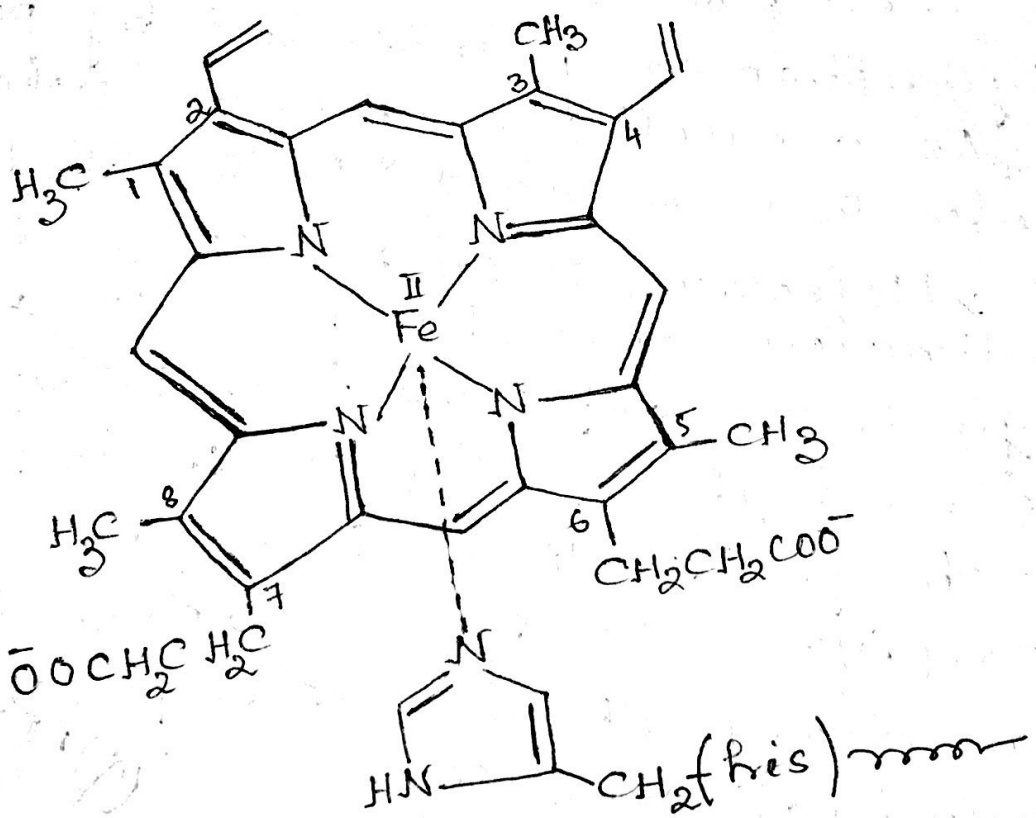
② Depict the structure of heme group in Hb and Mb. Explain clearly what is mean by co-operative interaction as prevails in Hb. Explain the change in Fe(II) coordination sphere during oxigination of Hb and Mb.



Active site structure of heme group in Hb and Mb.

Oxygen binds to the Fe(II) heme a vacant 6th position and the resulting oc -al field sufficiently strong to transform h Spin Fe(II) to low spin Fe(II). Hence a conf -mational change throughout the peptide ch occures which causes to rapture some of the $-COO^- \cdots {}^{+}NH_3$ salt-bridge interactio The constrained Hb tetramer then relaxes exposing the 6th positions of the remain heme grs. to oxygenation. This phenome is known as "cooperative interaction".

The active sites of both Hb and M contain the heme group in which Fe(II) equitorially coordinated by the four pyr nitrogen atoms of porphyrin ring. The position is coordinated by the imidaz nitrogen atom of a histidine of the prot chain i.e. globin. The 6th position is but hydrophobically shielded by protein chain. As a result, only non-polar neu molecules O_2 can bind to the 6th positio

Moreover, Fe(II) in Hb and Mb i 5-coordinated and hence Fe(II) is prese in high spin configuration. Fe(II)–N bon lengths in high spin Fe(II)–N compound is much greater than the mean radiu of the porphyrin cavity. Pentacoordinate Fe(II) in deoxy-Hb and deoxy-Mb has Sq. pyramidal geometry and Fe(II) is situa about 0·8 Å out of the porphyrin plane being shifted towards the apically coordin histidine. Oxygen binds to the Fe(II) heme a the vacant 6th position and the resulting octa field is sufficiently strong to transform high

Spin Fe(II) to low spin Fe(II). As a result of this Fe(II) radius is contracted by about 0.17 A° and Fe(II) in the active site of oxy-Hb and oxy-Mb moves towards the porphyrin plane and ultimately sits in the porphyrin cavity. This movement of Fe(II) causes the coordinated histidine to move towards the porphyrin ring plane. This brings about a conformational change throughout the peptide chain amounting to rapture of some or all the $COO^- \cdots NH_3^+$ salt bridge interactions. The constrained Hb tetramer then relaxes by exposing the 6th positions of the remaining heme grps. to oxygenation. This phenomenon is known as cooperative interaction. Oxygenation of Hb is autocatalytic due to this cooperative interaction. But such effects are absent in Mb due to its monomeric nature.