




2.2 Properties of Water

Lesson Objectives

-  Discuss the unique properties of water.
-  Differentiate between solutions and suspensions
-  Explain what acidic solutions and basic solutions are.

Lesson Summary

The Water Molecule Water molecules (H_2O) are polar because of an uneven distribution of electrons, creating a slight negative ($-$) charge in the oxygen atom and a slight positive ($+$) charge in each hydrogen atom. The attraction between a hydrogen atom of one water molecule and the oxygen atom of another water molecule is called a **hydrogen bond**.

- ▶ **Cohesion** is an attraction between molecules of the same substance. It causes water molecules to be drawn together, producing surface tension
- ▶ **Adhesion** is an attraction between molecules of different substances. It causes capillary action, an effect that causes water to rise in a narrow tube against the force of gravity.

Solutions and Suspensions A **mixture** is a material composed of two or more elements or compounds that are physically mixed together but not chemically combined. A **solution** is a mixture in which all the components are evenly spread out: the substance dissolved is the **solute**; the substance that causes the dissolving is the **solvent**. Mixtures of water and undissolved materials are **suspensions**.

Acids, Bases, and pH A water molecule (H_2O) can split apart to form a hydrogen ion (H^+) and a hydroxide ion (OH^-).

- ▶ The **pH scale** measures the concentration of hydrogen ions in a solution. The scale ranges from 0 to 14. Pure water has a pH of 7.
- ▶ An **acid** is any compound that forms H^+ ions in solution. Acidic solutions have pH values below 7. A **base** is a compound that forms OH^- ions in solution. Basic, or alkaline, solutions have pH values above 7.
- ▶ **Buffers** are weak acids or bases that can react with strong acids or bases to prevent sudden changes in pH.

The Water Molecule

For Questions 1–4, write True or False on the line provided.

- _____ 1. Water is a polar molecule.
- _____ 2. Hydrogen bonds are an example of adhesion.
- _____ 3. Covalent bonds give water a low heat capacity.
- _____ 4. A hydrogen bond is stronger than a covalent bond.

Solutions and Suspensions

5. Complete the table

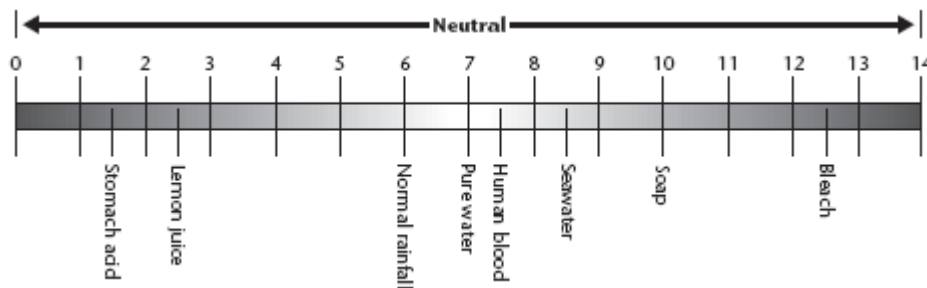
Substance	Definition	Example(s)
	Physical combination of two or more substances	Cinnamon sugar
Solute		Salt in saltwater
	Mixture of water and nondissolved substance	Blood
Solution		

Acids, Bases, and pH

6. What makes pure water neutral?

7. What does the pH scale measure?

8. On the pH scale, indicate which direction is increasingly acidic and which is increasingly basic.



9. Identify two solutions that have more H^+ ions than OH^- ions.

10. Identify two solutions that have more OH^- ions than H^+ ions.

11. How would you buffer a solution that has a pH of 12?

Apply the Big idea

12. Why are buffers important to living things?
