Chemistry of Water Lab

Water Makes Life On Earth Possible!

What are the four major topics of this lab?

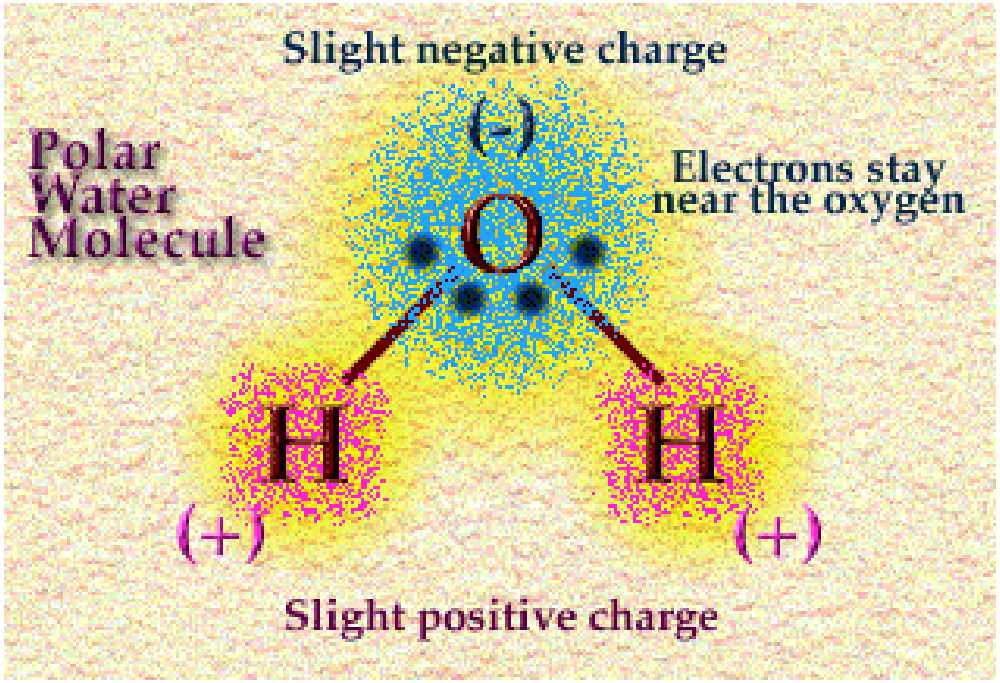
- Properties of Water
- pH
- Diffusion
- Osmosis

1. Properties of Water
Water is POLAR!

What does it mean to be polar?

