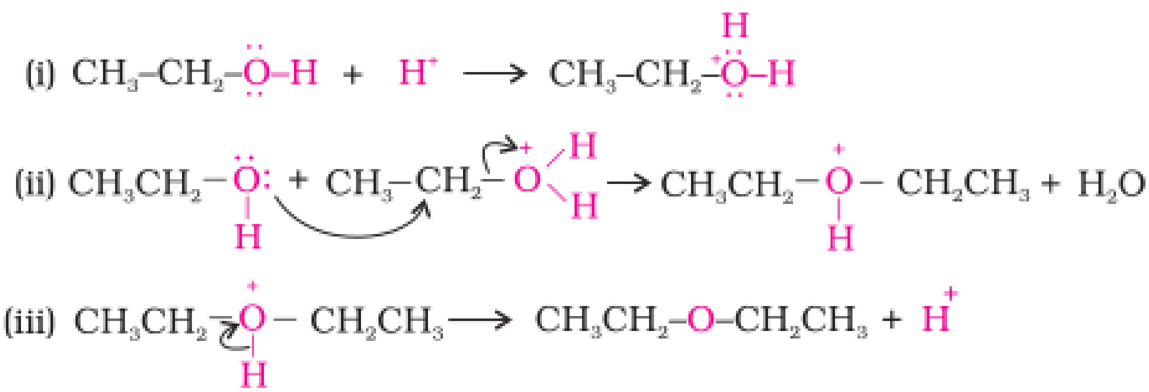
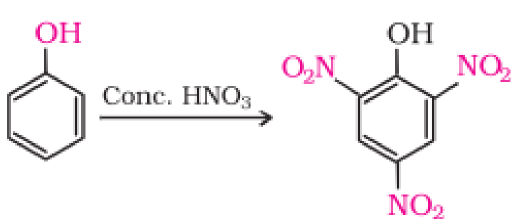
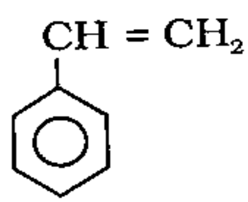
CHEMISTRY MARKING SCHEME
DELHI -2013
SET 56/1/1

Q no.	Answers	Marks
1	4	1
2	Mond Process/ Vapour phase refining method	1
3	4	1
4	4-chloropent-1-ene	1
5	CH_3CN is formed or ethanenitrile is formed.	1
6	$H_3C-CH(CH_3)-CH_2-CHO$	1
7	$(CH_3)_3N < CH_3NH_2 < (CH_3)_2NH$	1
8	mRNA, rRNA, tRNA	1
9	$\Delta T_b = K_b\, m$ $T_b - T_b^0 = 0.52\ K\ kg\ mol^{-1} \times \frac{18\ g}{180\ g\ mol^{-1}} \times \frac{1}{1 kg}$ $T_b - 373.15\ K = 0.052\ K$ **$T_b = 373.202\ K$**	½ ½ ½ ½
10	$\Lambda_m = \kappa / C$ $\Lambda_m = \frac{0.025\ S\ cm^{-1}}{0.20\ mol\ L^{-1}}$ $\Lambda_m = 125\ S\ cm^2\ mol^{-1}$ (deduct ½ mark for wrong or no unit)	½ ½ 1

11	**Dispersed phase** **Dispersion Medium** **(i) Smoke** **Solid** **Gas** **(ii) Milk** **Liquid** **Liquid**	 1 1
11	**OR** **Lyophilic sols are solvent attracting sols whereas Lyophobic sols are Solvent repelling sols** **Lyophobic sols can be easily coagulated.**	 ½ + ½ 1
12	<table><tr><th>Physisorption</th><th>Chemisorption</th></tr><tr><td>It is not very specific.</td><td>It is highly specific.</td></tr><tr><td>It is usually takes place at low temperature and decreases with increasing temperature.</td><td>It takes place at high temperature.</td></tr><tr><td>It is reversible.</td><td>It is irreversible.</td></tr><tr><td>Low enthalpy of adsorption.</td><td>High enthalpy of adsorption.</td></tr></table>	½ x4=2
13	(a) NaCN solution **(b)** CO	1+1
14	(i) $PCl_5 \xrightarrow{heat} PCl_3 + Cl_2$ (ii) $4H_3PO_3 \xrightarrow{heat} 3H_3PO_4 + PH_3$ (Full marks may be given if equation is not balanced)	 1 1

