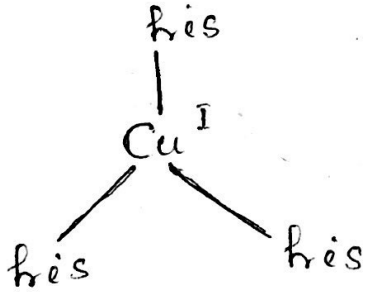
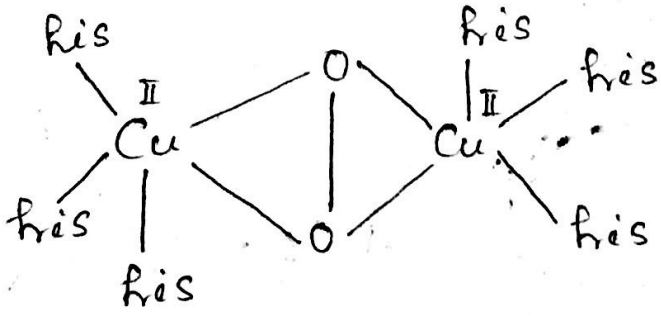
(3). What is hemocyanin? Indicate its active site. Discuss the spectral and magnetic property of hemocyanin. What is its majore functions?

Ans:-

Hemocyanins is are copper containing oxygen transport protein, occuring in no. of invertebrates namely snails, octopus, cuttle fish etc. They occur freely dissolved in hemolymph. These are of two types, namely i) molluscan hemocyanins and ii) arthropodan hemocyanins.



Active site structure of deoxy hemocyanin.



Active site structure of oxy-hemocyanin.

The deoxy hemocyanin is diamagnetic and colourless i.e. the copper atom is in Cu(I) state. But oxy hemocyanin is blue, but is diamagnetic. The oxy form may have the following resonating structures:

$$Cu^{+} O_2 Cu^{+} \longleftrightarrow Cu^{2+} O_2^{-} Cu^{+} \longleftrightarrow Cu^{+} O_2^{-} Cu^{2+}$$

$$\updownarrow$$

$$Cu^{2+} O_2^{2-} Cu^{2+}$$

met-aqueo-hemocyanin.

As two Cu atoms binds one oxygen molecule Cu may occur in both oxidation states Cu(I) and Cu(II). The bound O_2 molecules may take one electron from a Cu(I) to form a superoxide ion, O_2^{-}, with consequent oxidation of the Cu(I) to Cu(II). Diamagnetism may result from the spin coupling between the two paramagnetic centres, O_2^{-} and Cu^{2+} in the oxy form. Resonance Raman Spectrum of oxyhemocyanin indicates oxy-hemocyanin as $Cu^{2+} O_2^{2-} Cu^{2+}$ and diamagnetism might be due to anti-ferromagnetic interaction bet^{n}. two Cu(II) ions.

The major function of it is oxygen transportation in no. of invertebrates

in its active site.