

Haemoglobin

Haemoglobin molecules

- Haemoglobins are a group of chemically similar molecules.
- **Primary structure:** consisting of 4 polypeptide chains
- **Secondary structure:** each of these chains is coiled into a helix
- **Tertiary structure:** each chain folded into a precise shape – important in ability to carry oxygen
- **Quaternary structure:** all four chains are joined together to form an almost spherical molecule. Each chain is associated with a haem group which contains an Fe^{2+} ion. Each Fe^{2+} ion can combine with an oxygen molecule, meaning that a total of four O_2 molecules can be carried by a single haemoglobin molecule.

The role of haemoglobin

- To transport oxygen.
- It does this efficiently by:
 - Readily associating with oxygen where gas exchange takes place.
 - Readily dissociating with oxygen where tissues need it.
- Haemoglobin changes its affinity for oxygen under different conditions.
- Shape changes in presence of other substances, e.g. CO_2 .
- In the presence of CO_2 , the molecule changes shape so that the oxygen is more loosely bound and so it is therefore released.

Region of body	Oxygen concentration	Carbon dioxide concentration	Affinity of haemoglobin for oxygen	Result
Gas exchange surface	High	Low	High	Oxygen is attached
Respiring tissues	Low	High	Low	Oxygen is released