

Solution

SECTION A

- Defects which lead to a certain change in composition of solids are known as Non-stoichiometric defect. [1]
- The IUPAC name of the structure is N-methylethanamine [1]
- Froth floatation process [1]
- Zinc acts as a reducing agent in the extraction of silver. [1]
- Maltose [1]

$$\text{Molar mass, } d = \frac{Z \times M}{N_A \times a^3} \quad [1/2]$$

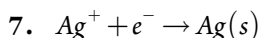
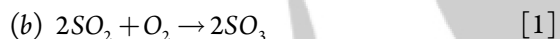
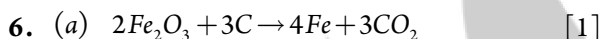
$$M = (N_A \times a^3 \times d) / Z \quad [1/2]$$

$$M = \frac{6.022 \times 10^{23} \times (2 \times 10^{-8})^3 \times 4.2 \text{ g cm}^{-3}}{4}$$

$$M = 6.022 \times 8.4 \times 10^{-1} = 5.05 \text{ g / mol} \quad [1/2]$$

9. (I)

SECTION B



$$\therefore 108 \text{ gm Ag required} = 96500 \text{ C}$$

$$\therefore 1.4 \text{ gm Ag required} = \frac{96500}{108} \times 1.4 \quad [1/2]$$

$$= 1250.9 \text{ C} \quad [1/2]$$

$$t = \frac{Q}{i}$$

$$t = \frac{1250.9}{2} \quad [1/2]$$

$$t = 625.45 \text{ sec} \quad [1/2]$$

8. $d = 4.2 \text{ g cm}^{-3}$

As the lattice is fcc type, the number of atoms per unit cell is $Z = 4$

Edge length, $a = 2 \times 10^{-8} \text{ cm}$ [1/2]

Avogadro's number, $N_A = 6.022 \times 10^{23} \text{ mol}^{-1}$

Absorption	Adsorption
(a) Process in which a fluid is dissolved by a solid or a liquid.	Process in which ions, atoms or molecules forms a substance, only at the surface of the adsorbent.
(b) It is a Bulk phenomenon	It is a Surface phenomenon
(c) It is an Endothermic process	It is an Exothermic process
(d) Example of Absorption is Water vapours absorbed by CaCl_2	Example of Adsorption is water vapour adsorbed on silica gel.

[1/2 + 1/2 + 1/2 + 1/2]

OR

CATALYSIS- When the catalyst is used to increase the rate of reaction without changing itself that is known as catalysis.

Few important features of solid catalysts are:

- Activity - It is where the catalyst can increase the rate of a reaction. [1]
- Selectivity - It is where the catalyst can direct a reaction to yield a particular reaction. [1]

10. Chemical substances used to protect food against bacteria, and are capable of inhibiting the process of fermentation or acidification of food. [1]

Example: Sodium metabisulphite ($\text{Na}_2\text{S}_2\text{O}_5$)

Sodium Benzoate ($\text{NaC}_7\text{H}_5\text{O}_2$) [1]

SECTION C

11. Given, $d = 4\text{cm}$, $\therefore r = 2\text{cm}$

$$l = 52.2\text{cm}, R = 6.12 \times 10^3 \Omega \quad [1/2]$$

$$A = \pi r^2$$

$$\Rightarrow 3.14 \times 2 \times 2\text{cm}^2$$

$$\Rightarrow 12.56\text{cm}^2 \quad [1/2]$$

$$\rho = R \times \frac{A}{l}$$

$$\Rightarrow 6.12 \times 10^3 \Omega \times 12.56 / 52.2$$

$$\Rightarrow 1472.5 \Omega \text{cm} \quad [1/2]$$

Conductivity, $\kappa = 1/\rho$

$$\Rightarrow \frac{1}{1472.5} \text{S cm}^{-1}$$

$$\Rightarrow 0.000675 \text{S cm}^{-1} \quad [1/2]$$

Molar conductivity $\Lambda_m = \kappa \times 1000 / C$

$$\Rightarrow 0.000675 \text{S cm}^{-1} \times 1000 / 1.05 \text{mol} / \text{cm}^3$$

$$\Rightarrow 0.638 \text{S cm}^2 \text{mol}^{-1} \quad [1]$$

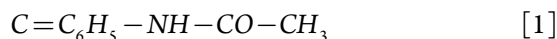
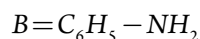
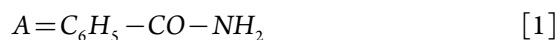
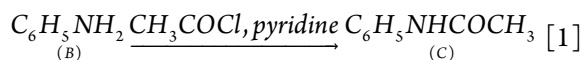
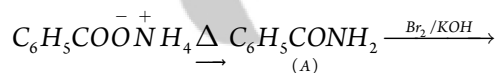
12. The IUPAC name of the given compound is

