

Describe and explain the roles of water in living organisms and as an environment for the organisms

Without water there would be no life on Earth; this is why water is the most important biochemical of all.

In “Human Biology” by J.M. Orten and O.W. Nevhans, it is suggested that 70% of all body weight is water, most of which is found in three major compartments: 70% intracellular fluid, 20% interstitial fluid (lymph) and 7% blood plasma, and only 3% in other compartments. By volume, nearly a half of each of our organs consist of water; amounting to approximately 10 gallons of water, of which most is in our cells.

Water is crucial for cells to function healthily and for all chemical reactions and transport processes to occur. Water is responsible for maintaining cell structure, aiding metabolism and helping the circulation of blood and bodily fluids; water is also responsible for removing bodily waste through excretion.

Water is effective in neutralising the blood, for example, if the blood is too acidic it is likely the body will suffer from high pressure, this is when water is required to control the acid level of the blood.

Another important process involving water is homeostasis. This is when the body maintains a constant internal environment, including, the regulation of glucose concentration, metabolic wastes, temperature and pH. Water helps to keep the body temperature constant when: the eaten food inside the body is turned into heat energy, this is then turned into action energy for all the daily activities we participate in, but, if the heat builds up, spinal nerves send the signal of “thirstiness” and we naturally consume water to maintain a regular temperature.

An increased amount of water leads to an increased amount of chemical activity within the cell because ions and polar molecules are attracted to water molecules, collecting and separating around them, helping chemicals to dissolve in water. Once a chemical is in a solution. It is able to move around freely and react with other chemicals. This is how many processes inside living organisms occur.

Non-polar molecules are insoluble in water and tend to get pushed together by the attractions between the water molecules. This is important in hydrophobic interactions in structures and in membrane structure as it increases stability.

By contrast, an insufficiency of water, in humans, can lead to various illnesses. Without water the body would malfunction and would not be able to remove poisonous elements out of the body. The body would be self-poisoned and die within a week.

On average, humans should drink around 2 litres of water a day to keep the cells and the body functioning properly. Water is excreted from the

body in 3 main ways: about 600g through breathing, 500g through perspiration and 1,400g through urination/excrement per day.

Green plants need water as a raw material to produce glucose by combining with carbon dioxide from the air in the presence of light energy. Minerals and nutrients get transported up and through the plant via water when water is absorbed from the soil. Not only do plants require water in the same ways as all other living cells, but they also need it for photosynthesis and for maintaining leaf turgidity.

It is believed that the original cells that began evolution on Earth about 3.5 billion years ago, began life in the sea, so all cells have an evolutionary heritage of living in water. Some living organisms spend their whole lives in water; they extract minerals from the water to maintain a balance of nourishment in their cells.

The density of water decreases as it solidifies. This means that ice will float and act as an insulator for the liquid water below; hence, the living organisms below the water surface are protected. As the water temperature changes, so does the density; this creates currents that allow nutrients to circulate. The high cohesion between water molecules help organisms to settle on the water surface, this is true of the pond skater, allowing them to exploit their habitat.