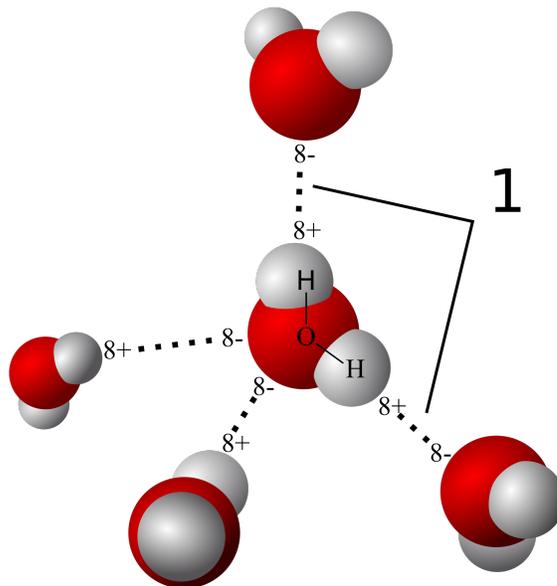


## CONCEPT: SMALL MOLECULES

- The properties of water are crucial for cell activity
  - Water is a **universal solvent**, which means it can \_\_\_\_\_ many types of molecules
    - Water makes up >70% of the cell's weight
    - In water **hydrophilic** molecules dissolve, **hydrophobic** molecules do not dissolve
  - Water (H<sub>2</sub>O) is **polar**, which is an uneven distribution of \_\_\_\_\_ within the water molecule
    - Oxygen draws electrons towards it giving it a slight negative charge and hydrogens a slight positive
  - Water molecules are **cohesive** because the polar nature allows for water molecules to stick together
    - Cohesion allows water to act as a temperature stabilizing molecule
      - has high **specific heat** = amount of absorbed heat per gram to raise temperature by 1°C

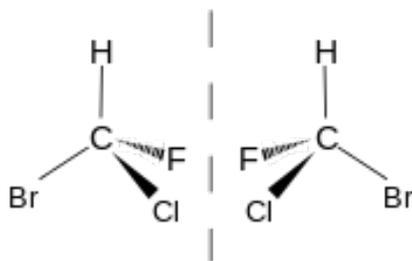
**EXAMPLE:** Water molecule demonstrating polarity



- The properties of carbon are also crucial for cell activity
  - The carbon atom can bind up to four molecules at once
    - Most likely to bond with Oxygen, Hydrogen, Nitrogen, and Sulfur
  - Carbon bonds through *covalent bonds* and these are extremely \_\_\_\_\_
    - **Bond energy** measures the amount of energy needed to break a bond (calories/mole)

- Carbon molecules can have multiple configurations as carbon can bind to \_\_\_\_\_ molecules
  - **Stereoisomers** are carbon molecules with the same chemical nature but are mirrored structures
    - Two stereoisomer conformations are possible for an **asymmetric carbon atom** (chiral center)
- **Functional groups** found on large carbon molecules confer particular characteristics onto the molecule

**EXAMPLE:** Carbon stereoisomers



## PRACTICE

1. Which of the following is not a property of water?
  - a. It is a universal solvent
  - b. It is polar
  - c. It dissolves hydrophobic molecules
  - d. It has a high specific heat

2. Which type of molecule dissolves in water?

- a. Hydrophobic
- b. Hydrophilic
- c. Amphipathic

3. A carbon atom can bind how many independent molecules at once?

- a. 1
- b. 2
- c. 3
- d. 4