(a) 2,4,6-trinitrotoluene [1]

(b) 2,4,6-tribromoaniline [1]

(c) N,N-Dimethylbenzenamine [1]

OR



13. Given: $T_1 = 300\text{K}, T_2 = 320\text{K}, \frac{t_1}{2}$
 $= 40\text{min}, \frac{t_2}{2} = 20\text{min}, \quad [1]$

$$\text{We know, } t_{1/2} = \frac{0.693}{K}$$

$$\log \frac{K_2}{K_1} = \frac{Ea}{2.303R} \left(\frac{1}{T_1} - \frac{1}{T_2} \right)$$

$$K \propto 1/t_{1/2} \quad [1]$$

$$\Rightarrow \log \left(\frac{40}{20} \right) = \frac{Ea}{2.303 \times 8.314} \left(\frac{20}{320 \times 300} \right)$$

$$\Rightarrow 0.3010 = \frac{20Ea}{2.303 \times 8.314 \times 320 \times 300}$$

$$\Rightarrow Ea = \frac{0.3010 \times 2.303 \times 8.314 \times 320 \times 300}{20 \times 1000}$$

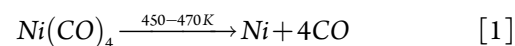
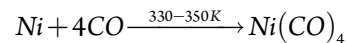
$$= 27.67 \text{KJ} / \text{mol} \quad [1]$$

14. (a) A beam of light is passed through a colloidal solution when diffusing of light by the colloidal particles happens and the way of the light ends lit up. This is called Tyndall Effect. [1]

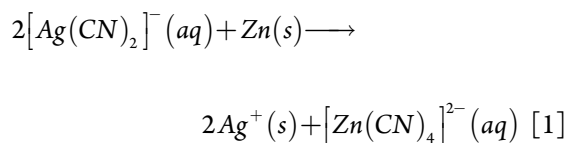
(b) Creature stowers a (way) are colloidal in nature. At the point when a stower which has emphatically charged particles, is absorbed tannin which contains contrarily charged colloidal particles, common coagulation happens. This outcomes in the solidifying of Leather. [1]

(c) The decidedly charged colloidal particles of hydrated ferric oxide arrangement get coagulated by the oppositely charged particles given by electrolyte NaCl. [1]

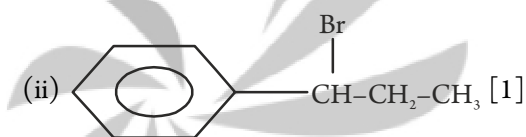
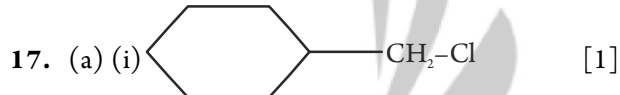
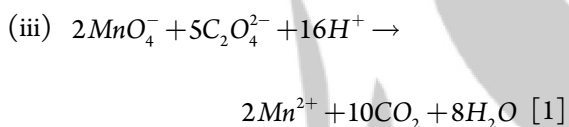
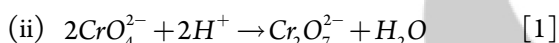
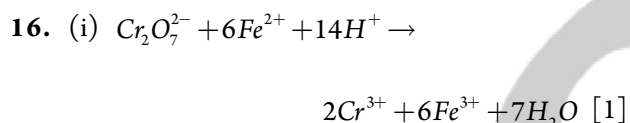
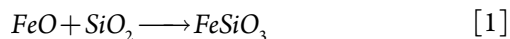
15. (i) CO is used in the vapor phase refining of nickel.



