Case study: Features of water

**Student Name** 

Institution

Professor

Course

Due date

Almost three-quarters of our home planet is covered by water, and without it, life as we know it could not exist on Earth. Water, like carbon, has a special role in living things. It is needed by all living things. Although water consists of simple molecules, each containing just three atoms, its structure gives it unique properties that help explain why it is vital to all living organisms.

Water is known as the "universal solvent" because it has the ability to dissolve a wide variety of substances, making it essential for many chemical reactions and biological processes (Sarkar, Maity, & Chakrabarti, 2021). It also has a unique ability to dissolve many polar and ionic substances. This is important to all living things because, as water travels through the water cycle, it takes many valuable nutrients along with it.

Water has a high heat capacity, it takes a lot of energy to raise the temperature of a certain amount of water by a degree, which means it can absorb and store a large amount of heat energy without significantly changing its temperature (Ma, Lu, Qian, Zhang, Yao, & Zhang, 2023). This property helps regulate Earth's climate and maintain stable temperatures in aquatic environments.

Water molecules are attracted to each other, creating a cohesive force known as surface tension (You, Guo, Guo, & Liu, 2019). This property allows water to form droplets and maintain a thin film on surfaces. Water is most dense at 4 degrees Celsius, which causes it to expand when it freezes. This unique property allows ice to float on water, insulating the liquid below and protecting aquatic life during cold temperatures. Water molecules are polar, with partial positive charges on the hydrogens, and a bent overall structure. This is because oxygen is more electronegative which is better than hydrogen in attracting electrons (Ivanova, Vinogradova, & Kozhukhovsky, 2021, March). This polarity allows water to form hydrogen bonds with other molecules, facilitating various biological processes such as cell communication and nutrient transport. This property is essential for photosynthesis in plants and enables aquatic organisms to thrive in underwater environments.

Water molecules have strong cohesive forces due to their ability to form hydrogen bonds with one another (Veress, 2022). Cohesive force is responsible for surface tension, the tendency of a liquid's surface to resist rupture when placed under tension or stress. Water also has adhesive properties that allow it to stick to substances other than itself. These cohesive and adhesive properties are essential for fluid transport in many forms of life, for example, they allow nutrients to be transported to the top of a tree against the force of gravity.

Water has a high heat of vaporization, humans (and other animals that sweat) use water's high heat of vaporization to cool off (Suwadi, Derbali, Sani, Lam, Arshad, Khan, & Ki-II, 2022). Water is converted from its liquid form to steam when the heat of vaporization is reached. Since sweat is made mostly of water, the evaporating water absorbs excess body heat, which is released into the atmosphere.

## Reference

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