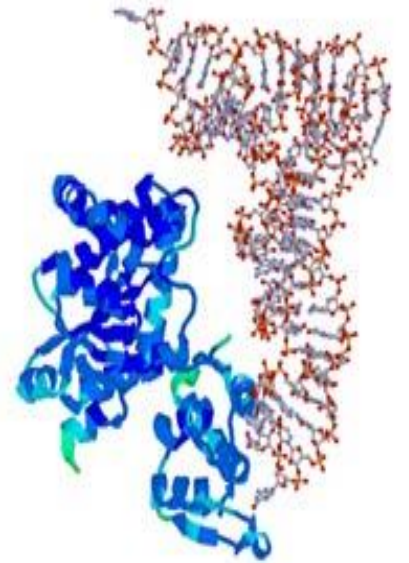
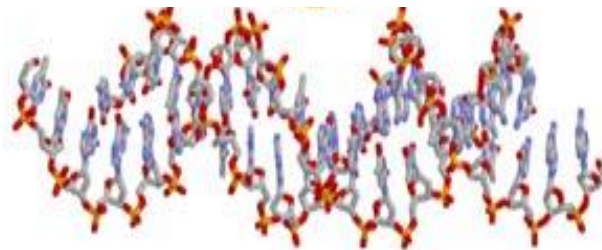
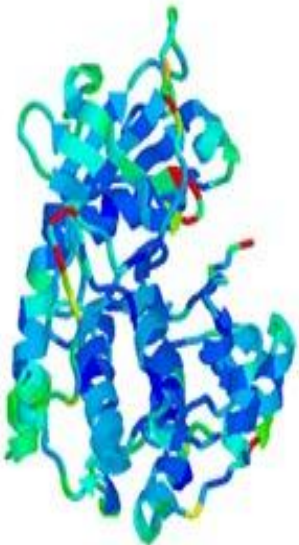
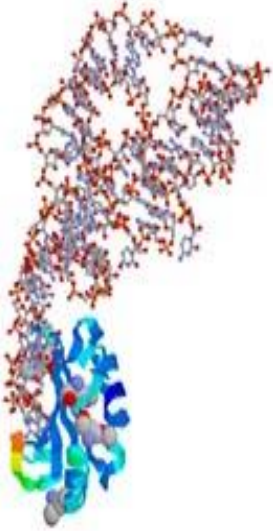


# Biochemistry



**1) Which four elements make up approximately 96% of living matter?**

**A) oxygen, hydrogen, calcium, sodium**

**B) carbon, sodium, chlorine, magnesium**

**C) carbon, oxygen, sulfur, calcium**

**D) carbon, sulfur, phosphorus, hydrogen**

**E) carbon, hydrogen, nitrogen, oxygen**

2) Which of the following is a trace element that is essential to humans and other living organisms?

A) nitrogen

B) oxygen

C) hydrogen

D) iron

E) carbon

**3) A covalent chemical bond is one in which**

**A) electrons are removed from one atom and transferred to another atom so that the two atoms become oppositely charged.**

