BIOLOGICAL IMPORTANCE OF WATER

(Water: The Solvent of Life)

Water is the mother liquid of all forms of life. The essentiality of water for living systems is quite evident as without water, there is no life. No other substance on earth is abundant as water. All aspects of cell structure and functions are adapted to the physical and chemical properties of water. The following are the important biological significance or importance of water in the living system.

1. Water is a ‘universal solvent’.
2. Water can dissolve most of the biologically important molecules.
3. It is the solvent of life. The life originated in water and adapted to survive only in the presence of water.
4. About 70 to 90% of a cell occupies water.
5. Water acts as a medium for the diffusion of molecules in the cell.
6. Osmotic concentration of cell is maintained by water and dissolved solutes.
7. The turgidity of the cell is maintained by the water.
8. Translocation of inorganic and organic compounds in the living system takes place through the water.
9. Carbohydrates, the product of photosynthesis, in plants are transported through the water.
10. Water is the source of H+ ions for photosynthesis.
11. Oxygen is released by the hydrolysis of water during photosynthesis.
12. Water acts as a reactant in the hydrolysis reaction.
13. Water supports aquatic plants and animals.
14. Flagellated and ciliated organisms can swim in the water.
15. Organisms with flagellated gametes require water for their fertilization.
16. Lower plants such as algae, fungi, Bryophytes and Pteridophytes require the presence of water to complete their fertilization.
17. Animals with external fertilization such as amphibians require water for completing their fertilization.
18. Pollination and dispersal of seed in plants can be done through water bodies.
19. Water cools the body by sweating process.
20. Transpiration in plants is due to the presence of water.
21. Transpiration ensures water uptake and transport of minerals in plants.
22. Transpiration also cools the leaves and makes them stay in the open sunlight.
23. Seed germination requires water.
24. The main medium of blood is water (80% of blood is water)
25. The main medium of lymphatic system is water.
26. The excretory system in animals operates through the water medium.
27. Osmoregulation of cell is due to the presence of water.
28. Water acts as the lubricant in the joints.
29. Water acts as the hydrostatic skeletons of annelids and worms.
30. Water forms the fluids such as tears, saliva, mucus and semen.
31. Water act as a reactant for many biological reactions.
32. Hydrophilic and hydrophobic interactions of macromolecules permit formation and stabilization of plasma membrane, conformation of proteins.
33. Ice has less density than liquid water, thus ice float on the water, this floating ice acts as an insulator over the water bodies and protect the aquatic animals from extreme cold conditions.
34. Water is transparent, thus enable light penetration and ensure the survival of water plants.
35. Condensation reaction, a common type of reaction in the cells, results in the release of water molecule.

36. Water can form buffers with acids and bases.

37. Water protects the cells from temperature fluctuations.

38. Water is an essential abiological component of the ecosystem.

39. Due to the high heat capacity, water prevents the effects of temperature fluctuations in the surroundings.

40. Water has high density than air, this ensures precipitation and raining.

41. Water can form a colloidal system in the soil with the nutrients and clay particles.

42. Water has high dielectric constant.

43. Water slightly expands when they freeze. If water shrinks during freezing, the ice will sink in the water and will destroy the aquatic life in Polar Regions.

44. Sound waves can travels 4.5 times faster in water than in air, this permit escaping fishes from dangers.