(ii) Zinc acts as a reducing agent which reduces cyanide complex of silver into pure silver.



(iii) Silica is used to remove impurities in the form of metal oxides as slag.

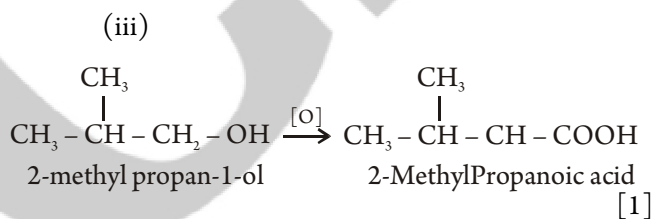
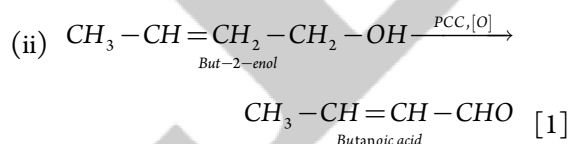
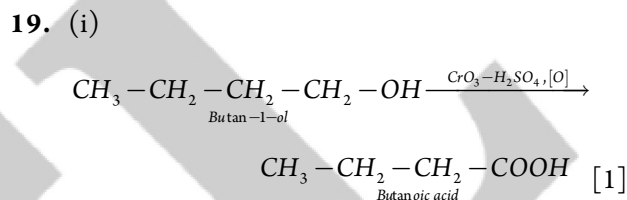
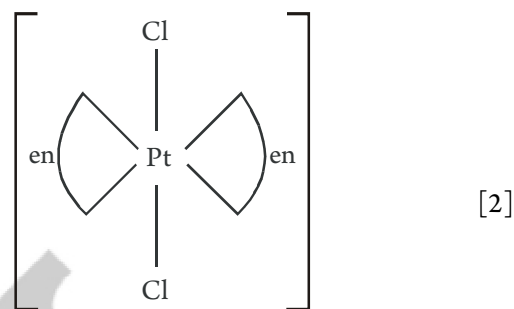


18. (a) Hybridization: sp^3d^2

Magnetic character: Paramagnetic [1/2]

Spin nature of complex: High-spin complex [1/2]

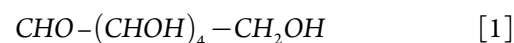
(b) trans-isomer of $[Pt(en)_2Cl_2]^{2+}$ is optically inactive.



20. (i) Vitamin A. [1]

(ii) Uracil [1]

(iii) Glucose exists in acyclic straight six membered carbon chain => open structure of Glucose.



21. (i) Peptide linkage: Peptide linkage is an amide ($-CO-NH-$) bond formed between $-COOH$ and $-NH_2$ group in protein formation. [1 1/2]

(ii) Denaturation: When a protein in its native form, is subjected to physical change like change in temperature or chemical change like change in pH, protein loses its biological activity. This is called denaturation of protein [1 1/2]

OR

(i) Vitamin-C [1]

(ii) Peptide linkage [1]

(iii) n-hexane: $CH_3CH_2CH_2CH_2CH_2CH_3 \quad [1]$

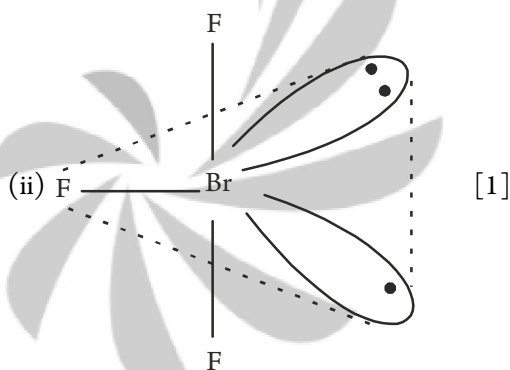
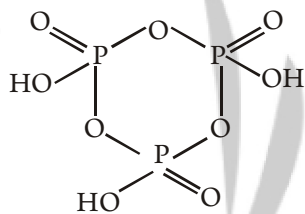
22. (i) Amminechloridonitrito-N-platinum (II), trigonal planar, diamagnetic. [1]
- (ii) Tetra-ammine dichlorido cobalt (III) chloride, octahedral, diamagnetic. [1]
- (iii) Tetracarbonyl nickel (0), Tetrahedral, diamagnetic. [1]

