Summer 2022

1

$$Zn + Cu^{2+} \longrightarrow Zn^{2+} + Cu$$

The oxidation half-reaction occurs in the anode compartment.

$$Zn \longrightarrow Zn^{2+} + 2e^-$$

The reduction half-reaction takes place in the cathode compartment.

$$Cu^{2+} + 2e^- \longrightarrow Cu$$

Difference between Galvanic Cell and Daniel Cell:

In Galvanic Cell ,Sulphate ions from the cathode half-cell migrate to the anode half-cell through the salt bridge. But In Daniel cell,

In this cell the salt-bridge has been replaced by a porous pot. Daniel cell resembles the above voltaic cell in all details except that Zn^{2+} ions and SO_4^{2-} ions flow to the cathode and the anode respectively through the porous pot instead of through the salt-bridge. Inspite of this difference, the cell diagram remains the same.

2

Electromotive force: The electromotive force of a cell or EMF of a cell is the maximum potential difference between two electrodes of a cell. It can also be defined as the net voltage between the oxidation and reduction half-reactions.

SOLVED PROBLEM 2. Determine the feasibility of the reaction

$$2Al(s) + 2Sn^{4+}(aq) \longrightarrow 2Al^{3+} + 3Sn^{2+}(aq)$$

SOLUTION

The given reaction consists of the following half reactions

$$\text{Anode}: \quad 2Al(s) \longrightarrow 2Al^{3+} + 6e^- \qquad E° = -1.66\ V$$

$$\text{Cathode}: \quad 3Sn^{4+} + 6e^- \longrightarrow 3Sn^{2+} \qquad E° = +0.15$$

$$E°_{cell} = 0.15 - (-1.66) = 1.81\ V$$

Since $E°_{cell}$ is positive, the reaction is **feasible**.

SOLVED PROBLEM 1. Predict whether the reaction is feasible or not.

2 Ag(*s*) + Zn2+ (*aq*) ——→ Ag+ (*aq*) + Zn(*s*)

SOLUTION

The cell half reactions are

$$\text{Anode}: \quad 2Ag(s) \longrightarrow 2Ag^{+}(aq) + 2e^- \qquad E° = 0.80\ V$$

$$\text{Cathode}: \quad Zn^{2+}(aq) + 2e^- \longrightarrow Zn(s) \qquad E° = -0.763\ V$$

$$E°_{cell} = E°_{cathode} - E°_{anode}$$

$$\therefore \quad E°_{cell} = -0.763\ V - 0.80 = -1.563$$

Since $E°_{cell}$ is negative, the given reaction is **not feasible**.

3

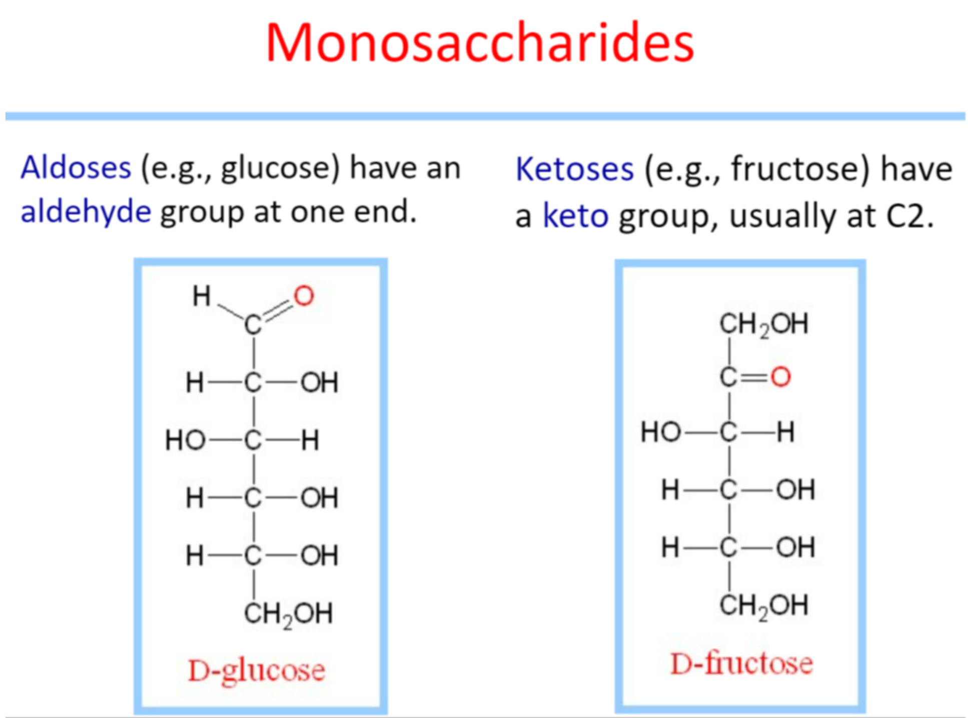
4

Amino acids are classified by R groups: Different amino acids are classified based on the side chain or R group. All these 20 amino acids are denoted by first letter (3 or single) or other letter (3 or single).

