

The biological importance of water in living organisms essay sample



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Water is the most important molecule in cells, the whole organisms and on earth, this is due to it's unique physical and chemical properties. " A water molecule, because of its shape, is a polar molecule. That is, it has one side that is positively charged and one side that is negatively charged"(1). A water molecule is made up of two hydrogen atoms and one oxygen atom and the bonds between these atoms are single covalent bonds. Fig 1. The polarity of a water molecule (2)

In a water molecule two hydrogen atoms form single polar covalent bonds with an oxygen atom. " Oxygen is more electronegative (6 valence electrons) - region around oxygen has partial negative charge. Hydrogen is less electronegative (1 valence electron) -region near the two hydrogen atoms has a partial positive charge." (3) A water molecule is a polar molecule with opposite ends of the molecule with opposite charges. Fig. 2. Positively and Negatively charged ions in water.

(7)

" Many water soluble materials which, when dissolved in water, split apart into electrically charged atoms or groups of atoms called ions. The ions with the negative charge are called anions and those with the positive charge are cations." (7) Water is vital to living organisms because between 60 to 70% of our body is made up of water. One of the main functions of water in living organism is its use as a solvent, because water is slightly ionised, other polar molecules such as salts, sugars and amino acids dissolve readily in water. This will allow water to be used for the transportation of many substances,

for example in the bloodstream of animals and the xylem and phloem vessels found in plants. Fig. 3. The dipolar bonding in water (8)

The dipolar bonds between water molecules show a large amount of energy and this determines the temperature of the water.

Water can also be used in this way to transport many substances for example nutrients, excretory products e. g. urea, ammonia, hormones and digestive juices can all be transported by using water as a solvent. “ Molecules such as starch and glycogen which are hydrophobic are not soluble and therefore are ideal for storage. In the digestive system many polymers and dimmers need to be broken down into smaller molecules by the process of hydrolysis. Water is used in hydrolysis reactions to separate the larger molecules into smaller ones (eg proteins into amino acids)” (4). Also the “ Uptake of minerals by plants from soil across root hairs occurs in solution. Transpiration stream and water-based movement of sugars and amino acids, hormones etc. in phloem occurs in solution” (6). Water is produced in respiration and this water can be very useful for organisms living in dry habitats.

The process of photosynthesis needs water in order to make glucose. Water does not change temperature very easily and therefore reduces variations in temperature in cells. “ Water has a high latent heat of vaporisation which means that when animals sweat and plants transpire water, takes energy from the organism when it evaporates and as a result cools the organism” (4). Furthermore ice is less dense than water and so in cold conditions, ice will float on water. This insulates the water below and allows aquatic life to

live in Sub zero conditions. " Sub zero literally means " beneath zero." As such, it is usually used for negative numbers; the most common usage refers to negative temperature." (5) Water is essential for plants. By the process of osmosis, plant cells take water which causes an increase in the pressure against the rigid cell wall, the cell enters a state of turgor. This allows plants to remain upright. In conclusion, water has uses in all organisms, from plants to animals and can offer many things from transport to support. This substance is absolutely essential to the existence of every living organism on this planet.

Bibliography

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