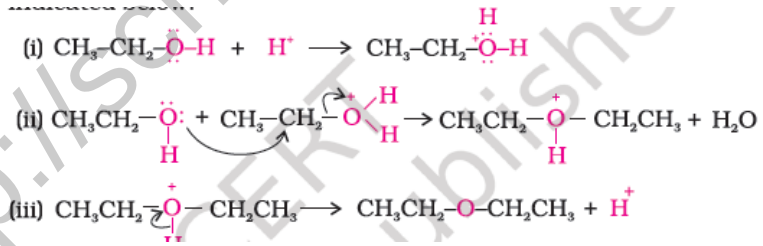
Central Board of School Education

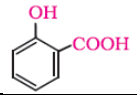
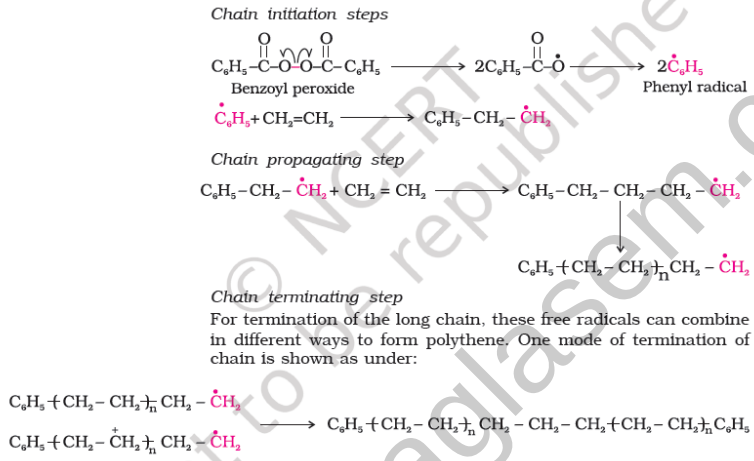
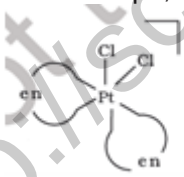
Marking Scheme 2016

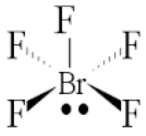
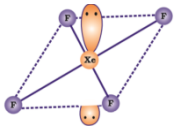
[Official]

Chemistry Marking scheme
Delhi - 2016
Set – 56/1/1/D

Q.No	VALUE POINTS	MARKS
1	$CH_3CH_2CH(Cl)CH_3$; secondary halide/ 2^0 carbocation is more stable	½, ½
2	NH_3	1
3	Ferromagnetism	1
4	2,4,6-Tribromoaniline / 2,4,6-Tribromobenzenamine	1
5	Like Charged particles cause repulsion/ Brownian motion/ solvation	1
6	(i) Mercury cell (ii) Fuel cell (iii) Lead storage battery (iv) Dry cell	½ ½ ½ ½
7	A-Na_2CrO_4 B-$Na_2Cr_2O_7$ C-$K_2Cr_2O_7$ Use- strong oxidising agent / as a primary standard in volumetric analysis	½ ½ ½ ½
	OR	
7	$8MnO_4^- + 3S_2O_3^{2-} + H_2O \longrightarrow 8MnO_2 + 6SO_4^{2-} + 2OH^-$ $Cr_2O_7^{2-} + 14\ H^+ + 3\ Sn^{2+} \rightarrow 2\ Cr^{3+} + 3\ Sn^{4+} + 7\ H_2O$	1 1
8	(i) $[Cr(H_2O)_5Cl]Cl_2.H_2O$ (ii) pentaaquachloridoChromium(III) chloride monohydrate (or chloride hydrate) (no deduction for not writing hydrate)	1 1
9.	(i) zero order , bimolecular/ unimolecular (ii) mol L^{-1} s^{-1}	½, ½ 1
10.	 (i) $CH_3–CH_2–\ddot{O}–H + H^+ \longrightarrow CH_3–CH_2–\overset{H}{\overset{\vert}{\overset{+}{\ddot{O}}}}–H$ (ii) $CH_3CH_2–\ddot{O}: + CH_3–CH_2–\overset{+}{O}\begin{matrix}H\\H\end{matrix} \rightarrow CH_3CH_2–\overset{+}{\underset{H}{\ddot{O}}}–CH_2CH_3 + H_2O$ (iii) $CH_3CH_2–\overset{+}{\ddot{O}}–CH_2CH_3 \longrightarrow CH_3CH_2–O–CH_2CH_3 + H^+$	½ 1 ½
11.	(i) In chlorobenzene, each carbon atom is sp^2 hybridised / resonating structures / partial double bond character. (ii) Due to +R effect in chlorobenzene/ difference in hybridization i.e. sp^2 and sp^3 respectively/ -I and +R effect oppose each other while –I effect is the only contributing factor in cyclohexane. (iii) Due to formation of planar carbocation/ Carbon in carbocation formed is sp^2 hybridised.	1 1 1
12.	2 x10^{24} atoms weigh =300g	