SECTION D

23. (a)
- To be aware about adverse effect of carcinogen present in bread. [1]
 - To replace the bakery product with some protein and vitamin rich food like fruits, salads etc. [1]
- (b) Riboflavin, Thiamine [1]
- (c) Alpha helix, Beta pleated sheet [1]
- (d) Starch, Glycogen [1]

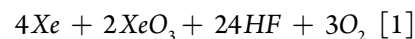
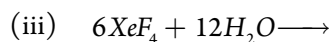
SECTION E

24. (a) (i) [1]



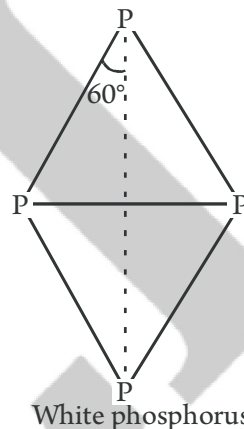
(b)

- (i) $S_8 + 48HNO_3(\text{conc.}) \rightarrow 8H_2SO_4 + 48NO_2 + 16H_2O$ [1]
- (ii) $4Zn + 10HNO_3(\text{dilute}) \rightarrow 4Zn(NO_3)_2 + 5H_2O + N_2O$ [1]



OR

- (i) White phosphorus is most reactive of all the allotropes of phosphorus. It is because it exists as P_4 discrete tetrahedral units with 60° angle, which results in angular strain and makes it highly reactive.

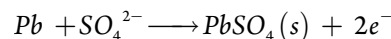


- (ii) (a) In NH_4^+ all the four orbitals are bonded where as in NH_3 , there is a lone pair of electrons in P, which is responsible for lone pair-bond pair repulsion in NH_3 & reduce the bond angle. [1/2]

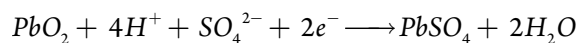
- (b) Acidic character increases due to decrease in bond enthalpy as we move down the group and due to increasing size of (Non metal-H), bond breaks more easily. [1/2]

25. (a) It is secondary cell

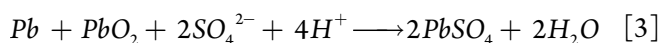
Anode Reaction:



Cathode Reaction:



Net Reaction:



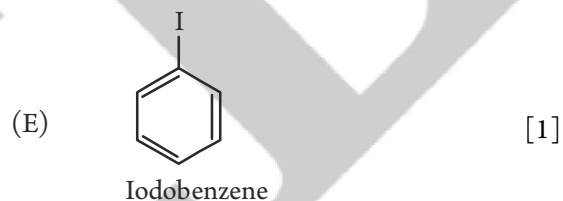
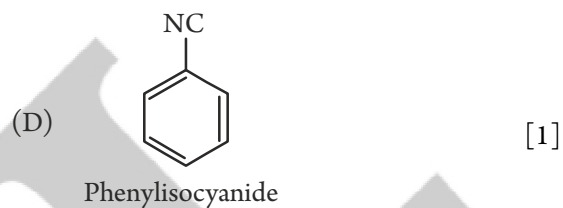
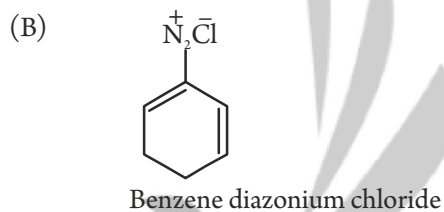
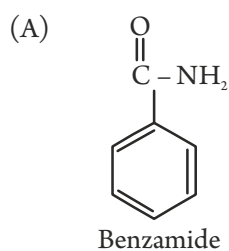
(b)
$$E_{cell} = E_{cell}^{\circ} - \frac{0.0591}{n} \log \frac{[Cr^{+3}]^2}{[Cr_2O_7]^{-2} [H^+]^{14}}$$

$$E_{cell} = 1.33V - \frac{0.0591}{6} \log \frac{[0.20]^2}{[0.10]^{-2} [10^{-4}]^{14}}$$

$$E_{cell} = 1.33V - 0.55V$$

$$E_{cell} = 0.78V$$

26.



OR

