

Chapter 6.2

Water and Diffusion



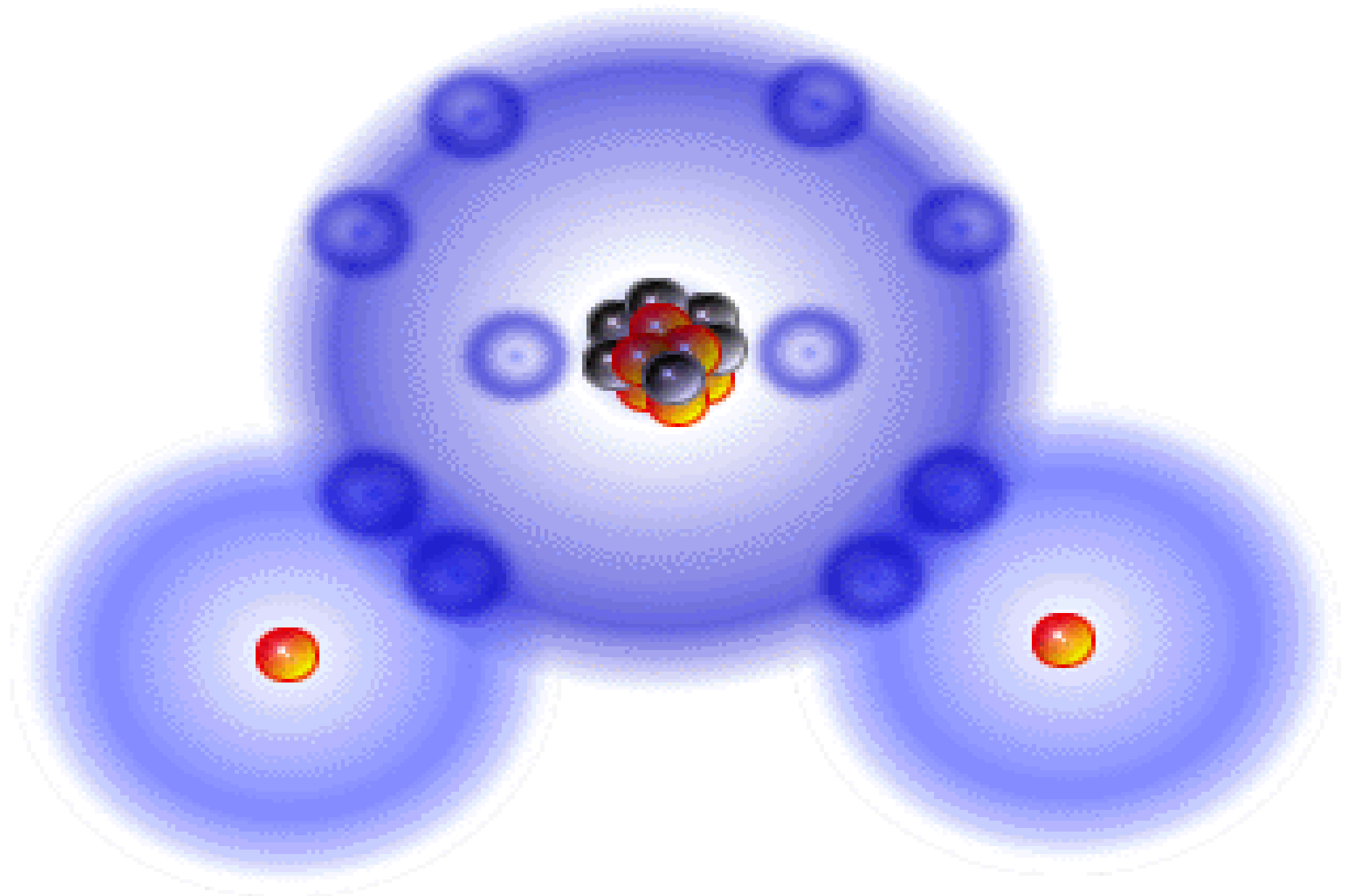
Water's Importance

- Most life processes can occur only when molecules and ions are free to move and collide with one another, and that condition exists when they are dissolved in water
- Water transports materials in organisms (blood, tree sap)
- Water makes up 70- 95% of most organisms

Water is Polar

- A Polar Molecule is a molecule with an unequal amount distribution of charge; that is, each molecule has a positive end and a negative end.
- Since water is polar it can dissolve many ionic compounds like salt, and many other polar molecules, such as sugar.

Water Molecule



Hydrogen Bond

- The attraction of positively charged hydrogen atoms in one water molecule with negatively charged oxygen atoms of another water molecule forms a hydrogen bond.
- Hydrogen bond is very important to living organisms because it holds many biomolecules (like protein) together.

Freezing Water

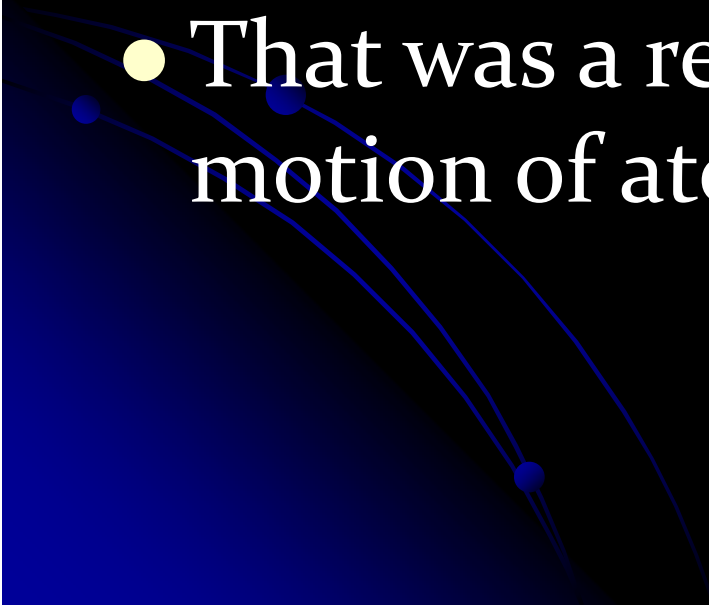
- Water expands when it freezes.
- That's why a glass cup shatters when it's filled with water and put into a freezer.



Diffusion

- All moving objects have energy of motion called kinetic energy.
- A moving particle of matter will move in a straight line until it collides with another particle. Afterwards it, and the other particle, will rebound.
- Particles are like tennis balls, they are constantly moving and colliding with each other.

Brownian Motion

- In 1827, Scottish scientist Robert Brown was observing pollen grains that were floating in water. He noticed that the grains jerked around in the water.
 - That was a result of the random motion of atoms and molecules.
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The Process of Diffusion

- **Diffusion**: The net movement of particles from an area of higher concentration to an area of lower concentration.
- Diffusion is slow because it relies on the random motion of atoms and molecules.
- Concentration, temperature, and pressure affect the rate of diffusion.

The Results of Diffusion

- Molecules will continue to move randomly and collide with one another, but no further change in concentration will occur.
- This is called Dynamic Equilibrium.

Diffusions in Living Systems

- Diffusion in biological systems is also evident outside of the cell and can involve substance other than molecules in an aqueous environment.
- Oxygen (a gas) diffuses in capillaries of the lungs because there is a greater concentration of oxygen in the air sacs of the lungs than in the capillaries.