Section 2.2
Properties of Water

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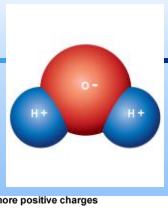
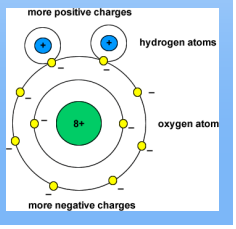
http://tomazlasic.net/2010/04/serious-fun-in-water/

The Water Molecule

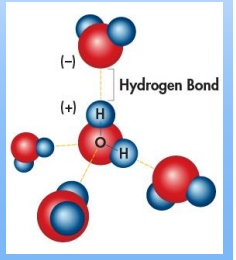
A. Water is neutral
   1. 10 electrons balance 10 protons.
B. Polarity
   1. O's 8 protons in nucleus is attracted to electrons better than H 1 proton.
   2. Water's shared electrons closer to oxygen, making it partially negatively charged.
   3. Hydrogen end slightly positively charged.





The Water Molecule

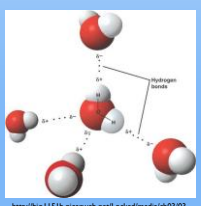
C. Hydrogen Bonding
   1. Water molecules are attracted to each other because unlike charges attract. (+ and -)
   2. Not as strong as ionic or covalent bonds.
   3. Gives water many of its unique properties.
      a. Expands when frozen – less dense.
      b. Able to dissolve many substances.



The Water Molecule

4. Cohesion: An attraction between molecules of the same substance.
   a. Causes water molecules to be drawn together.
   b. Reason water beads on a smooth surface.
   c. Produces surface tension – why some insects can walk on water surface.

http://bio1151b.nicerweb.net/Locked/media/ch03/03_04WaterStrider_UP.jpg



http://bio1151b.nicerweb.net/Locked/media/ch03/03_02WaterMolecules_L.jpg

The Water Molecule

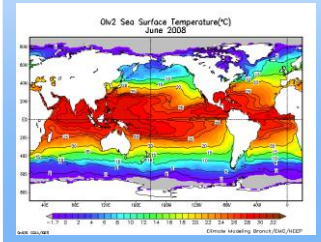
5. Adhesion: Attraction between molecules of different substances.
   a. Causes a meniscus to form in graduated cylinder. Molecules of water are more attracted to glass than each other.
   b. Also causes water to rise in tube against the force of gravity: termed capillary action. How plants move water from roots to leaves.

http://www.sciencewithmrmilstid.com/tag/density/

http://discovermagazine.com/2003/mar/featscienceof

The Water Molecule

6. Heat Capacity
   a. High Heat Capacity: Takes large of amount of heat energy to raise the temperature of water.
   b. Allows large bodies of water to absorb large amounts of heat with only small changes in temperature.
   c. Heat from cellular processes absorbed by water.



http://weather.about.com/b/2008/07/15/the-ocean-is-ready-for-hurricanesare-you.htm

Solutions and Suspensions

A. Mixture: A material composed of two or more elements or compounds, physically mixed together but not chemically combined.
   1. Salt and pepper, earth's atmosphere

http://www.sweetgreetingsshildon.co.uk/soft-chewy-sweets/lions-sports-mixture/prod_61.html

http://www.kidsgeo.com/geography-for-kids/0040-introduction-to-our-atmosphere.php

Solutions and Suspensions

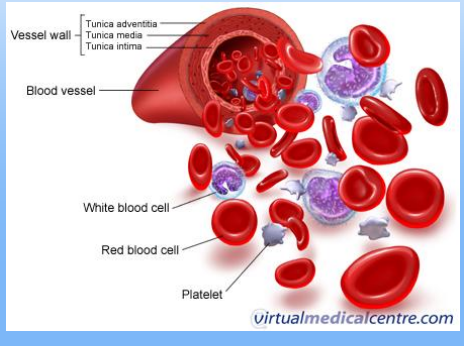
http://commons.wikimedia.org/wiki/File:SaltInWaterSolutionLiquid.jpg

B. Solutions
   1. All components are evenly distributed.
      a. Salt dissolved in water.
      b. Solute: Substance dissolved (salt).
      c. Solvent: The substance in which the solute dissolves (water).

Solutions and Suspensions

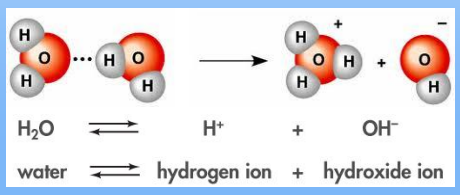
C. Suspensions
   1. When materials placed in water do not dissolve, but separate into pieces so small they do not settle out.
   2. Water keeps particles suspended.
   3. Most important biological fluids: both solutions and suspensions
      a. Blood in your body: water contains dissolved compounds and also cells/undissolved particles.

Components of Blood



Acids, Bases, and pH

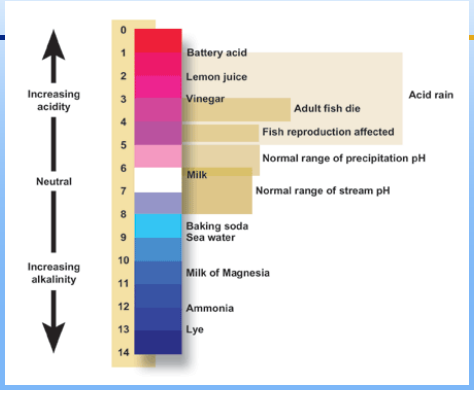
A. Water can split to form ions.
B. Only happens 1 in 550 million times.
C. Ion numbers are equal so water is neutral.



Acids, Bases, and pH

D. The pH Scale
   1. Used to indicate the concentration of H^+ ions in solution.
   2. Ranges from 0 to 14.
   3. Lower the pH = more acidic (1-6).
   4. Higher the pH = more basic (8-14).
   5. 7 is neutral (H^+ ions and OH^- ions equal).

pH Scale



Acids, Bases, and pH

E. Acids
   1. Acid: A compound that forms extra hydrogen (H^+) ions in solution.
   2. Strong acids on scale 1-3
   3. Hydrochloric acid from stomach.

F. Bases
   1. A compound that produces hydroxide ions (OH^-) in solution.
   2. Called alkaline solution.
   3. pH above 7.
   4. Lye used in soap making (Strong base 11-14).

Acids, Bases, and pH

G. Buffers
   1. pH of human body must be between 6.5 and 7.5.
   2. Important for maintaining homeostasis.
   3. Buffers: Weak acids or bases that can react with strong acids and bases to prevent sudden changes in pH.
      a. Blood pH is 7.4.
      b. Bicarbonate and phosphate ions released when pH is lowered.