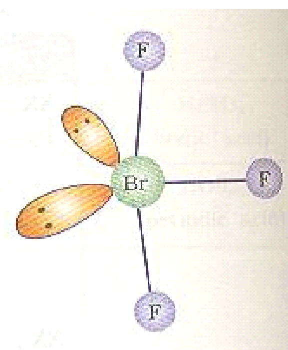
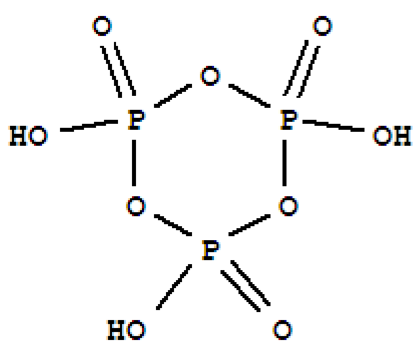
15	(a) Cu, because in +1 oxidation state it has stable $3d^{10}$ configuration. (b) Mn^{2+}, V^{3+}: because of the presence of unpaired electrons. (if only one ion is mentioned deduct ½ mark)	½ + ½ ½ + ½
16	(i) Due to resonance / diagrammatic representation, C-Cl bond acquires a partial double bond character which is difficult to cleave. (ii) Due to sp^2 hybridisation of 'C' of C-Cl bond. (iii) Due to unstable phenyl cation. (iv) Due to repulsion between nucleophile and electron rich arenes. (any two)	1+1
17		½ ½ 1
18	(i) $CH_3-CH=CH_2 \xrightarrow{H_2O/H^+} CH_3-\underset{\large OH}{\underset{\vert}{CH}}-CH_3$ (ii)  (or by any other correct suitable method)	1+1

19	(a) p-type semiconductor (b) Ferromagnetism (c) Impurity defect / Cation vacancy defect	1x3=3
20	When K_2SO_4 is dissolved in water, ions are produced. Total number of ions produced = 3 **i =3** $\pi = i\,CRT \qquad = i \times \frac{n}{V} \times R \times T$ $\pi = 3 \times \frac{2.5 \times 10^{-2}\ g}{174\ g\ mol^{-1}} \times \frac{1}{2L} \times 0.0821\ L\ atm K^{1}\ mol^{-1} \times 298\ K$ $\pi = 5.27 \times 10^{-3}$ atm (deduct ½ mark for wrong or no unit)	½ ½ 1 1
21	The cell reaction : $Fe(s) + 2H^{+}(aq) \rightarrow Fe^{2+}(aq) + H_2(g)$ $E^{o}_{cell} = 0.44\ V$ Nernst equation $E_{cell} = E^{o}_{cell} - \frac{0.059}{2} \log \frac{[Fe^{2+}]}{[H^{+}]^{2}}$ $E_{cell} = 0.44\ V - \frac{0.059}{2} \log \frac{(0.001\ M)}{(1\ M)^{2}}$ $= 0.44\ V - \frac{0.059}{2} \log (10^{-3})$ $= 0.44\ V + 0.0885\ V$ **=0.5285 V** (deduct ½ mark for wrong or no unit)	1 ½ ½ 1

22	(i) Due to incomplete filling of d-orbitals, transition metals show variable oxidation states. (ii) Because of Lanthanoid Contraction. (iii) Because of their ability to show multiple / variable oxidation states. OR	1 x 3=3
22	(i) $Cr_2O_7^{2-} + 6Fe^{2+} + 14H^+ \rightarrow 2Cr^{3+} + 6Fe^{3+} + 7H_2O$ (ii) $2CrO_4^{2-} + 2H^+ \rightarrow Cr_2O_7^{2-} + H_2O$ (iii) $2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \rightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$ (Accept only balanced equation)	1 x 3=3
23	(i) Triamminetrichloridochromium(III)	1
	(ii) Potassium hexacynoferrate(III)	1
	(iii) Dibromidobis-(ethane-1,2-diamine)cobalt(III) / Dibromidobis-(ethylenediamine)cobalt(III)	1
24	(i) A=C_6H_5CN B=C_6H_5COOH C=$C_6H_5CONH_2$	½x3=1 ½
	(ii) A=$C_6H_5NH_2$ B=$C_6H_5N_2^+Cl^-$ C=C_6H_5-OH	½x3=1 ½
25	(i) Buna-S : 1,3- Butadiene and Styrene **$CH_2 = CH - CH = CH_2$ and** 	½+ ½
	(ii) Neoprene: Chloroprene **$CH_2 = C(Cl) - CH = CH_2$**	½+ ½

	(iii) Nylon-6,6: Hexamethylene diamine and Adipic acid $H_2N-(CH_2)_6-NH_2$ $HOOC-(CH_2)_4-COOH$	½+½
26	(i) Sonali: Concerned for the society, socially active and helpful to others. Principal: Caring, commanding and serious about the welfare of students. (or any other suitable values) (ii) Vitamins B and C	1 1 ½ + ½
27.	(a) Sodium Benzoate (b) To impart antiseptic properties (c) Tranquilizers	1 x 3=3