	6.022×10^{23} atoms weigh = $(300 \times 6.022 \times 10^{23})/2 \times 10^{24}$ = 90.3 g	1
	$d = \frac{z \times M}{a^3 N_A}$ $= 4 \times 90.3/(250 \times 10^{-10})^3 \times N_0$ $= 38.4\ gcm^{-3}$ (or any other correct method)	½ + ½ 1
13	$\log k = \log A - E_a/2.303RT$ $E_a / 2.303\ RT = 1.0 \times 10^4\ K/T$ $E_a = 1.0 \times 10^4 \times 2.303 \times 8.314$ $= 191471.4\ J/mol$ $t_{1/2} = 0.693/k$ $k = 0.693/200\ min$ $= 0.0034 min^{-1}$	½ 1 ½ 1
14.	(i) **Adsorption** / **Surface phenomena** / **The accumulation of molecular species at the surface rather than in the bulk of a solid or liquid is termed adsorption.** **Absorption** / **Bulk phenomena** / The substance is uniformly distributed throughout the bulk of the solid essentially a bulk phenomenon. **(any one difference)** (ii) $AlCl_3$, more positive charge/Hardy-Schulze rule (iii)Sulphur	1 ½ + ½ 1
15.	(i) Zone refining (ii) Leaching / Bayer's process (iii) Reducing agent / to form CO which acts as a reducing agent.	1 1 1
16.	(i) $E^0_{cell} = E^0_c - E^0_a$ $= (-0.44) - (-0.74)\ V$ $= 0.30V$ $E_{cell} = E^0_{cell} - \frac{0.059}{n} \log \frac{[Cr^{3+}]^2}{[Fe^{2+}]^3}$ $E_{cell} = E^0_{cell} - \frac{0.059}{6} \log \frac{[0.01]^2}{[0.1]^3}$ $= 0.30 - (-0.059/6)$ $= 0.3098V$	½ ½ 1 1
17.	(i) ability of oxygen to form multiple bond/ pπ-dπ bond. (ii) Partially filled d orbitals / due to comparable energies of ns and (n-1) d orbitals (iii) due to relative stabilities of the f^0, f^7 and f^{14} occupancies of the 5f orbitals/ Comparable energies of 7s,6d,5f orbitals.	1 1 1