**B) protons or neutrons are shared by two atoms**

**C) electrons of one atom are transferred to another atom.**

**D) electrons are shared by two atoms**

**4) A covalent bond is likely to be polar when**

**A) the electron being shared between two atoms is much more attracted to one of the atoms than the other atom.**

**B) the two atoms sharing electrons are different elements.**

**C) the two atoms sharing electrons are of the same element.**

**D) the two atoms are sharing electrons equally**

**5) The ionic bond of sodium chloride is formed when**

**A) sodium and chlorine both lose electrons.**

**B) chlorine gains a proton from sodium.**

**C) sodium gains an electron from chlorine.**

**D) sodium and chlorine share an electron pair.**

**E) chlorine gains an electron from sodium.**

**6) Organic chemistry is a science based on the study of**

**A) water and its interaction with other kinds of molecules.**

**B) functional groups.**

**C) carbon compounds.**

**D) the properties of oxygen.**

**E) vital forces interacting with matter.**

**7) Polymers of polysaccharides, fats, and proteins are all synthesized from monomers by**

**A) the addition of water to each monomer.**

**B) the formation of disulfide bridges between monomers.**

**C) ionic bonding of the monomers.**

**D) connecting monosaccharides together.**

**E) the removal of water (condensation reactions).**

**8) Which of the following best summarizes the relationship between condensation reactions and hydrolysis?**

**A) Condensation reactions occur in plants, and hydrolysis happens in animals.**

**B) Condensation reactions assemble polymers, and hydrolysis breaks them down.**

**C) Hydrolysis occurs during the day, and condensation reactions happen at night.**

**D) Hydrolysis creates monomers, and condensation reactions destroy them.**

**E) Condensation reactions can occur only after hydrolysis.**

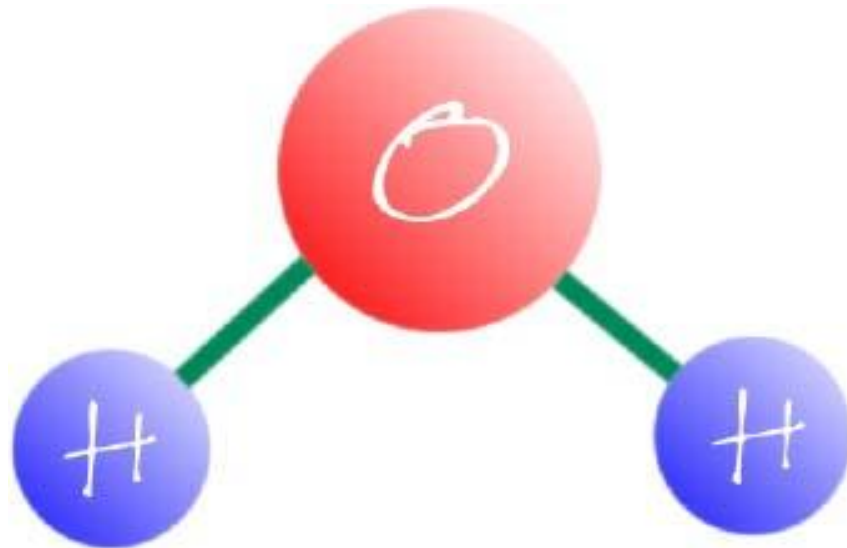


**Water is important because:**

- Most organisms have high water content (75 - 95%).
- Many organisms live in water.
- Most chemical reactions of life take place in water.

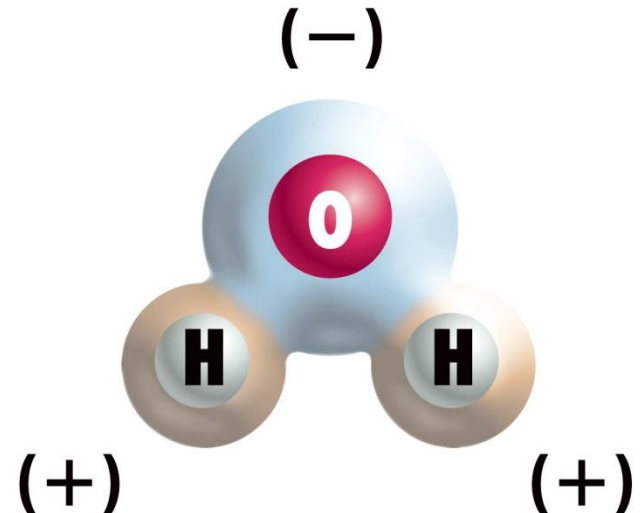
# Water Structure

- A water molecule consists of 2 hydrogen and 1 oxygen atom, hence...H<sub>2</sub>O.
- Electrons are *shared* through covalent bonding between the 3 atoms.



# Water molecules are polar

- The e are shared unequally, creating an unequal distribution of charge.
- The oxygen atom has more protons so it attracts the shared electrons more of the time
  - The hydrogen's have a partial positive charge
  - The oxygen has a partial negative charge



