

Biological Importance Of Water

Water is essential for life; it is a metabolite and as a result is a vital part in many biochemical reactions within cells. It also makes up 60% of the human body and typically makes up 70%-90% of the mass of cells. Water also provides a habitat for many animals, making up over $\frac{3}{4}$ of the Earth's surface. Water is a unique molecule because, unlike many other molecules of its size, it exists as a liquid in regular Earth temperature. What makes water so unique?

Water as a solvent

Water is a very good solvent for ions and polar molecules, such as sugars. This is because the water

surrounds and separates the ions. Fig. 1 shows how water molecules surround a positive ion, the oxygen is attracted to the ion as it is a negative particle and opposites attract. The hydrogen particles face away from the ion because they have a positive charge and like charges repel. The opposite occurs when there is a negative ion in a solution.

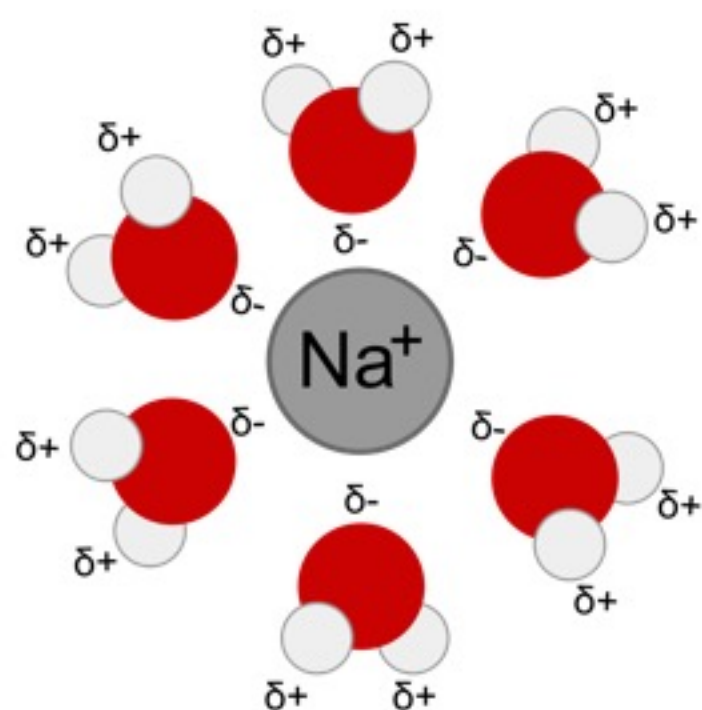


Fig. 1

When there are non-polar molecules (insoluble) in water they tend to get pushed together as a result of water molecules being attracted to each other. This is why when a substance such as cooking oil is added to water it forms a series of circles on the surface rather than irregular shapes.

Water as a transport medium

Water is a transport medium for all living things. It is the transport medium in the blood and in various systems in animals. It is also the transport system in the vascular tissues of plants. This would not be possible without its solvent properties.

Specific heat capacity

The heat capacity of a substance is the amount of heat required to raise its temperature by a given amount. The specific heat capacity of water is the heat energy required to raise the temperature of 1kg of water by 1 C. Water has the highest heat capacity of all liquids. The heat capacity of water is significant to life as it helps animals to maintain a constant internal temperature easier. It also results in the ocean cooling much slower than land, this is the cause of offshore and onshore winds.

Latent heat of vaporisation

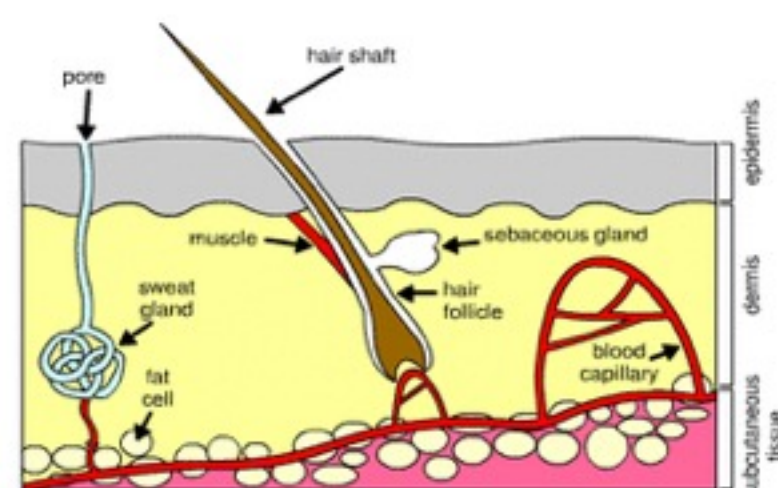


Fig. 4

The latent heat of vaporisation is the amount of heat required to vaporise a liquid. Water has a large latent heat of vaporisation, as a result of this heat loss via sweating is efficient. This means that a reason water is important is its ability to help cool us and other mammals. Fig. 4 shows a sweat gland, without these many animals would be unable to survive in hot climates.