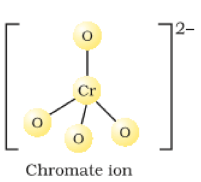
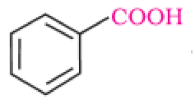
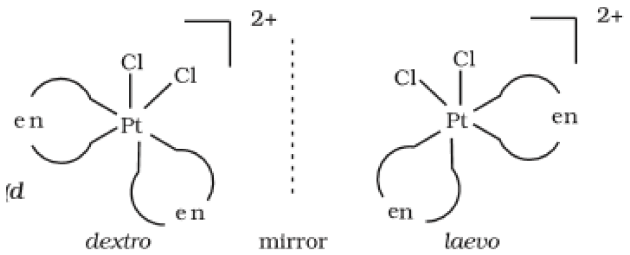
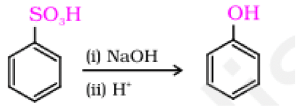
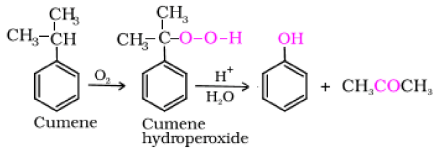
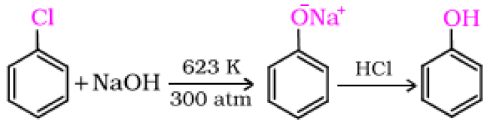
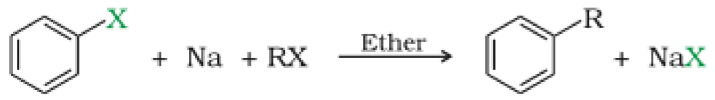
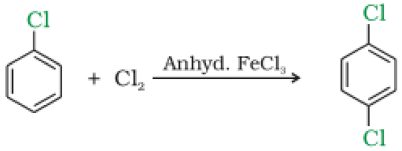
HSE II | Answer key
Chemistry | SET -A

Qn. No.	Scoring Indicator	Detailed score	Total score
1	i or $[Co(NH_3)_6]^{3+}$	1	1
2	Phosgene or $COCl_2$	1	1
3	$NH_4NO_3 \rightarrow N_2O + 2H_2O$	1	1
4	+3	1	1
5	$C_6H_5CONH_2$	1	1
6	PCC, Pyridinium chloro chromate	1	1
7	Osmotic pressure The measurement is carried out at room temperature	1 1	2
8	$ZnO \rightarrow Zn^{2+} + ½\ O_2 + 2$ electrons Zinc ion formed get trapped in the interstitial position and equivalent number of electrons in another interstitial position. Yellow colour is due to this trapped electrons in the interstitial site Or Metal excess defect due to excess metal ion in the interstitial site and electrons in the another interstitial site	1 1	2
9.	a) Enzyme catalysis b) High efficiency, highly specific, highly active at optimum temperature and p^H(any two)	1 1	2
10	1. c 2. d 3. a 4. b	½ ½ ½ ½	2
11	a)$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^7$ b) $\sqrt{n(n+2)} = \sqrt{15} = 3.87$ BM	1 1	2
12	a) $PCl_3 + 3H_2O \rightarrow H_3O + HCl$ fumes b) Due to inert pair effect	1 1	2
13	a)Treating sulphite salt with dil H_2SO_4 or $Na_2SO_3 + 2HCl \rightarrow 2NaCl + H_2O + SO_2$ b)SO_2 is a reducing agent so decolourises acidified $KMnO_4$ Or equation	1 1	2
14	Definition or equation of average rate Definition or equation of instantaneous rate	1 1	2
15	Structure of chromate ion  Chromate ion By adding acid, chromate ion change into dichromate ion Or equation $2\ CrO_4^{2-} + 2H^+ \rightarrow Cr_2O_7^{2-} + H_2O$	1 1	2
16	(a) $CH_3\text{-}O\text{-}CH_3 < CH_3CH_2Cl < C_2H_5OH$, (b) $C_6H_5CH_3 < C_6H_5Cl < C_6H_5OH$	1 1	2

17	CH_3-CH_2-NH_2 reacts with Hinsberg's reagent form ethyl benzene sulphonamide which is soluble in alkali Or equation/isocyanide test $(CH_3CH_2)_2$ NH reacts with Hinsberg's reagent form diethyl benzene sulphonamide which is insoluble in alkali Or equation	1 1	2
18	$CH_3CH_2COOH < CH_3COOH < C_6H_5COOH$ Electron withdrawing group (EWG) stabilises the carboxylate anion and strengthens the acid Electron donating group (EDG) like alkyl groups destabilises the carboxylate anion and weakens the acid	1 1	2
19	Due to lanthanide contraction Explanation	1 1	2
20	 Benzoic acid	1 1	2
21	Density d = (ZxM)/(N_oxa^3) Density d = 3.8gcm^{-3} Edge length a = 5.0 A^0 = 5X10^{-8} cm Formula mass of FeO = 56 +16 = 72 g/mol Avogadro number = 6.022X 10 ^{23} 3.8gcm^{-3} = Z X 72/ [(5X10^{-8})^{3}x6.022X 10^{23}] Z = 3.97 ≈ 4. The number of Fe^{2+} and O^{2-} ions per unit cell is four each	1 1 1	3
22	a) At anode : 2Fe(s) → 2Fe^{2+}(aq) + 4 e^- At cathode : 4H^+(aq) + O_2 +4e^- →2H_2O (l) b) Any two method	1 1 1	3
23	a)  b)cis-isomer shows optical activity	1 1 1	3
24	a) t_{2g}^1 e_g^0 splitting diagram b) Explanation using d-d transition	2 1	3
25	a) sp^3 d^2 hybridisation Octahedral shape b) any two demerits	1 1 1	3

26	a)  b)  	1 2	3
27	$(CH_3)_3C-ONa+CH_3-CH_2-CH_2-Cl \rightarrow (CH_3)_3C-O-CH_2-CH_2-CH_3$	3	3
28	a) $CH_3-OH+CH_3-CHO \rightarrow CH_3-CH(OH)OCH_3$ b) $CH_3-CHO+HCN \rightarrow CH_3-CH(OH)CN$ c) $CH_3-CHO+NH_2-NH_2 \rightarrow CH_3-CH=NH-NH_2$	1 1 1	3
29	a) X= Pent-2-ene Y= Pent-1-ene b) Pent-2-ene c) statement of Saytzev rule	1 1 1 1	4
30	Equations of Ostwald's process Any two uses of nitric acid	3 1	4
31	a)  b)  c)  	1 2 1	4
32	a) Cannizzaro reaction and equation b) Aldehydes or ketones react with hydrazine followed by heating with KOH in a high boiling solvent gives corresponding hydrocarbon or equation c) Nitriles are reduced to corresponding imine with $SnCl_2$ in presence of HCl which on hydrolysis give aldehyde or equation	2 1 1	4