

“The Importance of Water and its Properties for Living Organisms”

Next to oxygen, water is essential for all living organisms on Earth. It is a major component in cells, which make up all living organisms; therefore approximately 60% to 95% of living organisms are water. Water molecules are dipolar (meaning that its electrons are not shared equally due to covalent bonding) and this generates hydrogen bonding between atoms. As a result its structure gives water many important properties such as its thermal, high surface tension, incompressibility and cohesiveness, which give it many useful biological roles such as being a solvent, a coolant, an insulator, as support, a lubricant and a reagent. Moreover water is used in chemical reactions, transporting and it provides a suitable environment for aquatic animals to habitat.

There are a few thermal properties, which are very important for living organism. Since water molecules have a strong attraction to one another by hydrogen bonds, water has a high boiling point and high freezing point (compared to other molecules with similar relative molecular mass). This means that it has a high specific heat capacity, in other words a lot of energy is needed to break the attraction so that atoms can move freely, which would increase the water temperature. This property is useful for organisms that live in oceans, rivers and lakes because they are large bodies of water, so its specific heat capacity prevents fluctuations in temperature and maintains a constant one so that metabolic reactions in cells are not upset. Another useful property that is caused by the strong attraction between hydrogen bonds is that it is an effective coolant. It has a high latent heat of vaporization (meaning a lot of heat is needed to turn it from a liquid to a gas). For example when humans sweat, heat energy from the body evaporates the water in sweat, which cools us down. Insulation is especially important for organisms that live in the water during cold seasons. For instance as the temperature drops water on the surface of a pond would freeze and ice would form on the surface. This acts as an insulator, allowing aquatic animals to survive.

Water is a solvent for ions and polar molecules since they are attracted to them can separate them and therefore dissolve them. Since water has the ability to dissolve so many substances, it is a useful medium for transportation in animals and plants, such as blood plasma, lymph, and tissue fluid. Organisms removing waste such as ammonia and urea involves these substances turning into solutions with water. Secreting is another very important function of living organisms. Substances are comprised into aqueous solutions like digestive juices contain salts and enzymes in water.

Water's cohesive forces bring molecules close together, so that it is not easily compressed, thus making it useful for supporting organisms. Examples of this would include; animals such as earthworms and jellyfish which have hydrostatic skeletons meaning that they are supported by the medium inside them. Plant cells as well are supported by the osmotic flux of water this is called turgor pressure. For humans

supported from water is vital for various body parts. This includes the aqueous and vitreous humors that give the eye's spherical shape. Also amniotic fluid supports and protects the fetus while it develops.

There are metabolic roles of water as a reagent; in particular hydrolysis uses water to hydrolysis substances such as protein to amino acids and polysaccharides to monosaccharides. For diffusion and osmosis, water is vital for the diffusion of materials across the lungs and alimentary canal. There is also the process of photosynthesis, which cannot be performed without the presence of water.

To conclude water is a crucial element and it is the main constituent for all living organisms. Its unique structure gives it properties that subsequently give it many various biological roles. Without water we would not be able to obtain oxygen, which is created by photosynthesis, or be able to remove waste from our bodies. Water even provides a supportive habitat for organism like a whale which is just too large to move on land.