

SECTION 3 - 1 REVIEW**WATER****VOCABULARY REVIEW** Define the following terms.

1. polar compound _____

2. hydrogen bond _____

3. cohesion _____
4. adhesion _____

MULTIPLE CHOICE Write the correct letter in the blank.

- _____ 1. In a water molecule,
- | | |
|---|---|
| a. all of the atoms have a slight positive charge. | c. the oxygen atom has a slight positive charge and the hydrogen atoms have a slight negative charge. |
| b. the oxygen atom has a slight negative charge and the hydrogen atoms have a slight positive charge. | d. all of the atoms have a slight negative charge. |
- _____ 2. When sodium chloride is dissolved in water, the sodium ions
- | | |
|--|--|
| a. are attracted to the oxygen atoms of water molecules. | c. are attracted to each other. |
| b. are attracted to the hydrogen atoms of water molecules. | d. do not dissociate from the sodium chloride. |
- _____ 3. Hydrogen bonds
- | | |
|--|---|
| a. form between hydrogen atoms in different molecules. | c. hold water molecules to one another. |
| b. are strong bonds. | d. hold the two hydrogen atoms together in a molecule of hydrogen gas, H ₂ . |
- _____ 4. When a glass is filled to the brim with water, the water appears to bulge from the sides of the glass due to
- | | | | |
|-----------------|--------------------|--------------|--------------|
| a. capillarity. | b. thermal energy. | c. adhesion. | d. cohesion. |
|-----------------|--------------------|--------------|--------------|
- _____ 5. When liquid water is heated, most of the energy that the water initially absorbs is used to
- | | |
|---|--|
| a. raise the temperature of the water. | c. make the water boil. |
| b. break the covalent bonds between the hydrogen and oxygen atoms in water. | d. break the hydrogen bonds between the water molecules. |

SHORT ANSWER Answer the questions in the space provided.

1. Why is water a good solvent? _____

2. What kinds of substances besides water can be involved in hydrogen bonding? _____

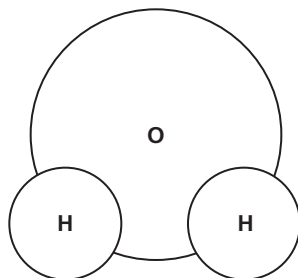
3. What property of water allows it to stick to a dry surface, such as a wooden countertop?

4. How does water help cells keep an even temperature despite temperature changes in the environment? _____

5. **Critical Thinking** Explain why water forms large, round drops as it falls from a faucet with a slow leak. _____

6. **Critical Thinking** Water is often called the universal solvent because it dissolves most substances that are important to living things. What does this suggest about the nature of those substances?

STRUCTURES AND FUNCTIONS The diagram below represents a single water molecule. Draw three other water molecules near it, and use dashed lines to indicate where hydrogen bonds would form between the molecule shown below and the ones you drew.



- Since a tenfold increase in H_3O^+ ion concentration reflects a decrease of one pH unit, a 100-fold increase in concentration reflects a decrease of two pH units. Therefore, the new pH would be 5.5.

STRUCTURES AND FUNCTIONS

- a, alkaline; b, neutral; c, acidic

Section 3-1

VOCABULARY REVIEW

- A polar compound is one with an uneven distribution of positive and negative charges.
- A hydrogen bond is an attraction between a hydrogen atom in one molecule and a region of negative charge on another molecule.
- Cohesion is an attractive force between particles of the same kind.
- Adhesion is an attractive force between unlike substances.

MULTIPLE CHOICE

- b
- a
- c
- d
- d

SHORT ANSWER

- Water's polar nature allows it to dissolve other polar substances as well as ionic compounds.
- Any molecule that has a region of negative charge or a hydrogen atom with a slight positive charge can be involved in hydrogen bonding.
- Adhesion allows water to stick to a dry surface.
- Because of its hydrogen bonds, water must gain or lose a relatively large amount of energy for its temperature to change. It therefore tends to resist temperature changes.
- Cohesive forces cause the water molecules in each drop to move as close as possible to one another, making the drop round.
- It suggests that the substances are most often polar molecules or ionic compounds.

STRUCTURES AND FUNCTIONS

Drawings should show two water molecules below and one above the central water molecule. The molecules below should have their H atoms facing away from the central molecule, and the molecule above should have one of its H atoms pointing toward the central molecule. Dashed lines should be drawn between each H atom in the central molecule and the O atom in each of the lower water molecules, and between the O atom in the central molecule and the nearer H atom in the upper water molecule.

Section 3-2

VOCABULARY REVIEW

- An organic compound is a compound containing carbon atoms covalently bonded to other carbon atoms and to other elements. Examples: any carbon-containing compound, such as benzene, ethanol, glycerol, glucose, fructose, sucrose, ATP, and ADP.
- A functional group is a cluster of atoms in a compound that influences the properties of that compound. Examples: hydroxyl group, phosphate group.
- An alcohol is an organic compound with a hydroxyl group attached to one of its carbon atoms. Examples: ethanol, methanol, glycerol.

- A monomer is a simple molecule that can bond to others of its kind to form more complex molecules. Examples: glucose, fructose.
- A polymer is a complex molecule that consists of repeated, linked units. Example: sucrose.

MULTIPLE CHOICE

- a
- c
- b
- a
- d

SHORT ANSWER

- The hydroxyl group on alcohols is polar, and this makes alcohols polar compounds. Alcohols can therefore form hydrogen bonds.
- carbon atom, monomer, polymer, macromolecule
- The glucose molecule releases a hydroxide ion, OH^- , and the fructose molecule releases a hydrogen ion, H^+ . These two ions combine to produce water, H_2O .
- The hydrolysis products are ADP and inorganic phosphate. Energy is released.
- With seven electrons in its outermost energy level, carbon could not form double or triple bonds with other atoms, so far fewer organic compounds could be formed.

STRUCTURES AND FUNCTIONS

- Forward reaction: reactants, glucose and fructose; products, sucrose and H_2O .
- condensation reaction
- Reverse reaction: reactants, sucrose and H_2O ; products, glucose and fructose.
- hydrolysis

Section 3-3

VOCABULARY REVIEW

- A monosaccharide is a simple sugar containing carbon, hydrogen, and oxygen in a ratio of 1:2:1; a polysaccharide is a complex molecule composed of three or more monosaccharides.
- Hydrophilic* means "water-loving," or attracted to water; *hydrophobic* means "water-fearing," or tending not to interact with water molecules.
- A nucleotide is a compound containing a phosphate group, a five-carbon sugar, and a ring-shaped nitrogen base; a nucleic acid is a very large polymer of nucleotides.

MULTIPLE CHOICE

- c
- a
- d
- b
- d

SHORT ANSWER

- The storage form is glycogen, and the quick-energy form is glucose. Glycogen consists of hundreds of glucose molecules linked in a highly branched chain.
- Starch, 1; proteins, 20; nucleic acids, 4.
- Phospholipid composes most of the cell membrane. The hydrophobic tails of the phospholipids provide a barrier between the inside and outside of the cell.
- Steroids are lipids. Examples: testosterone and cholesterol.
- Wax serves as a waterproof layer, limiting water loss and preventing insects from drying out.

STRUCTURES AND FUNCTIONS

- a, substrate; b, enzyme; c, products