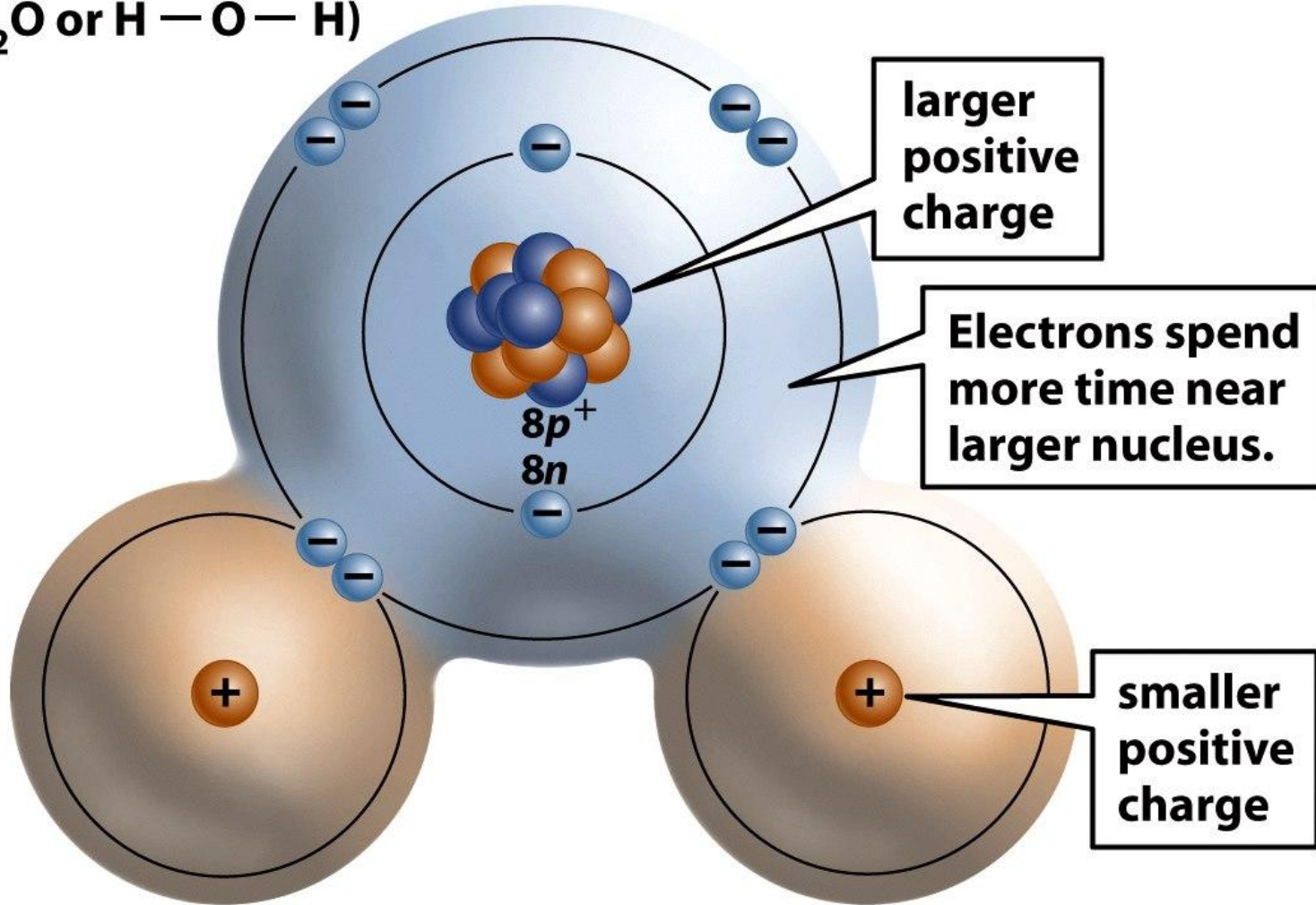
# Polar covalent bonding

Water



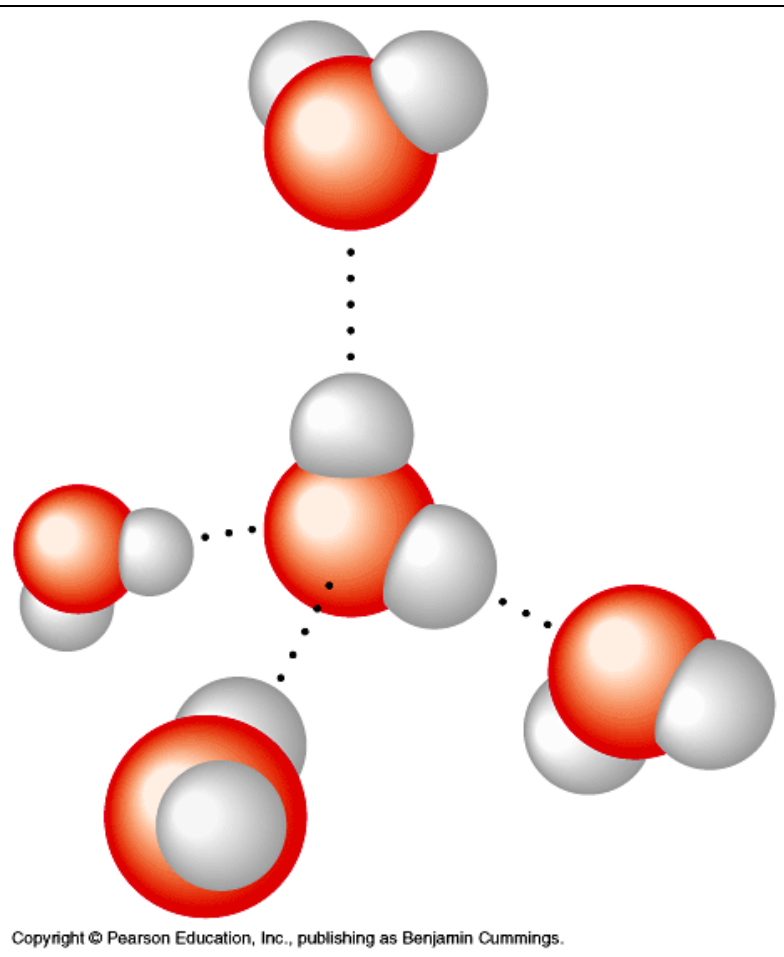
(oxygen: slightly negative)

(-)



(+) (hydrogens: slightly positive) (+)

# Water molecule can form **hydrogen bonds**



- Partly positive hydrogen atoms of one water molecule are attracted to the partially negative oxygen of another water molecule
- The bonds are made and broken quickly as the molecules move, however the large numbers of bonds contribute to the stability of water