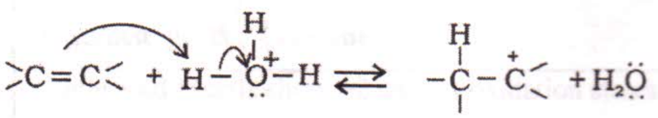
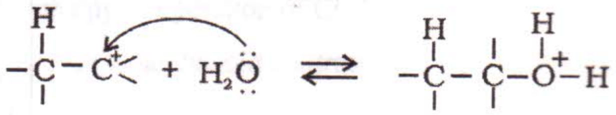
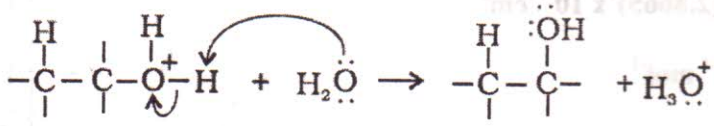
Marking Scheme

Chemistry - 2012

Outside Delhi- SET (56 /1)

1	Their conductivity is increased by adding an appropriate amount of suitable impurity / by **doping.**	1
2	The process of converting precipitates of a substance into colloidal form by adding small amount of electrolyte is called **peptization.**	1
3	By hydrometallurgy	1
4	BiH_3, because the stability of hydrides decreases on moving from SbH_3 to BiH_3.	½ + ½
5	$CH_2{=}CH{-}CH_2{-}C{\equiv}CH + Br_2 \longrightarrow \underset{Br}{CH_2}{-}\underset{Br}{CH}{-}CH_2{-}C{\equiv}CH$ or colour of Bromine get discharged or any other correct suitable answer.	1
6.	Pent–2–enal	1
7.	$COOH{-}(CHOH)_4{-}COOH$ Saccharic acid	1
8.	Antiseptics are applied to the living tissues whereas disinfectants are applied to inanimate objects / non-living objects.	1
9.	k = 1/R (l/A) Where k is conductivity, R is resistance and l/A is cell constant $\Lambda m = k/C$ Where Λm is molar conductivity C is concentration **OR** $\Lambda m = 138.9\ S\ cm^2\ mol^{-1}$ M = 1.5 K = ? $\Lambda_m = \frac{1000\ K}{M}$ $K = \frac{\Lambda_m \times M}{1000}$ $K = \frac{138.9 \times 1.5}{1000} = 0.20835\ Scm^{-1}$	1 1 1 1

10	For the reaction A $\longrightarrow$ Product (i) Rate of reaction becomes 4 times (i)Rate of reaction decreases by 4 times	1+1
11	(i) **Nickel:-** Mond Process **Principle** the metal is converted into its volatile compound which is then decomposed to give pure metal at higher temperature. (ii) **Germanium:-** Zone refining **Principle** that the impurities are more soluble in the melt than in the solid state of the metal.	½ + ½ ½ + ½
12	(i) Because bond energy of F_2 is lower than that of Cl_2 and therefore F forms stronger bond with N with the release of energy. (ii) SF_4 has trigonal bipyramidal structure with one l.p. Due to l.p-b.p repulsion two axial S-F bonds are longer than two S-F equatorial bonds.	1 1
13	(i) $Cr_2O_7^{2-} + 14H^+ + 6I^- \longrightarrow 2Cr^{3+} + 3I_2 + 7H_2O$ (ii) $2MnO_4^- + 6H^+ + 5NO_2^- \longrightarrow 2Mn^{2+} + 5NO_3^- + 3H_2O$	1 1
14	**Mechanism:-** The mechanism of the reaction involves the following three steps: Step 1: Protonation of alkene to form carbocation by electrophillic attack of H_3O^+. $H_2O + H^+ \rightarrow H_3O^+$  Step 2: Nucleophilic attack of water on carbocation  Step 3: Deprotonation to form an alcohol 	1 ½ ½
15	(i) Alcohols are more soluble in water because of the formation of hydrogen bond whereas hydrocarbon cannot form hydrogen bond with water. (ii) This is because $-NO_2$ group is electron withdrawing and therefore stabilize phenoxide ion whereas $-OCH_3$ group is electron donating which destabilize phenoxide ion. **(or any other correct suitable answer)**	1+1