18.	(i) CH_3OH , $(CH_3)_3C\text{-}I$ (ii) $CH_3CH_2CH_2OH$ (iii) 	1 1 1
19.	(i) $C_6H_5NH_2$, $C_6H_5N_2^+Cl^-$, C_6H_5I (ii) CH_3CN, $CH_3CH_2NH_2$, CH_3CH_2NC	½ + ½ + ½ ½ + ½ + ½
20.	a. Catalyst / initiator of free radical b. Hexamethylene diamine and adipic acid / structure / IUPAC name c. Buna-S<polystyrene<Terylene	1 ½, ½ 1
	OR	
20	 *Chain initiation steps* $C_6H_5-C(=O)-O-O-C(=O)-C_6H_5 \longrightarrow 2C_6H_5-C(=O)-O^{\bullet} \longrightarrow 2C_6H_5^{\bullet}$ Benzoyl peroxide — Phenyl radical $C_6H_5^{\bullet} + CH_2=CH_2 \longrightarrow C_6H_5-CH_2-CH_2^{\bullet}$ *Chain propagating step* $C_6H_5-CH_2-CH_2^{\bullet} + CH_2=CH_2 \longrightarrow C_6H_5-CH_2-CH_2-CH_2-CH_2^{\bullet}$ $C_6H_5-(CH_2-CH_2)_n-CH_2-CH_2^{\bullet}$ *Chain terminating step* For termination of the long chain, these free radicals can combine in different ways to form polythene. One mode of termination of chain is shown as under: $C_6H_5-(CH_2-CH_2)_n-CH_2-CH_2^{\bullet}$ $C_6H_5-(CH_2-\overset{+}{C}H_2)_n-CH_2-CH_2^{\bullet} \longrightarrow C_6H_5-(CH_2-CH_2)_n-CH_2-CH_2-CH_2-(CH_2-CH_2)_n-C_6H_5$	1 1 1
21.	(i) β-D glucose and β-D-galactose / glucose and galactose (ii) water soluble ,excreted out of the body (iii)In nucleotide , phosphoric acid/phosphate group attached to the nucleoside / structures of both nucleotide and nucleoside / nucleotide= base +sugar + phosphate group, nucleoside= base +sugar.	½ , ½ 1 1
22.	d^2sp^3, Paramagnetic, low spin 	1, ½ , ½ 1
23.	(i)Aware, concerned or any other correct two values. (ii) Side effects, unknown health problems (iii) Neurologically active drugs/ stress relievers Example- valium, equanil (or any other correct two example)	½ + ½ 1 1 ½ + ½
24	a) i. Endothermic compound / decomposition of ozone is exothermic in nature and ΔG is negative / decomposition of ozone is spontaneous. ii. Exists as $[PCl_4]^+[PCl_6]^-$ iii. Shows only -1 oxidation state / most electronegative element/ absence of d-orbitals	 1 1 1

	b) i) ii)  	1,1
	OR	
24	(i) F_2 is the stronger oxidising agent than chlorine (a) low enthalpy of dissociation of F-F bond (b) less negative electron gain enthalpy of F (c) high hydration enthalpy of F^- ion ii) low temperature, high pressure and presence of catalyst iii) a) $H_3PO_4 < H_3PO_3 < H_3PO_2$ b) $BiH_3 < SbH_3 < AsH_3 < PH_3 < NH_3$	½ ×4=2 1 1 1
25.	A -$C_6H_5COCH_3$ B-$C_6H_5CH_2CH_3$ C-C_6H_5COOH D ,E -C_6H_5COONa , CHI_3	1 1 1 1+1
	OR	
25	a)HCHO + HCHO $\xrightarrow{\text{conc NaOH}}$ HCOONa +CH_3OH (or any other example) b)$CH_3CH=N-NHCONH_2$ c) Stronger -I effect of fluorine ,stronger acid less pk_a / strong electron withdrawing power of fluorine. d)$CH_3CH=CHCH_2CHO$ e)Silver mirror formed on adding ammonical silver nitrate to propanal and not with propanone (or any other correct test)	1 1 1 1 1
26.	a) $\Delta T_f = i \frac{K_f w_b \times 1000}{M_b \times w_a}$ $\Delta T_f = 3 \times (1.86 \times 1.9/95 \times 50) \times 1000$ $= 2.23K$ $T_f - \Delta T_f = 273.15 - 2.23 / 273 - 2.23$ $T_f = 270.92$ K or 270.77K b) i)2M glucose ; More Number of particles / less vapour pressure ii)Reverse Osmosis	1 1 1 ½ + ½ 1
	OR	
26	a)	

	$\Delta T_f = \frac{K_f w_b \times 1000}{M_b \times w_a}$	1
	$0.383 = (3.83 \times 2.56/M \times 100) \times 1000$	1
	$M=256$ $S \times x = 256$ $32 \times x = 256$ $x=8$	1
	b) i)Shrinks	1
	ii)swells	1

Name	**Signature**	**Name**	**Signature**
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