There are Four major types of driving forces for stabilizing the protein structures:

- **Electrostatic Interactions**
- **Hydrogen Bond**
- **Hydrophobic Bonds**
- **Van der Waals Forces**

5



Functions of CHO

- Carbohydrates spare protein so that protein can concentrate on building, repairing, and maintaining body tissues instead of being used up as an energy source.

- For fat to be metabolized properly, carbohydrates must be present. If there are not enough carbohydrates, then large amounts of fat are used for energy.

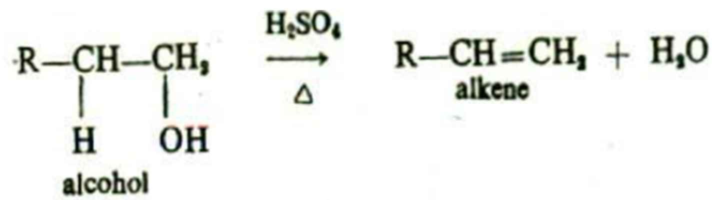
- Carbohydrate is necessary for the regulation of nerve tissue and is the ONLY source of energy for the brain.

- Certain types of carbohydrates encourage the growth of healthy bacteria in the intestines for digestion.

- Some carbohydrates are high in fiber , which helps prevent constipation and lowers the risk for certain diseases such as cancer, heart disease and diabetes.

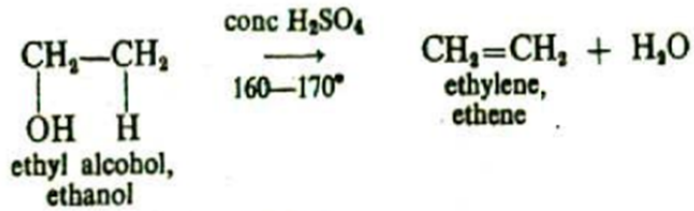
6

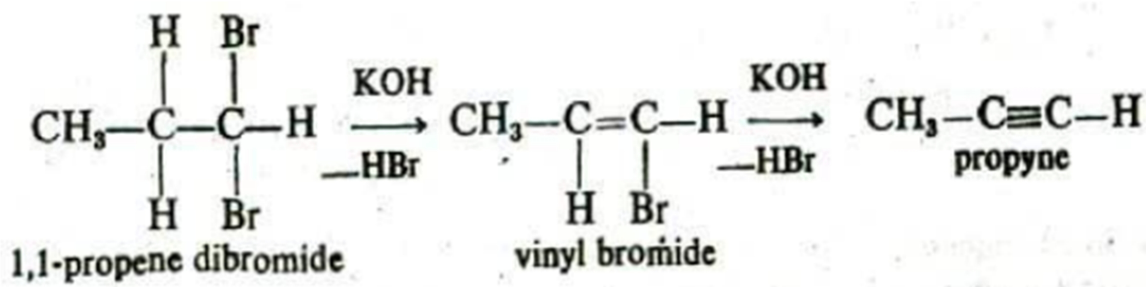
7

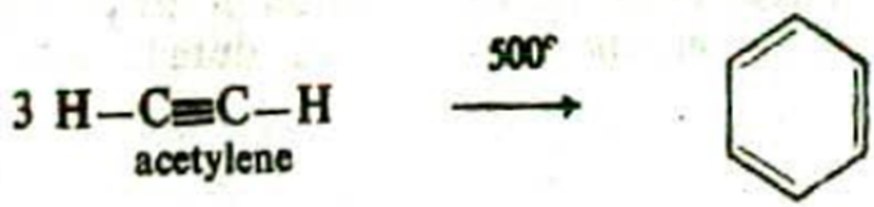


Examples :

(i)







Benzene

8

Calculation of Half-cell potential

For an oxidation half-cell reaction when the metal electrode M gives M^{n+} ion,

$$M \longrightarrow M^{n+} + ne^-$$

the Nernst equation takes the form

$$E = E° - \frac{2.303\,RT}{nF} \log \frac{[M^{n+}]}{[M]} \quad ...(2)$$

The concentration of solid metal [M] is equal to zero. Therefore, the Nernst equation can be written as

$$E = E° - \frac{2.303\,RT}{nF} \log [M^{n+}] \quad ...(3)$$

Substituting the values of R, F and T at 25°C, the quantity 2.303 RT/F comes to be 0.0591. Thus the Nernst equation (3) can be written in its simplified form as

$$E = E° - \frac{0.0591}{n} \log [M^{n+}]$$

This is the equation for a half-cell in which oxidation occurs. In case it is a reduction reaction, the sign of E will have to be reversed.