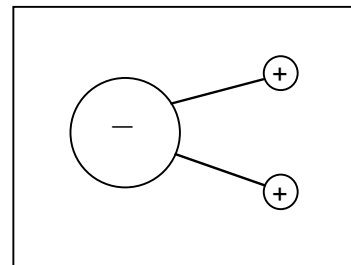


## Background Information on Water Cohesion

### Putting It All Together

Water molecules are often described as *polar*, meaning that their two ends have different charges. For water, the larger oxygen atom has a slight negative charge and the end with 2 small hydrogen atoms has a slight positive charge. The negative oxygen ends are attracted to the positive hydrogen ends of other water molecules; the weak bonds that form as a result of these bonds are called hydrogen bonds.



*Cohesion* is the attraction of water molecules to each other because of these hydrogen bonds. *Adhesion* is the attraction of water molecules to other materials as a result of hydrogen bonding. *Surface tension* is the attraction among water molecules at the surface of a liquid. Surface tension creates a skin-like barrier between air and underlying water molecules.

Besides being attracted to other molecules, water is also attracted to itself. As you conducted your experiment, you probably observed water levels that were higher than the edges of the penny. The water levels should have been highest for the water-only trials. Oil and soap both reduce surface tension by decreasing water's ability to stick to itself — by decreasing the strength of the hydrogen bonds.

You observed the strength of water's surface tension as you dropped water on the penny. To further explore surface tension, drop paper clips in a full glass of water. See how many paper clips can be placed in a glass of water without breaking the surface tension.

Because water sticks, or coheres, to itself, it can travel up tree trunks to nourish leaves high above streams. Water molecules also can be attracted to other materials, such as to soil, rocks, and glass. On a very small scale, water molecules will wiggle in between the sodium and chlorine atoms of table salt, causing them to drift apart and dissolve. This ability to penetrate molecules is why water is a good solvent.

Surface tension is important to many water organisms. Water's surface tension is strong enough to support water striders (an insect) traveling on top of the water.