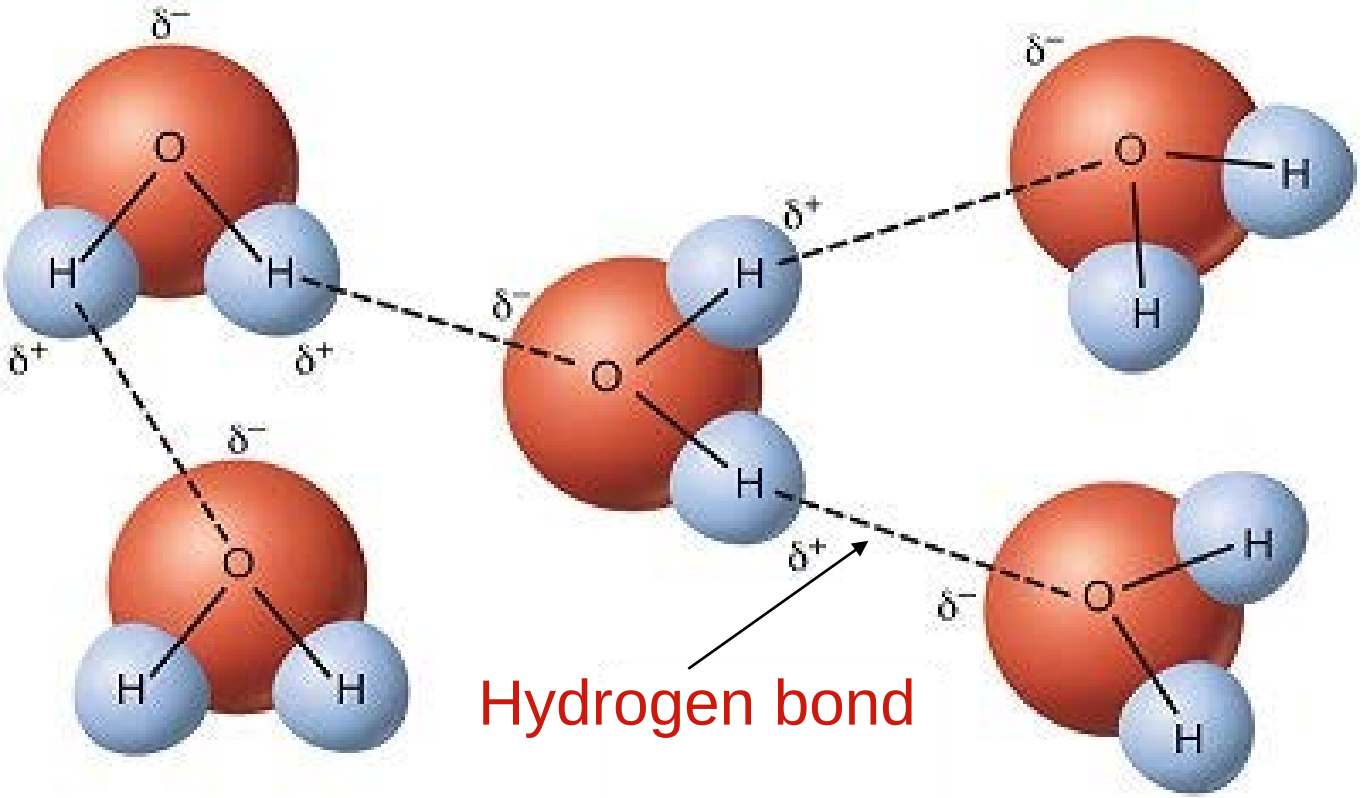
It means the atoms of the water molecule do NOT share electrons equally.

Result? The water molecule has partial charges!



1.Properties of Water

Because of its polarity, water forms hydrogen bonds.



Are hydrogen bonds weak or strong?

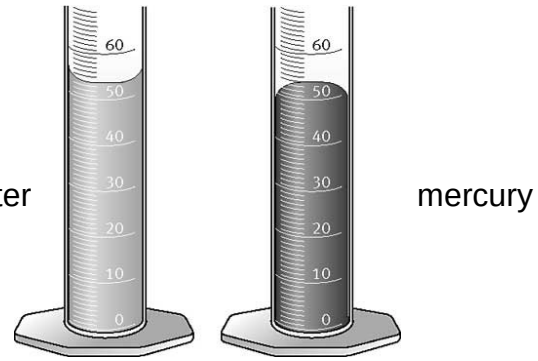
They are weak bonds!

1. Properties of Water

Because water is polar:

It is “cohesive” that is it sticks to itself.

It is “adhesive” that is it sticks to other molecules.