28	(a) (i) rate= $k[A]^2[B]$ (ii) Rate will increase 9 times of the actual rate of reaction. (iii) Rate will increase 8 times of the actual rate of reaction.	1x3= 3
	(b) $k = \frac{2.303}{t} \log \frac{[A_0]}{[A]}$	½
	$k = \frac{2.303}{40\text{min}} \log \frac{100}{70}$	
	$k = \frac{2.303}{40} \times 0.155 = 0.00892 \text{ min}^{-1}$	½
	$t_{1/2} = \frac{0.693}{k}$	½
	$t_{1/2} = \frac{0.693}{0.00892} \text{min}$	
	$t_{1/2} = 77.7 \text{ min}$	½
28	OR	
	(a) $t_{99\%} = \frac{2.303}{k} \log \frac{100}{1}$	½
	$t_{90\%} = \frac{2.303}{k} \log \frac{100}{10}$	½
	on comparision $\frac{t_{99\%}}{t_{90\%}} = \frac{\log 100}{\log 10}$	½
	Hence $\mathbf{t_{99\%} = 2\, t_{90\%}}$ **(or solved by any other correct suitable method)**	½

	(b) **Slope** $= \frac{-E_a}{2.303R}$ $-4250\ K = -\frac{E_a}{2.303 \times 8.314\ J K^{1}\ mol^{-1}}$ $E_a = 81375\ J\ mol^{-1}$ **or** $81.375\ kJ\ mol^{-1}$	1 1 1
29.	(i) Because of smaller size of F-atom/ shorter bond length, the electron –electron repulsion among the lone pairs is greater in F_2 than Cl_2 (ii) Due to hydrogen bonding in NH_3. (b) (i)  (ii) 	1+1

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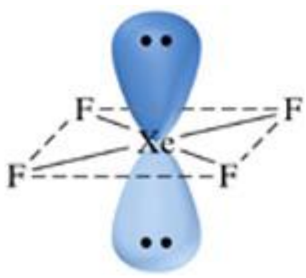
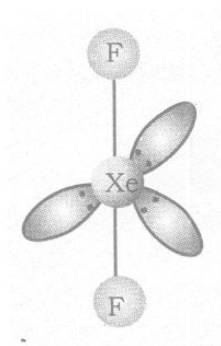
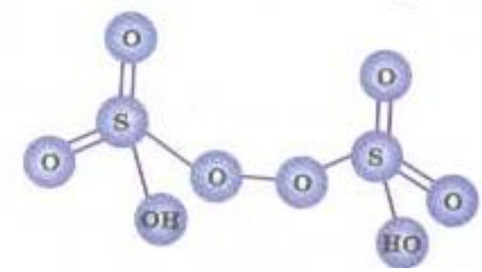
<tr>
<td>29</td>
<td>(iii)


OR

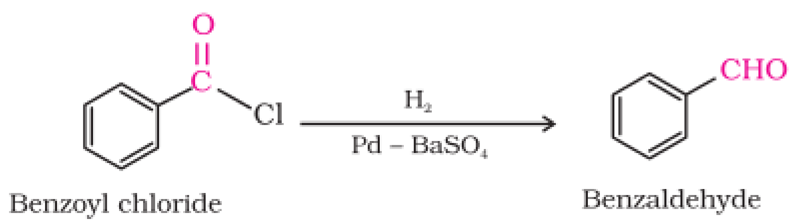
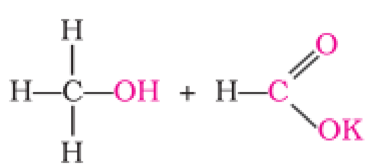
(a) (i) Because of its low solubility in blood.
(ii) Because of its highest electronegativity.
(iii) Because O-O single bond is weaker than S-S single bond.

(b)
(i)


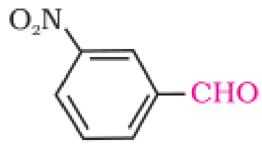
(ii)

</td>
<td>1x3=
3

1x3=
3

1+1</td>
</tr>
</table>

30.	(a) (i) Resonating structures of carboxylate ion are more stable than phenoxide ion structures. (ii)–ve charge is dispersing on two electronegative oxygens in carboxylate ion whereas on one oxygen in phenoxide ion. (b) i) $CH_3-CO-CH_3 \xrightarrow[conc.\ HCl]{Zn-Hg} CH_3-CH_2-CH_3$ ii)  iii) $CH_3-CHO \xrightarrow{dil.\ NaOH} CH_3-CH(OH)-CH_2-CHO \xrightarrow[-H_2O]{\Delta} CH_3-CH=CH-CHO$ (or by any other correct suitable method) OR	1+1 1x3 =3
30	(a) (i)  (ii) $Br-CH_2COOH$	

(iii)



1 x3=3

(b)

(i) **<u>Ethanal and Propanal</u>** : Ethanal gives yellow ppt of Iodoform (CHI_3) on addition of NaOH/I_2 whereas Propanal does not give this test.

(or any other suitable test)

(ii) **<u>Benzoic acid and Phenol</u>** : Add neutral $FeCl_3$ to both, phenol gives purple / violet colouration whereas Benzoic acid does not give this test or / Add $NaHCO_3$ to both, Benzoic acid will give brisk effervescence whereas phenol does not give this test. 1+1

(or any other suitable test)

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