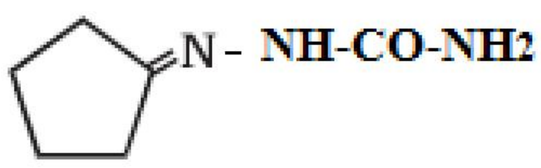
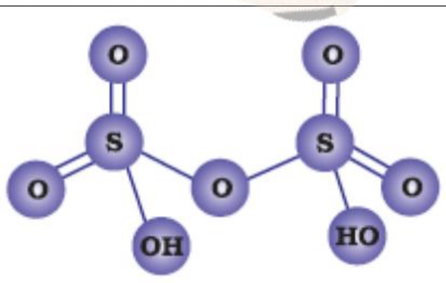
Marking scheme Compartment – 2019

CHEMISTRY (043)/ CLASS XII

56/1/2

Q.No	Value Points	Marks
	SECTION A	
1	Chemicals which prevent spoilage of food due to microbial growth . eg: sodium benzoate / table salt/ sugar/ any other correct example	½ , ½
2	Homopolymer	1
3	Glucose and Fructose	1
4		1
	OR	
4	CH_3-CH_2-CH_3	1
5	No unpaired electron.	1
	OR	
5	$[Fe(C_2O_4)_3]^{3-}$; $C_2O_4^{2-}$ is a didentate / chelating ligand so it is more stable	½ , ½
	SECTION B	
6	Since its a first order reaction, a) Unit of rate constant is s^{-1} / $time^{-1}$ b) $t_{1/2} = \frac{0.693}{k}$ $= \frac{0.693}{5.5 \times 10^{-14}}$ $= 1.26 \times 10^{13}$ s (or any other unit of time)	1 ½, ½
7	a) Conductivity of a solution at any given concentration is the conductance of one unit volume of solution kept between two platinum electrodes with unit area of cross-section. Molar conductivity is the conductivity of solution for 1M solution. b) Because number of ions per unit volume that carry the current in a solution decreases.	½ ½ 1
8	 a) b) Carbon dioxide is formed , $C + 2H_2SO_4(conc.) \rightarrow CO_2 + 2\ SO_2 + 2\ H_2O$ (Award full marks if only balanced equation is given)	1 ½ , ½
9	a) Because Cr is more stable in +3 oxidation state due to t_2g^3 configuration whereas Mn is more stable In +2 oxidation state due to half filled $3d^5$ configuration. B) Because it undergoes disproportionation reaction	1 1
10.	For fcc, $r = \frac{a}{2\sqrt{2}}$ $a = 2r \times \sqrt{2}$ $= 2 \times 125pm \times 1.414$ $= 353.5$ pm	½ ½ 1
	OR	
10.	$d = \frac{zM}{a^3 N_A}$	½