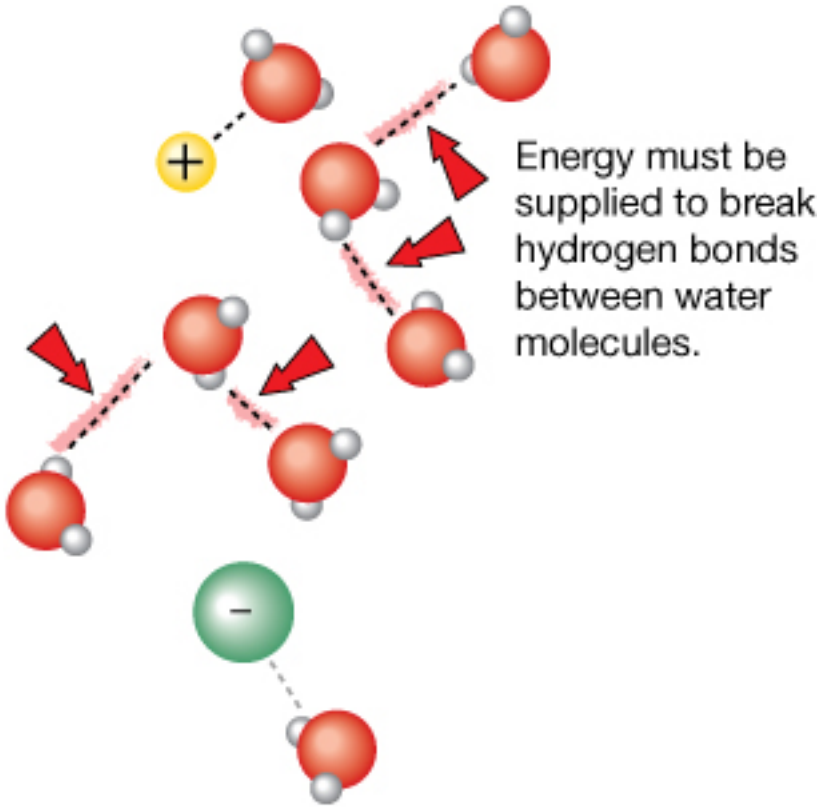


It is a great temperature moderator.

What would be an example of water being a great temperature moderator?

Example of Water as a Temperature Moderator

Why is water such a great temperature moderator?

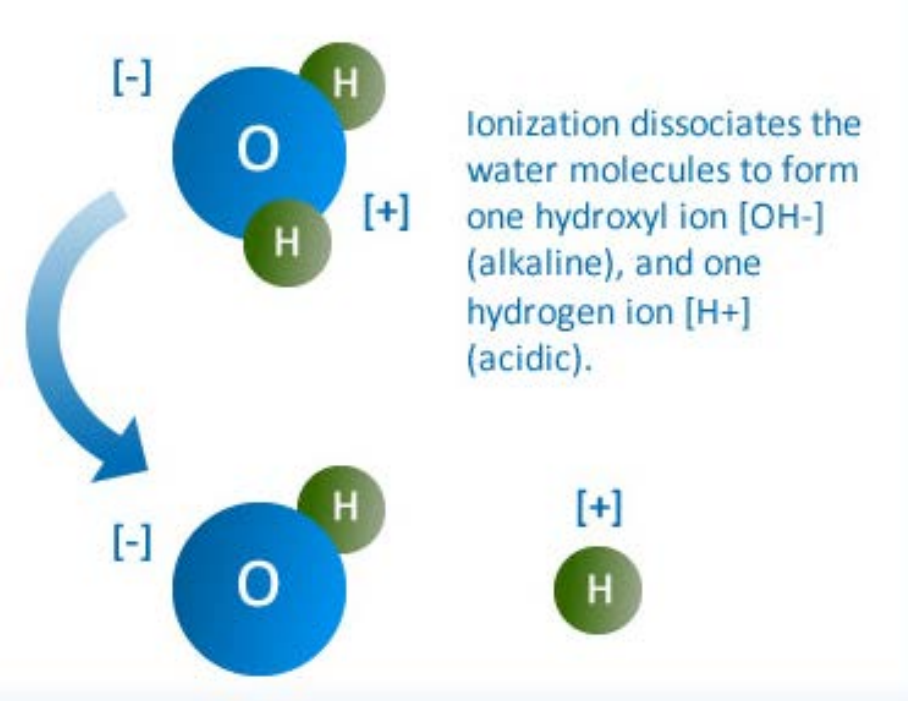


This means it takes extra energy to heat up water. First, energy to break hydrogen bonds and then energy to get molecules moving.

If it takes energy to break hydrogen bonds then it energy must be released when hydrogen bonds are formed.

2. pH

- pH = - log of the hydrogen ion (H+) concentration.
- Pure water has neutral pH of 7. Why?



