

♦ *Chapter 3: Water & the Fitness of the Environment*

Outline

- I. The polarity of water molecules results in hydrogen bonding
- II. Organisms depend on the cohesion of water molecules
- III. Water contributes to Earth's habitability by moderation temperatures
- IV. Oceans and lakes don't freeze solid because ice floats
- V. Water is the solvent of life
- VI. Organisms are sensitive to changes in pH
- VII. Acid precipitation threatens the fitness of the environment

Key Terms

cohesion	temperature	solvent	dissociation	heat
surface tension	hydronium ion	hydroxide ion	solution	solute
adhesion	kilocalorie	aqueous solution	base	mole
hydrophilic	specific heat	pH scale	calorie	acid
hydrophobic	heat of vaporization	molecular weight	buffer	base
kinetic energy	evaporative cooling	acid precipitation		

Objectives

After reading this chapter, the students will be able to:

1. How does water contribute to the fitness of the environment to support life?
 - a) Describe the structure & geometry of a water molecule
 - b) Explain what properties emerge as a result of this structure.
 - c) Explain how the polarity of the water molecule makes it a versatile solvent.
2. Explain the relationship between the polar nature of water and its ability to form hydrogen bonds.
3. List five characteristics of water that are emergent properties which result from hydrogen bonding.
4. Explain the biological significance of the cohesiveness of water.
5. Explain how water's high specific heat, high heat of vaporization & expansion upon freezing affect both aquatic and terrestrial ecosystems.
6. Explain the basis for the pH scale & how acids & bases directly or indirectly affect the hydrogen ion concentration from one molecule to another.
7. Using the bicarbonate buffer system as an example, explain how buffers work.
8. Describe the causes of acid precipitation & explain how it adversely affects the fitness of the environment.