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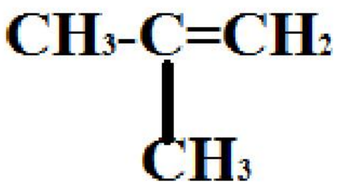
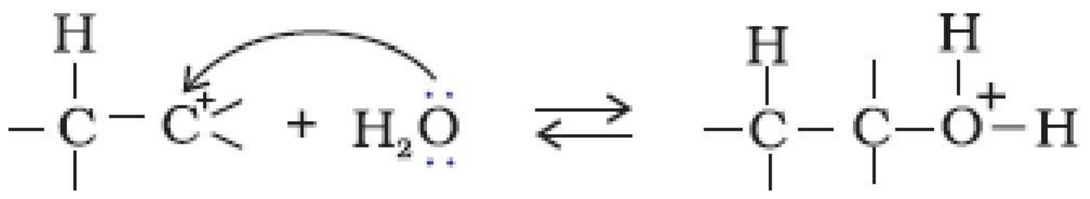
	$a^3 = \frac{4 \times 99 \text{ g mol}^{-1}}{3.04 \text{ g cm}^{-3} \times 6.022 \times 10^{23} \text{ mol}^{-1}}$ $a^3 = 21.6 \times 10^{-23} \text{ cm}^3$ (Deduct half marks if correct unit is not given)	½ 1
11	 ; 2--Methylpropene	1,1
	OR	
11	 a) b) 2,6-dimethylphenol	1 1
12	a) A_2B_3 b) Frenkel defect , due to small size of Zn^{2+} ion.	1 ½ , ½
	SECTION C	
13	$\log \frac{k2}{k1} = \frac{Ea}{2.303R} [\frac{1}{T1} - \frac{1}{T2}]$ $\log \frac{6 \times 10^{-2}}{2 \times 10^{-2}} = \frac{Ea}{2.303 \times 8.314 \, J \, K^{-1} mol^{-1}} [\frac{1}{300} - \frac{1}{320}] \, K^{-1}$ $\log 3 = \frac{Ea}{19.15 \, J \, mol^{-1}} [\frac{320-300}{300 \times 320}]$ $0.4771 = \frac{Ea}{19.15 \, J \, mol^{-1}} [\frac{20}{300 \times 320}]$ Ea= 43855 J mol^{-1} or 43.855 kJ mol^{-1} (Deduct half marks if correct unit is not given)	½ 1 ½ 1
14	$Zn^{2+} + 2e \rightarrow Zn(s)$ $E_{Zn2+/Zn} = E^o_{Zn2+/Zn} - \frac{0.059}{2} \log \frac{1}{[Zn2+]}$ $E_{Zn2+/Zn} = -0.76 - \frac{0.059}{2} \log \frac{1}{[0.01]}$ $= -0.76 - \frac{0.059}{2} \log 10^2$ $= -0.76 - 0.059$ V $E_{Zn2+/Zn} = -0.819$ V (Deduct half marks if correct unit is not given)	1 1 1
15	a) Calamine is an ore of Zn while malachite is an ore of copper. / Calamine is $ZnCO_3$ while malachite is $CuCO_3.Cu(OH)_2$ b) Zn is more reactive than Cu , so reduction will be faster in case of Zn. c) Cryolite makes alumina a good conductor of electricity and lowers melting point of the mixture.	1 1 1
	OR	
15	a) Cast iron | Pig iron 1.It contains low percentage of carbon and other impurities | 1.It contains high percentage of carbon and other impurities 2.It is moulded pig iron | 2. It is directly obtained from blast furnace	1+ 1

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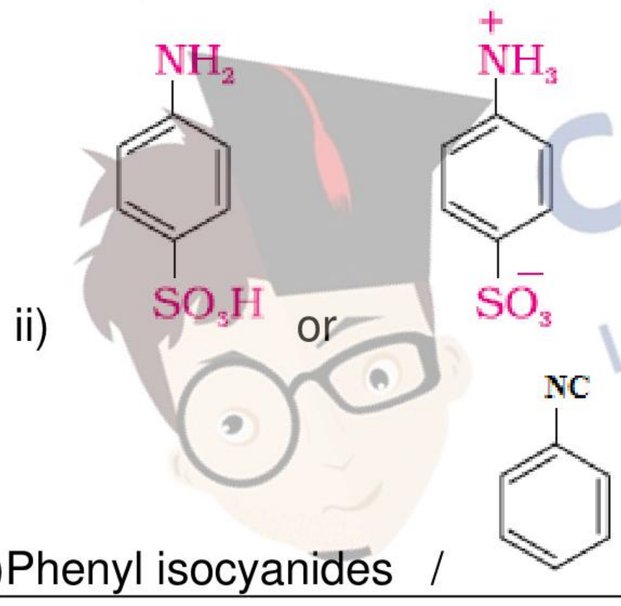
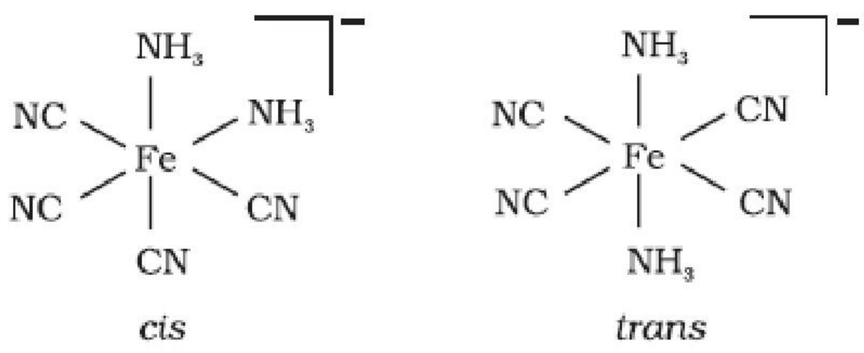
	3. It is less brittle | 3. It is more brittle (Any two) b)Zone refining – impurities are more soluble in the melt than the solid state of the metal.	1
16	a) Because acid formed in the reaction provides H^+ which acts as a catalyst in hydrolysis. b) The solution becomes colourless because the molecules of methylene blue/ dye get adsorbed on the surface of charcoal. c) Milk / Vanishing cream (or any other suitable example)	1 1 1
	OR	
16	a) Colloids which acts as electrolytes at low concentration and show colloidal behaviour at high concentration b) The movement of colloidal particles towards a particular electrode under the influence of an electric field. c) The potential difference between fixed layer and the diffused layer of opposite charges.	1 1 1
17	a) i) $5NO_2^- + 2MnO_4^- + 6H^+ \longrightarrow 2Mn^{2+} + 5NO_3^- + 3H_2O$ ii) $3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^- + MnO_2 + 2H_2O$ b) Cerium / Ce	1 1 1
18	a) i) Propene ii) 	1 1
	b)Phenyl isocyanides /	1
19	 a) b)In the presence of strong field ligand CO , the unpaired d-electrons of Ni pair up so $[Ni(CO)_4]$ is diamagnetic but Cl^- being a weak ligand is unable to pair up the unpaired electrons, so $[Ni(Cl_4)]^{2-}$ is paramagnetic.	1,1 1
	OR	
19	a) Ligand that can ligate through two different atoms. b) Ligands can be arranged in a series in the order of increasing field strength. / An experimentally determined series based on absorption of light by complexes with different ligands. c)Complexes in which a metal is bound to more than one kind of ligands / donor groups	1 1 1

