

Reinforcement Worksheet – Properties of Water

KEY CONCEPT: Water’s unique properties allow life to exist on Earth.

The structure of the water molecule gives water unique properties. Water is a polar molecule, which means that it has a region with a slight negative charge (the oxygen atom), and a region with a slight positive charge (the hydrogen atoms). The oppositely charged regions of water molecules interact to form hydrogen bonds. A hydrogen bond is an attraction between a slightly positive hydrogen atom and a slightly negative atom. Hydrogen bonds are responsible for several important properties of water.

- High specific heat: Water resists changes in temperature; it must absorb a large amount of heat energy to increase in temperature.
- Cohesion: The attraction among molecules of a substance is called cohesion. Cohesion due to hydrogen bonds makes water molecules “stick” together.
- Adhesion: The attraction among molecules of different substances is called adhesion. Water molecules “stick” to many other materials because of hydrogen bonds.

Many compounds that are important for life dissolve in water. Water is the largest component of cells’ interiors, and chemical reactions in the cell take place in this water. When one substance dissolves in another, a solution is formed. The substance present in the greatest amount is called the solvent. Substances that are present in lower amounts and dissolve in the solvent are called solutes. Polar solvents, such as water, dissolve polar molecules and ions.

When some substances dissolve in water they break up into ions. A compound that releases a hydrogen ion (a proton) when it dissolves in water is an acid. Bases are compounds that remove, or accept, hydrogen ions. A solution’s acidity, or its hydrogen ion concentration, is measured on the pH scale. An acid has a low pH (pH below 7) and a high hydrogen ion concentration. A base has a high pH (pH above 7) and a low hydrogen ion concentration. Organisms must maintain a stable pH. Even a small change in pH can disrupt many biological processes.

1. Explain why water is a polar molecule?

2. How do hydrogen bonds form?

3. What are the two parts of a solution?

4. What types of molecules dissolve easily in water? What types do not dissolve easily in water?

5. What does pH mean?