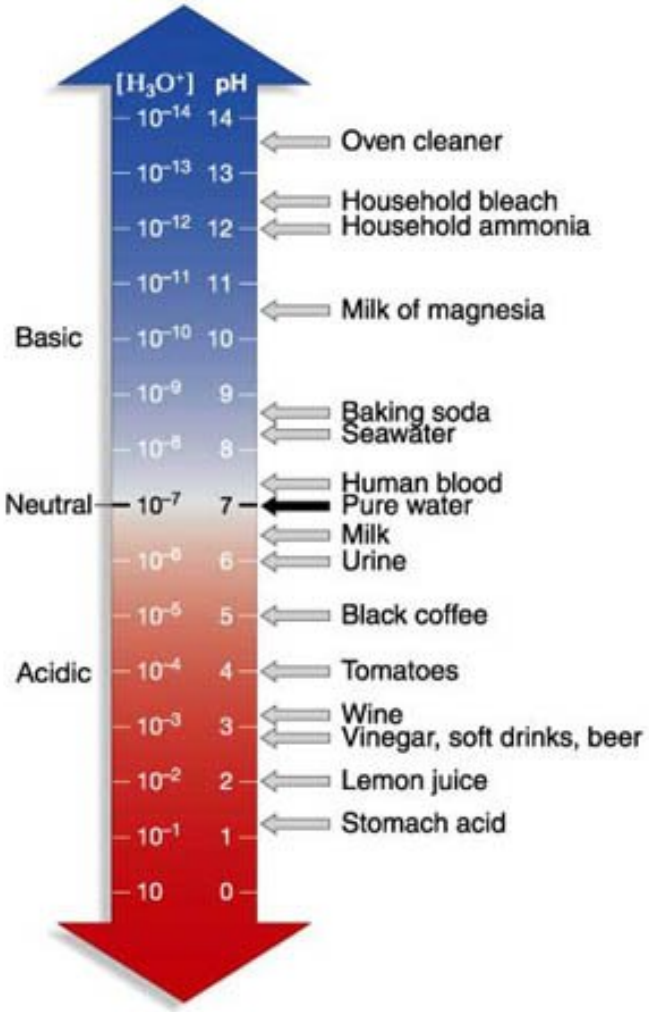
A certain amount of water ionizes. In pure water the H+ = OH- so they cancel each other out.

2. pH

Hydrogen Ion (H^+) Concentration

The higher the pH, the more basic and the lower the H+ concentration.

The lower the pH, the more acidic and the higher the H+ concentration.



Each increase is actually a 10X change in pH.

So going from pH 3 to pH 5 would be how big an increase?

