

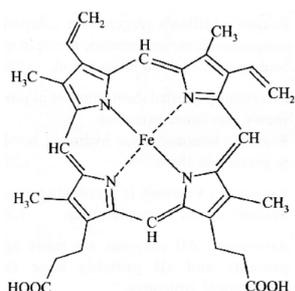
SOLUTION (CHEMISTRY)

Class 12 - Chemistry

Section A

1. (a) Haemoglobin, cytochromes

Explanation: Cytochromes are conjugated proteins consisting of an apoprotein and a prosthetic group (heme). The heme consists of porphyrin with a central iron atom. The name haemoglobin is the concatenation of heme and globin, reflecting the fact that each subunit of haemoglobin is a globular protein with an embedded heme (or haem) group; each heme group contains an iron atom, and this is responsible for the binding of oxygen. The most common types of haemoglobin contain four such subunits, each with one heme group.



2. (c) cell emf

Explanation: cell emf

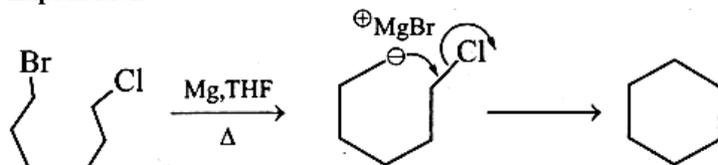
3. (b) oxidation by heating with copper followed by reaction with Fehling's solution

Explanation: Cu oxidise 1° alcohol to aldehyde while 2° alcohol get oxidise to ketone. Aldehyde and ketone can be differentiated by Fehling solution.

4. (a)



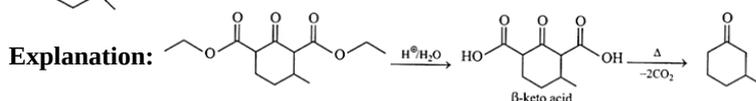
Explanation:



5. (a) Ni(CO)₄

Explanation: In nickel tetracarbonyl, the oxidation state for nickel is assigned as zero

6. (a)

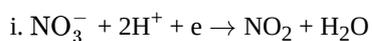


7. (d) In fixed ratio with that in the lower layer

Explanation: A solute distributes itself between two immiscible liquids. Ratio of conc. of solute in liquid1 and liquid 2 is constant.

8. (a) 1.2

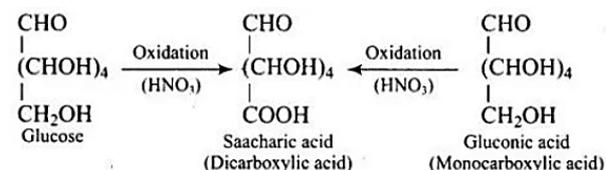
Explanation:



$$E = E^\circ + \frac{0.06}{1} \log \frac{[\text{NO}_3^-][\text{H}^+]^2}{[\text{NO}_2]}$$

$$E = 0.8 + 0.06 \times 2 \log [\text{H}^+] \dots(i)$$

conditions.



OR

- Peptide linkage.** Amino acids are bifunctional molecules with NH_2 group at one end and COOH at the other. Therefore, the COOH of one molecule and NH_2 of another molecule interact by elimination of H_2O to form an amide like linkage called peptide bond or peptide linkage.
- Primary structure.** The sequence in which amino acids are linked with each other in polypeptide chain form primary structure.
- Denaturation.** The process of by which secondary and tertiary structure of proteins get disturbed on change of pH or temperature and they are not able to perform their functions. This is called denaturation of proteins.

Section D

31. Read the text carefully and answer the questions:

Vapour pressure of a liquid or a solution is the pressure exerted by the vapour in equilibrium with the liquid or solution at a particular temperature. It depends upon the nature of the liquid and temperature. The non-volatile solute in solution reduces the escaping tendency of the solvent molecules in the vapour phase because some of the solute particles occupy the positions of the solvent molecules on the liquid surface. The relative lowering of the vapour pressure of a solution containing a non-volatile solute is equal to the mole fraction of the solute in the solution. This is also known as Raoult's law. However, for solutions of volatile solutes, the vapour pressure of a component in a solution at a given temperature is equal to the mole fraction of that component in the solution multiplied by the vapour pressure of that pure component. The solutions in which each component obeys Raoult's law is called an ideal solution. For ideal solutions ΔH_{mixing} and ΔV_{mixing} are also zero. Practically no solution is ideal. A non-ideal solution is that solution in which solute and solvent molecules interact with one another with a different force than the forces of interaction between the molecules of the pure components. There are two types of non-ideal solutions, showing positive deviations and negative deviations from ideal behaviour. If for the two components A and B, the forces of interaction between A and B molecules are less than the A-A and B-B interactions, the non-ideal solutions have positive deviations. On the other hand, if the forces of interaction between A and B molecules are more than the A-A and B-B interactions, the non-ideal solutions have negative deviations.

