Biological Importance Of Water

Water is an essential part of life, it takes up between 60 and 95% of mass of living organisms, it plays an important part in cells and also many organisms live in water. I am going to talk about physical properties of water and the biological importance of water.

Physical properties of water

Hydrogen bonding is when a water molecule forms hydrogen bonds, it form with up to four other water molecules. Water is a polarized molecule, this means it can form hydrogen bonds with other water moles because hydrogen is slightly positively charged and oxygen is slightly negatively charged due to in water oxygen's nucleus attracts the electrons more than the hydrogen's nucleus.

High specific heat capacity

Water has a high specific heat capacity. The amount of heat (energy) in joules is required to raise the temperature of water by 1 degree.

High latent heat of vaporization

This is the measure of heat energy needed to vapourise water. It is hard to vapourise water because large amounts of heat is needed to break the hydrogen bonds, and also water has a high boiling point, even though it is a small molecule.

Cohesion and Surface tension

Hydrogen bonds make water molecules stick together; to stick to other molecules cohesion takes place. At the surface of a liquid a force known as surface tension takes place, this makes the molecules attract.

Biological Importance of water

Water is a good solvent for polar substances. Polar water molecules and ions have greater force of attraction between them, than cation and anion. For example sodium chloride is separated in water, sodium+ ions are attracted to the oxygen atoms of water because they are slightly negatively charged, chlorine- ions are attracted to hydrogen atoms because they are slightly positively charged.

Transpiration Stream
Water is able to move up the xylem due to cohesion taking place between water molecules and adhesion between water and the xylem vessels walls.

Supporting role
Water cannot be easily compressed due to cohesion between water molecules.

Molecular Mobility
Due to weak individual hydrogen bonds water molecules can move easily therefore osmosis is able to take place.

Stability
Balanced earth's temperatures means that the water cycle, evaporation, transpiration and precipitation can take place and be maintained.

Transparency
Water is transparent, so it allows light to pass through it, which allows living organisms like plants to live through the process of photosynthesis.

Density and Freezing
When water freezes to form ice it has lower density than its liquid form, hence ice floats upon its surface. When water freezes it expands this is because when water cool, the molecules move apart to allow space to fit four other hydrogen bonds. Ice forms only at the top of lakes, ponds, and so life can exist underneath the ice. The ice insulates the water below and increases chances of survival. Due to change in density water circulation still is able to take place, and it helps the nutrient cycle.

Metabolic functions
Water is used to reduce power in photosynthesis, it plays a part in chemical reactions also it is sued in digestion.

Thermoregulation
Due to water having high specific heat capacity organisms made up largely of water molecules are thermo stable. Also due to high latent heat vaporization of water living organisms can be cooled without loosing much water.

Conclusion

I therefore conclude saying that life on earth would not exist if water did not exist, as I have already described water is used everywhere and is essential for life.