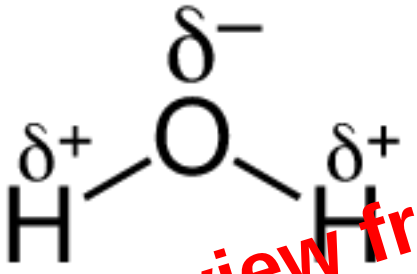
TRANSPORT AND CIRCULATION

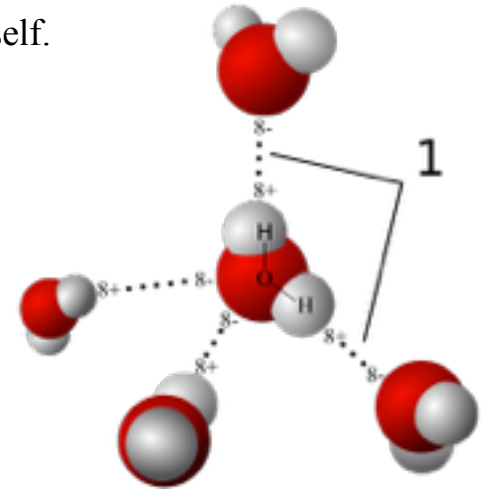
WATER

Water has many useful properties, and so it is ubiquitous in life on earth. The useful properties of water arise from its structure.

A Water molecule consists of two Hydrogen atoms covalently bonded to an Oxygen atom. Because oxygen is more electronegative than hydrogen, it has a greater pull on the shared electrons. This that the oxygen atom is slightly negative (δ-) (because of the closer electrons), and hydrogen is slightly positive (δ+). Water is therefore called a Polar Molecule.



The slightly negative and slightly positive regions of the water molecule are attracted to charged regions of other molecules, forming Hydrogen Bonds (which are weak in comparison with other chemical bonds). Water will form Hydrogen Bonds within itself.

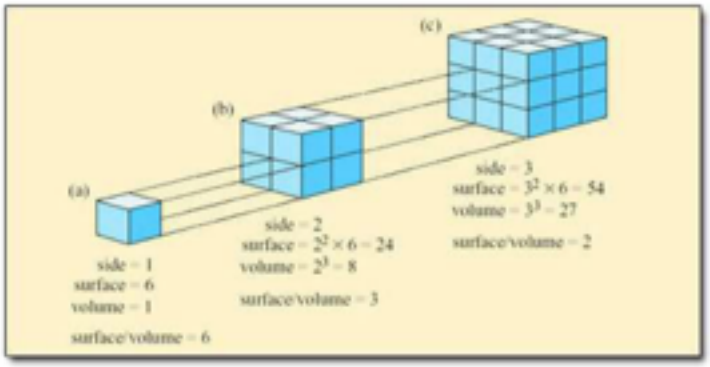


Hydrogen bonds within water give it a high stability, which means that a large

Fick's law:

$$\text{Rate of Diffusion} = \frac{\text{Surface Area} \times \text{Conc Gradient}}{\text{Distance}}$$

If we apply this to a cube, the rate at which O_2 reaches the centre of the cube is a product of the ratio of the Surface Area compared to the Volume (i.e. SA:Vol)



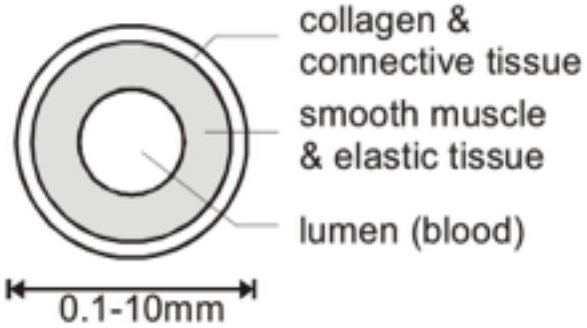
Amoeba	Large SA:Vol ratio	Can rely on diffusion through its surface.
Human	Small SA:Vol ratio	Diffusion through surface is too slow to supply O_2. Therefore require a mass transport system and specialized exchange organs

In humans the **mass transport** system is the circulatory system and the heart. The specialized **exchange organs** include the lungs and the digestive system.

THE

STRUCTURE AND FUNCTION OF ARTERIES,VIENS AND CAPILLARIES

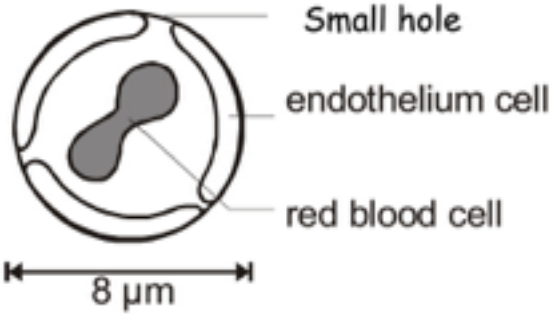
Artery:



Arteries carry **high pressure blood** away from the heart.

CAPILLARY

Capillary:



Capillaries are adapted for exchange - they are not connected directly to the heart.

Key Points:

1. Walls are **one cell thick** (cells are called endothelial cells)
2. Lumen is the same width as one RBC (therefore more of RBC in contact with wall, therefore smaller diffusion distance)
3. No muscle or elastic tissue
4. Tiny (compare the scales and remind yourself what a µm is)

MAKE SURE YOU REVISE THE CORE PRACTICAL PLS BUY MY CORE PRACTICAL BOOK / NOTES FROM NOTE SALE