$$(i) P_A = x_A \times P_A^\circ$$

$$32 = x_A \times 40$$

$$x_A = \frac{32}{40}$$

$$x_A = 0.8$$

(ii) For pure octane, $x = 0$

$$\therefore p(\text{sol.})(\text{mm Hg}) = P(\text{octane}) = 35 + 65 \times 0 = 35 \text{ mm of Hg}$$

(iii) The value of ΔV_{mixing} and ΔH_{mixing} is negative.

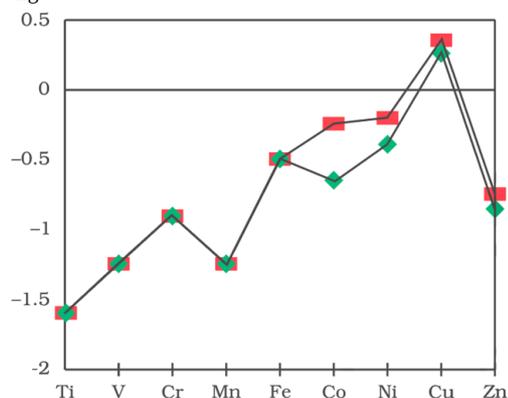
OR

It is an example of Non-ideal solution.

32. Read the text carefully and answer the questions:

The unique behaviour of Cu, having a positive E° accounts for its inability to liberate H_2 from acids. Only oxidising acids (nitric and hot concentrated sulphuric) react with Cu, the acids being reduced. The stability of the half-filled d sub-shell in Mn^{2+} and the completely filled d^{10} configuration in Zn^{2+} are related to their E° values, whereas E° for Ni is related to the highest negative $\Delta_{\text{hyd}}H^\circ$. An examination of the $E^\circ_{(M^{3+}/M^{2+})}$ values the low value for Sc reflects the stability of Sc^{3+} which has a noble gas configuration. The comparatively high value for Mn shows that $\text{Mn}^{2+}(d^5)$ is particularly stable, whereas a comparatively low value for Fe shows the extra stability of $\text{Fe}^{3+}(d^5)$. The comparatively low value for V is related to the stability of V^{2+} (half-filled

t_{2g} level).



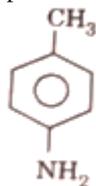
- (i) Due to the removal of an electron from the stable d^{10} configuration of Zn^{2+} .
- (ii) Transition metals despite having high E° oxidation, are poor reducing agents because of their high heat of vaporization, high ionisation energies and low heats of hydration.
- (iii) Cr^{2+} is reducing as its configuration changes from d_4 to d_3 , the having a half-filled t_{2g} level. On the other hand, the change from Mn^{3+} to Mn^{2+} results in the half-filled (d_5) configuration which has extra stability.

OR

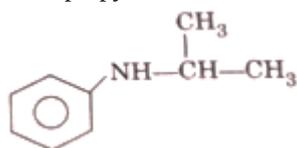
The Stability of Cu^{2+} is more than Cu^+ as stability depends on the hydration energy of the ions when they bond to the water molecules. The Cu^{2+} ion has a greater charge density than Cu^+ ion and thus forms much stronger bonds releasing more energy.

Section E

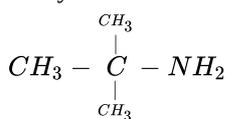
33. a. p-toluidine



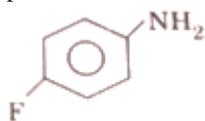
b. N-isopropylaniline



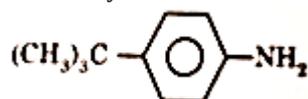
c. t-butylamine



d. p-fluoroaniline



e. P-tert-butylaniline



OR

- i. Methylamine and dimethylamine can be distinguished by the carbylamine test. Carbylamine test: Aliphatic and aromatic primary amines on heating with chloroform and ethanolic potassium hydroxide form foul-smelling isocyanides or carbylamines. Methylamine (being an aliphatic primary amine) gives a positive carbylamine test, but dimethylamine does not.
- ii. Secondary and tertiary amines can be distinguished by allowing them to react with Hinsberg's reagent (benzenesulphonyl chloride, $C_6H_5SO_2Cl$).

Secondary amines react with Hinsberg's reagent to form a product that is insoluble in an alkali. For example, N, N -