100X

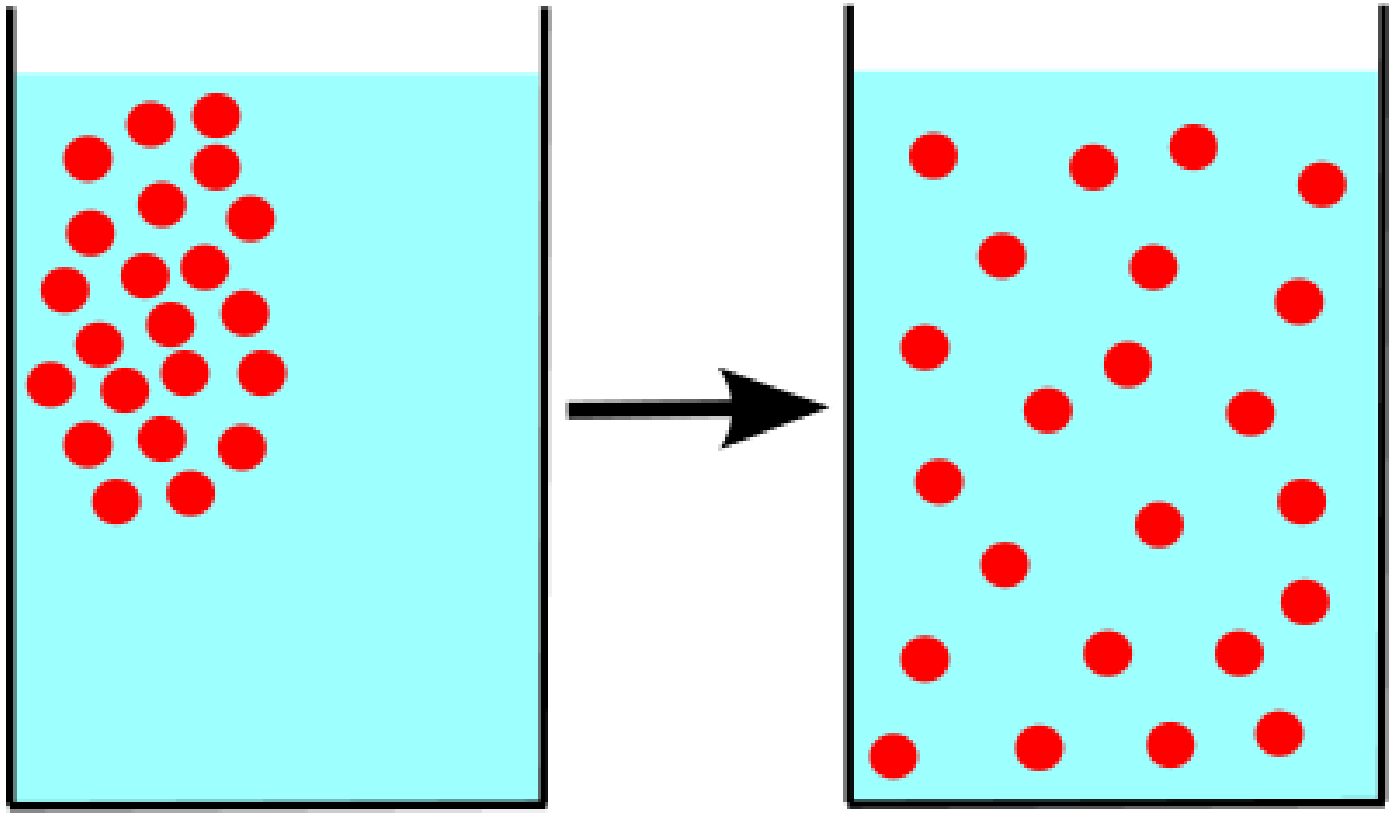
PH changes can cause damage to cells and molecules.
Are you afraid to drink orange juice?

NO! Your body has buffers!

Buffers are molecules that help to maintain pH even if you add acids or bases.

3. Diffusion

Molecules going from high to low concentration



Write a hypothesis for this question:

What is the effect of molecular weight on the rate of diffusion?