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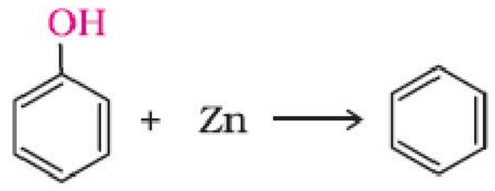
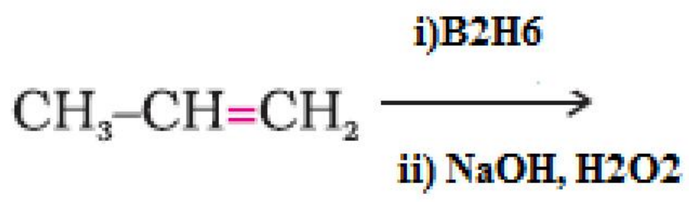
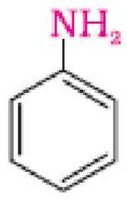
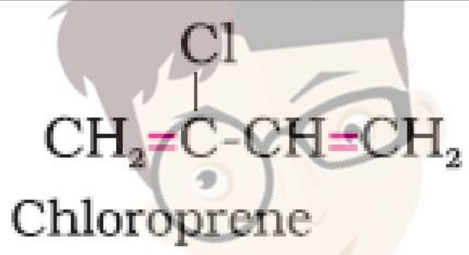
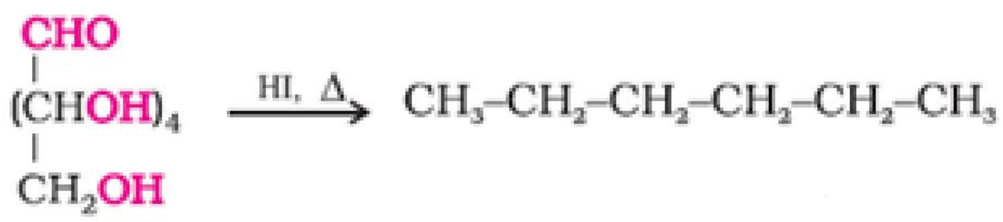
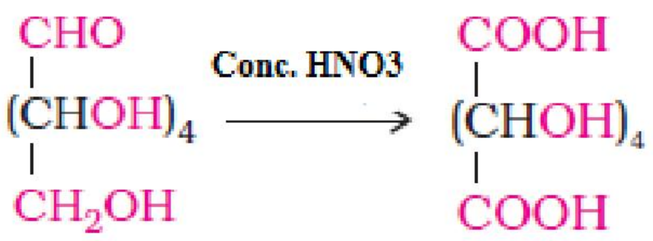
20.	a) i)  ii)  (or any other suitable method) b) Because $-NO_2$ is an electron withdrawing group and stabilises the conjugate base.	1 1 1
21	a) A =  / Aniline , B =  / 2,4,6-Tribromoaniline b) Because of hydrogen bonding in ethylamine whereas it is hindered by the bulky phenyl group in aniline.	1+ 1 1
22	a) Antiseptics – chemicals applied on living tissues to prevent the growth of microorganisms while disinfectants are applied on non-living tissues. Example: Antispetic- Dettol , Disinfectants- 1% phenol (or any other suitable example) b) It is needed by diabetic persons as it is excreated from the body in urine unchanged. / Reduces calories intake	½ + ½ ½ + ½ 1
	OR	
22	i) Chemical compounds used for the treatment of stress and mental diseases. ii) Chemical compounds which stop overproduction of acid in stomach. iii) Chemical compounds which reduce or abolish pain without disturbing nervous system.	1 1 1
23	 a) b) $C_6H_5OH + HCHO$, phenol and formaldehyde c) $CH_2=CH-Cl$, vinyl chloride	½ , ½ ½ , ½ ½ , ½
24	**a) i)**  or n-Hexane is formed **ii)**  or Saccharic acid is formed b) Starch is a polymer of α-glucose while cellulose is a polymer of β-glucose.	1 1 1
	SECTION D	
25	a) Compound = Benzaldehyde or C_6H_5CHO	1