16 (i) **Carbylamine reaction:-**

$$RNH_2 + CHCl_3 + 3KOH \xrightarrow{Heat} R\text{–}NC + 3KCl + 3H_2O$$

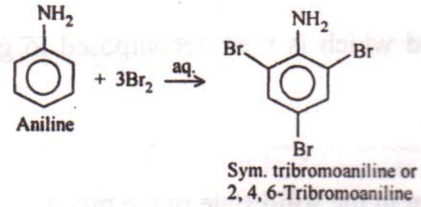
(ii) **Hoffmann bromamide reaction:-**

$$RCONH_2 + Br_2 + 4NaOH \longrightarrow R\text{–}NH_2 + Na_2CO_3 + 2NaBr + 2H_2O$$

1+1

17 (i) $C_6H_5N_2^+Cl^- + H_3PO_2 + H_2O \longrightarrow C_6H_6 + N_2 + H_3PO_3 + HCl$

(ii)



1+1

18 Food preservatives are chemicals that prevent food from spoilage due to microbial growth.

Examples of food preservatives: - Table salt, sugar, vegetable oil, sodium benzoate (C_6H_5COONa), and salts of propanoic acid. (any two) — 1+ ½ + ½

19

$$d = \frac{z \times M}{a^3 \times N_A}$$ ½

For fcc lattice for copper

$a = 2\sqrt{2}\, r$ ½

$$a^3 = (2\sqrt{2}\, r)^3 = 8 \times 2\sqrt{2}\,(1.278 \times 10^{-8}\text{cm})^3 = 4.723 \times 10^{-23}\text{cm}^3$$

$$d = \frac{4 \times 63.55 \text{ g mol}^{-1}}{4.723 \times 10^{-23} \text{ cm}^3 \times 6.02 \times 10^{23} \text{ mol}^{-1}}$$ 1

$= \mathbf{8.95\ g\ cm^{-3}}$ 1

Or

$$N_A = \frac{z \times M}{d \times a^3}$$ 1

$$= \frac{2 \times 56 \text{ g mol}^{-1}}{7.87 \text{ g cm}^{-3} \times (2.8665)^3 \times 10^{-24} \text{cm}^3}$$ 1

$N_A = \mathbf{6.043 \times 10^{23}\ mol^{-1}}$ 1

20 $A = \pi r^2 = 3.14 \times 0.52 \text{ cm}^2 = 0.785 \text{ cm}^2 = 0.785 \times 10^{-4} \text{ m}^2$ $l = 50 \text{ cm} = 0.5 \text{ m}$

$R = \frac{\rho l}{A}$ or $\rho = \frac{RA}{l}$

$$\rho = \frac{5.55 \times 10^3\ \Omega \times 0.785 \text{ cm}^2}{50 \text{ cm}} = 87.135\,\Omega\text{cm}$$ 1

	Conductivity = K = $\frac{1}{\rho}$ $= \frac{1}{87.135}$ S cm^{-1} = 0.01148 S cm^{-1} Molar conductivity, $\Lambda_m - \frac{1000\ K}{M}$ $= \frac{0.01148\ S\ cm^{-1} \times 1000\ cm^3\ L^{-1}}{0.05}$ = 229.6 S cm^2 mol^{-1}	1 1
21	$N_{2(g)} + O_{2(g)} \longrightarrow 2NO_{(g)}$ Initial Conc. 0.80M 0.20M 0 Final Conc. (0.80 – x) (0.20 – x) 2x $K_c = \frac{[NO]^2}{[N_2] \times [O_2]}$ $1 \times 10^{-5} = \frac{[2x]^2}{[0.80 - x] \times [0.20 - x]}$ Thus x = 0.66 x 10^{-3} (approx) At equilibrium [NO] = 2x = 1.32 x 10^{-3}. **(Note: any attempt whichsoever made may be awarded full marks.)**	½ ½ 1
22	(i) **Aerosol:** A colloidal solution having a gas as the dispersion medium and a solid / liquid as the dispersed phase is called an aerosol. For example: fog,smoke,dust **(any one)** **(ii) Emulsion:** The colloidal solution in which both the dispersed phase and dispersion medium are liquids is called an emulsion. For example: milk, cold cream **(any one)** **(iii) Micelles:** There are some substances which at low concentrations behave as normal strong electrolytes, but at higher concentrations exhibit colloidal behaviour due to the formation of aggregates. The aggregated particles thus formed are called **micelles.** eg. Soap,detergents **(any one)**	½+ ½ ½+ ½ ½+ ½
23	(i) Lanthanoid Metals show +2 and +4 oxidation states to attain stable f^0 and f^7 configurations. (ii)Because of high enthalpy of atomization and ionization which is not compensated by the enthalpy of hydration of Cu^{2+}. ii) Due to lanthanoid contraction.	1x3=3