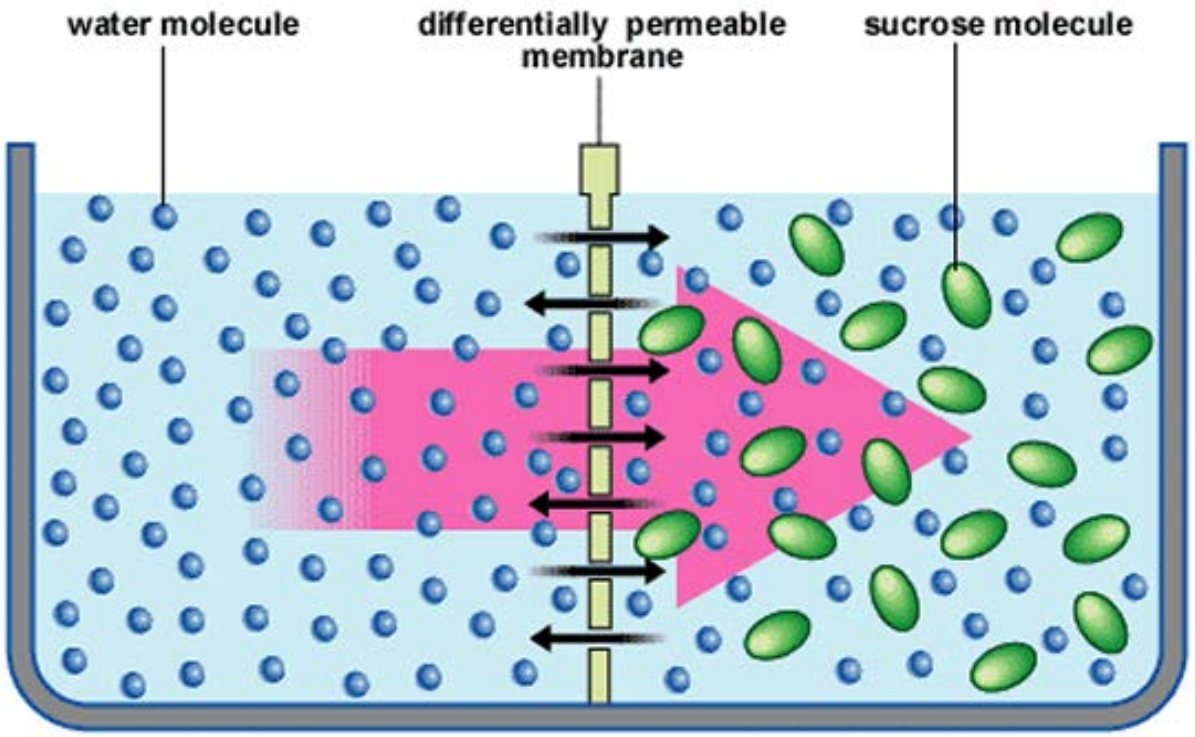
We will compare methylene blue (mw of 320) and potassium permangenate (mw of 158.)

Measure the diameter of ring of color after 30 minutes and 1 hour.

4. Osmosis

Water Molecules going from high to low concentration across a membrane

Water can cross this membrane but not sucrose.

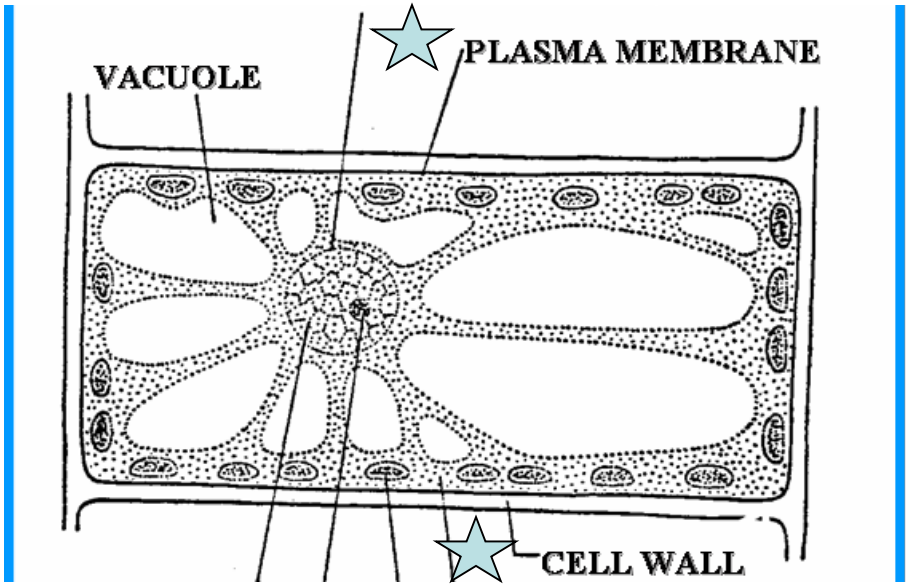


Higher water concentration

Lower water concentration

You will be placing Elodea cells (which, of course, have membranes) in a salt solution.

Elodea is a plant. Remember, plant cells have cell walls that are rigid while plasma membranes are fluid.



Clean up – please:

- Put all equipment back in its appropriate place.
- Empty beakers from buffer experiment, rinse and turn upside down.
- Put used pH paper in container.
- Wash slide and return and throw away coverslip.
- Wipe down tables and push in chairs.
- Thank you!