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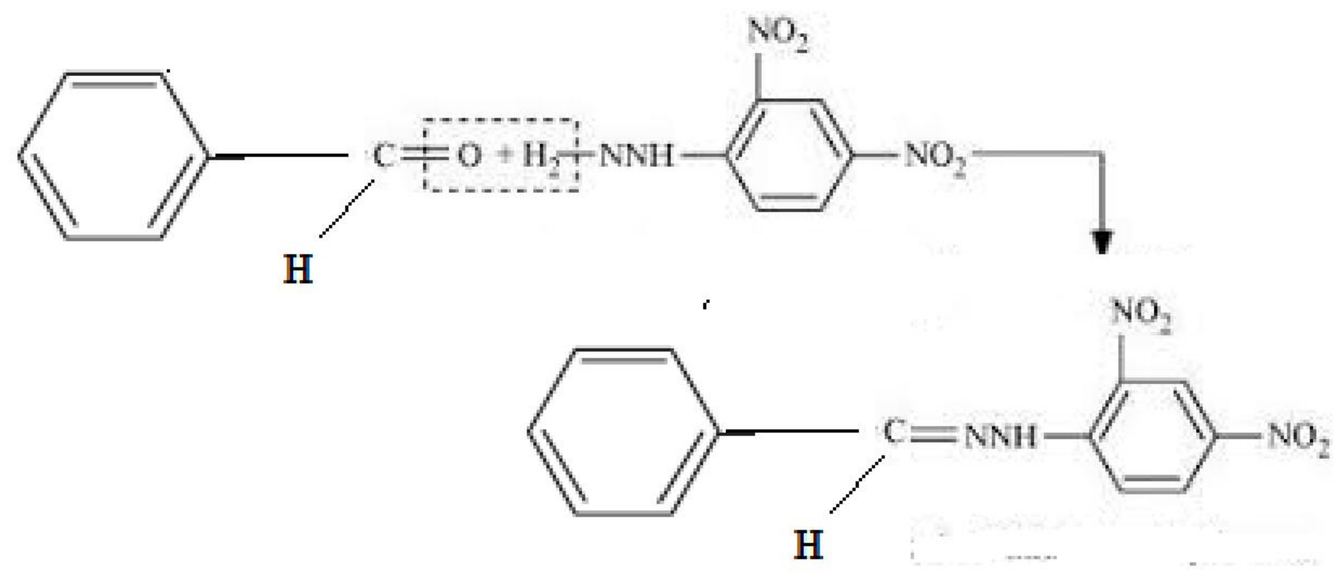
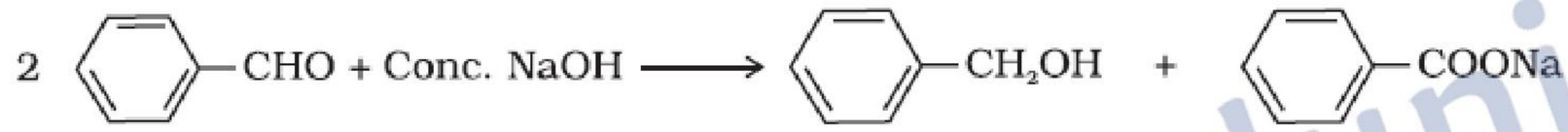
	Reaction Reaction with 2,4-DNP  (orange ppt) With Tollens reagent $RCHO + 2[Ag(NH_3)_2]^+ + 3\,\bar{O}H \longrightarrow R\bar{C}O\bar{O} + 2Ag + 2H_2O + 4NH_3$ (Where R= $-C_6H_5$) Cannizzaro  b) i)Add neutral $FeCl_3$ to both the compounds, phenol will give violet colour] ii) Add $NaHCO_3$ to both the compounds, benzoic acid acid will give brisk effervescence of CO_2	½ ½ 1 1 1
	OR	
25	a) A= CH_3COOH B= CH_3COCl C= CH_3CONH_2 D= CH_3NH_2 b) $HCOOH < ClCH_2COOH < CCl_3COOH < CF_3COOH$	1 1 1 1 1
26	a)$\Delta T_f = T_f^o - T_f = 273.15 - 271\ K = 2.15\ K$ $\Delta T_f = K_f\, m$ $\Delta T_f = K_f \times \frac{w_b \times 1000}{M_B \times w_A}$ $K_f = \frac{2.15K \times 342\ g\ mol^{-1} \times 95\ g}{5g \times 1000\ g\ Kg^{-1}}$ $= 13.97\ K\ kg\ mol^{-1}$ For 5% glucose in water, $\Delta T_f = K_f\, m$ $\Delta T_f = K_f \times \frac{w_b \times 1000}{M_B \times w_A}$ $= \frac{13.97\ K\ Kg\ mol^{-1} \times 5g \times 1000\ g\ K^{-1}}{180\ g\ mol^{-1} \times 95\ g}$ $= 4.08K$ $T_f = T_f^o - \Delta T_f = 273.15 - 4.08\ K = 269.07\ K$ b) It is due to the fact that KCl dissociates to give K^+ and Cl^- ions whereas urea does not dissociate	½ ½ ½ 1 ½

