

EXPLAIN HOW THE PROPERTIES OF WATER MAKE IT SUITED TO  
(A) ITS FUNCTIONS IN THE BODIES OF LIVING ORGANISMS

Water is useful in a variety of different ways. The first of these being its solvency.

Because the oxygen atom in water has a greater pull on the shared electrons than the hydrogen atoms, this gives two separate charged areas. So substances that have an electrostatic charge are attracted to the charges on water molecules, allowing them to dissolve. This allows molecules like nutrients to be dissolved in water, and be actively transported around an organism.

The solvency of water is also useful for digestion in organisms. Using hydrolysis to break down disaccharides and polysaccharides into monosaccharides by adding water.

The use of water in digestion can be attributed to another of its properties. Water can be heated into the gaseous form of water vapour, which removes water from its liquid state. This process of condensation helps reverse the process of hydrolysis, and allows monosaccharides to bond into disaccharides and polysaccharides.

Although water can be heated into water vapour, it does have a very high heat capacity in which it takes a large amount of energy to change its temperature. This is vital to all living organisms which contain water, so they are able to maintain there optimum temperatures for longer in adverse conditions.

The fact that water contains two hydrogen atoms and one oxygen atom is essential for photosynthesis. During the light dependant stage, the hydrogen molecules of water are separated from the oxygen molecule. And in the light independant stage, the hydrogen molecules from water, react with the carbon dioxide to form a carbohydrate.

Water is relatively incompressible, it is able to maintain its shape. This allows it to act as a hydrostatic skeleton in organisms such as earthworms and diploblastic organisms like jellyfish.

The process of osmosis is only possible because of the size of the water molecule. Because it is so small, water is able to travel through the semi-permeable membrane of cells in living organisms, which larger molecules cannot fit through. This is useful in plant cells, as water is lost in transpiration, it can easily be replaced by this process. Creating a water column through the plant.

The viscosity of water is low. This allows it to move about with ease. Without

this, it wouldnt matter if nutrients could dissolve into it, or if it was small enough to pass from cell to cell. The fact that water is bonded together so easily, allows it to

be used in all the different ways I have already highlighted.

Water is transparent, and this, believe it or not(!), allows our eyes to function.

The transparency of water allows it to be used as a cleaning compound on an organisms eyes, without trapping any of the light rays that before they reach the pupil.

EXPLAIN HOW THE PROPERTIES OF WATER MAKE IT SUITED  
(B) AS AN ENVIRONMENT FOR ORGANISMS TO LIVE IN

The properties of water are essential for organisms to live in for a variety of reasons. The one that is most evident is its transparency. The fact that light can travel through it allowed marine life millions of years ago to develop a more sophisticated detection device other than sonar, sight. This is evident with many types of fish using visual effects to deter predators, like schools of fish in a large mass to make it seem as though they are bigger than they actually are. Or for predators to seek out food. Coupled with the fact that light can travel through water, so can heat. Which is essential for aquatic plants to photosynthesize.

Water, unlike most liquids, actually increases in volume and decreases in density when frozen. This gives ice a buoyancy, allowing it to float on top of a body of water rather than sinking. This allows organisms that live in water to survive beneath the ice, this has undoubtedly contributed towards the survival of life on earth.

Water has a molecule of oxygen contained within it. This means that aquatic organisms such as dogfish are able to extract that molecule for respiration using a series of vascularized gills. Water is kept flowing over these gills by a specialized pumping system. And it is due to the density of water, in comparison to air, that prevents the gills from collapsing on top of each other. This is evident when a fish is taken out of water.

The thermal capacities of water are important to the organisms living in it. Most organisms require a stable temperature as part of their environment, and water has a very high heat capacity. A large increase in heat results in a small rise in the water temperature. Keeping the water temperature fairly constant, allowing organisms to keep within their required temperature ranges.

Water's thermal capacities are also important on a more grand scale. The fact that water has a high boiling point for a molecule so small means that water can exist on

many areas of the earth, and thus allow life to thrive in abundance.

The surface film formed between air and water is due to water's high surface tension. This is caused by the polarity of water that causes the surface of water to contract to occupy the smallest possible area. This is the basis for a habitat for organisms that live on top of the water like pond skaters, whirlig beetles and raft spiders.

Water is 800 times denser than air. And although the density of water causes more friction for organisms moving or swimming through it than air. This property is also suited towards organisms because it supports them. Therefore it is easier for some of the larger organisms to support their weight.