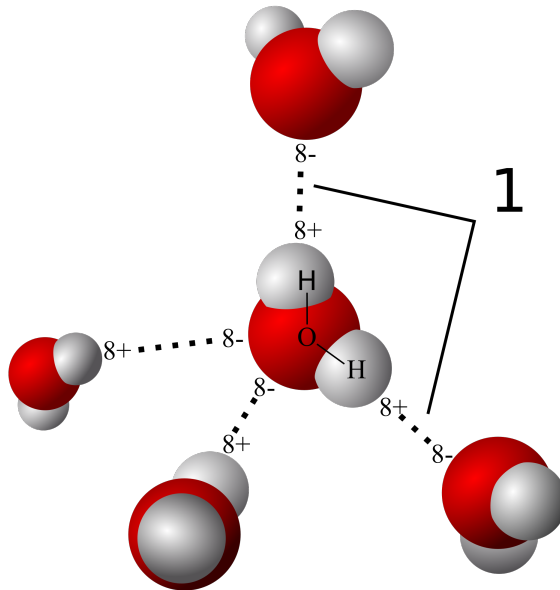


## CONCEPT: SMALL MOLECULES

- 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

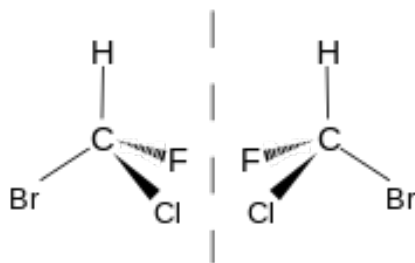


- The properties of carbon are also crucial for cell activity

- 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