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	into ions c) Liquids having similar nature and polarities / which obey Raoults' law	1 1
	OR	
26	$\Delta T_f = K_f\, m$ $\Delta T_f = K_f \times \frac{w_b \times 1000}{M_B \times w_A}$ $M_b = K_f \times \frac{w_b \times 1000}{\Delta T_f \times w_A}$ $= 5.12 \times \frac{1 \times 1000}{0.40 \times 50}$ $= 256\ g\ mol^{-1}$ b) Higher the value of K_H, lower will be the solubility of a gas in the liquid. c) Low level of oxygen in the blood and tissues of people at high altitudes leads to the condition of anoxia.	1 1 1 1 1
27	A= S_8 / Sulphur $S_8 + 8\ O_2 \rightarrow 8SO_2$ / $S + O_2 \rightarrow SO_2$ B= SO_2 $Ca(OH)_2\ (aq) + SO_2\ (g) \rightarrow CaSO_3\ (s) + H_2O$ (milky) Decolourises $KMnO_4$ $2KMnO_4 + 5\ SO_2 + 2H_2O \rightarrow 2\ H_2SO_4 + 2MnSO_4 + K_2SO_4$ / $2\ MnO_4^- + 5\ SO_2 + 2H_2O \rightarrow 4\ H^+ + 2Mn^{2+} + 5\ SO_4^{2-}$ Reduces Fe^{3+} to Fe^{2+} $2Fe^{3+} + SO_2 + 2\ H_2O \rightarrow 2\ Fe^{2+} + SO_4^{2-} + 4H^+$	1 ½ 1 ½ 1 1
	OR	
27	a) $H_2Te > H_2Se > H_2S > H_2O$ b) PCl_4^- , as phosphorous has 10 e^- which cannot be accommodated in sp^3 orbitals. c) Rhombic sulphur d) H_3PO_4 e) PCl_3 hydrolyses in presence of moisture to give fumes of HCl / $PCl_3 + 3H_2O \rightarrow H_3PO_3 + 3HCl$	1 ½ , ½ 1 1 1

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