Features of Water

Name

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* 1. **Introduction**

Water is a chemical substance that is essential for existence of life, covering about 71% of the earth’s surface. In as much as it exists in three physical states; solid, liquid and gaseous state, water has unique properties such as its ability to dissolve many substances, its high capacity to absorb and retain heat and its general polarity (Kontogeorgis et al., 2022). In Biology, water plays a crucial role sustaining life by the fact that it’s the major component of cells. It’s a crucial component as a solvent, a medium for chemical and biological reactions, medium of transport and body temperature regulation and osmoregulation processes (Alvanou et al., 2024). This project focuses on the salient features of water with an aim of discovering the unique properties that make it indispensable for life, promoting existence, biological processes and overall health outcomes.

* 1. **Features of Water** 
     1. **Polarity**

Polarity in water is a fundamental feature which influences its properties. In water molecule, in which we have electronegative oxygen atom which is covalently bonded to two electropositive hydrogen atoms brings about uneven distribution of electrons and this results into a partial negative charge (δ-) on the oxygen atom and a partial positive charge (δ+)on the hydrogen atom (Milovanović et al., 2022). The uneven distribution of electrons leads to uneven distribution of charges results into a dipole moment whereby one end of the water molecule is slightly negative while the other end is slightly positive.

It is the polarity of water that makes it a universal polar solvent especially for polar and ionic substances. Thus, the polar solvent ability makes water to be very essential for biological processes including the bio chemical reactions, nutrient and blood transport. Moreover, polarity of water also influences how it interacts with membranes made of lipid layers with hydrophilic and hydrophobic ends. In other words, the polar nature of the water molecules enables them to interact will with the hydrophilic ends of the lipid layers thus it plays an essential role in modifying the functions and structures of the membrane (Levental & Lyman, 2023). In conclusion, polarity of water is key in its role as a polar solvent in the manner in which it influences its overall biological and physical processes.

* + 1. **Cohesion and Adhesion**

A study by (Wu et al., 2022) defines cohesion as the attraction between water molecules and adhesion as the attraction between water molecules and other substances. In a s much as cohesive and adhesive properties of water are greatly influenced by its polarity, they really define how the water molecules stick together as well as how they cling to other surfaces and capillary action mechanisms through narrow spaces such as the xylem (Walandari et al., 2022).

* + 1. **High Specific Heat Capacity**

The high specific heat capacity (C) in water is unique from other solvents due to the hydrogen bonds that exist between its molecules, which require high heat energy to break. In homeostasis, the high heat capacity of water enables stable internal temperature of an organism despite fluctuations in eternal temperature. Moreover, it is the high specific heat capacity that enables thermos-regulation from metabolic processes in warm blooded animals (Adun et al., 2021).

In general, the ability of water to absorb and release heat is important in the stability of aquatic ecosystems, moderation of extreme temperatures and seasonal balance. The value of C is a property of water which helps in temperature by enabling the cooling effect for stability in organisms and climate (Vargas-Chacoff et al., 2020).

**1.2.4 Transparency and Neutral pH**

Transparency is a property of water which allows light to pass through due to its molecular structure (Jacucci et al., 2021). It’s the molecular structure of water that makes it not be able to absorb visible light. However, we have deep waters appearing either pale blue or green due to absorption of some infrared light. Also, in the presence of factors such as impurities or suspensions lowers the transparency of water (Spangenberg et al., 2021).

Transparency is not unique to water only; however, it plays a vital role in most ecological processes. For instance, this property allows sunlight to penetrate aquatic life, enabling proper photosynthesis in aquatic plants such as algae, enhances clarity of water as well as determining the absorption and distribution of heat in water bodies, which in turn has an effect on survival of aquatic organisms and the general weather patterns Woolway et al., 2022).

**1.2.6 Capillary Action**

The capillary action in water is caused by adhesive and cohesive forces experienced by the water molecules. Therefore, when water comes into contact with a narrow space or a porous surface, the adhesive forces pull the water through, based on the nature of water, size of the pores or the available space diameter (Wang et al., 2023). In fact, it is this principle that allows plants to draw water up from the roots, through the xylem tubes.

**1.3 Conclusion**

The features discussed above make water to be very essential for life in the manner in which it influences the biological, chemical and physical processes on the earth. These properties therefore make water crucial for existence of living things, sustaining and maintaining balance in the ecosystem and the environment at large.

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