STUDY MATERIAL

Lecture – 1

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Discipline : B.SC (H)

Subject : Chemistry

Semester : VI

Course Code : CCT13

Topic : DIOXYGEN MANAGEMENT PROTEINS – Hb AND Mb

DIOXYGEN MANAGEMENT PROTEINS

- Nature has designed four oxygen management proteins for transport and storage of oxygen in biological systems.These are Haemoglobin (Hb), Myoglobine (Mb),Hemocyanin(Hc),Hemerythrin(Hr)
- Haemoglobin (Hb) and Myoglobine (Mb) are Fe(II) Heme proteins While Hemerythrin (Hr) is a non Heme Fe(II) protein.
- On the other hand, Hemocyanin (Hc) contains copper at its binding sites.

HEMOGLOBIN (Hb)

- Hb acts as a dioxygen (O2) transport from lungs to the muscle cells.
- Hb is tetrameric protein contains four polypeptide chains two alpha and two beta.
- Hb is found in blood and it’s molecular weight is approx.64,500.
- Hill co-efficient of Hb is 3 and it has four oxygen binding sites.
- Oxygen binding curve of Hb is sigmoidal (s-shaped) in nature.

HEMOGLOBIN (Hb)

- Hb is more oxygenated than Mb at higher oxygen pressure.
- Oxygenation of Hemoglobin is PH dependent i,e Hb shows Bohr effect.
- Oxygenation of Hb is autocatalytic due to co-operative interaction as Hb contains tetrameric units.
- Due to constraining rate of oxygenation in Hb is slower than that of in Mb.

ROLE OF Hb IN BIOLOGICAL SYSTEM

- Hb is very sensitive to oxygen.When we breath in O2 , Hb present in our blood combines reversibly with O2 in the lungs to form oxy hemoglobin.
- As the blood runs through the arteries to the tissues,the oxygen pressure decreases and O2 bound with Hb is set free.This free O2 diffuses into the body cells where it combines with glucose and oxidises it to CO2 and H2O.Thus O2 is used in the combustion of food.

MYOGLOBIN (Mb)

- Mb acts as a dioxygen storage and it stores O2 for use in mitochondrial oxidation i.e, respiration.
- Mb is a monomeric protein and contain one polypeptide chain.
- Mb is found in muscle cell and its molecular weight is approx. 17000 .In Mb, co-operative interaction is absent as Mb contains monomeric unit.
- Oxygenation of Mb is PH independent i.e, Mb does not show Bohr effect.
- O2 binding curve of Mb is hyperbolic in nature.