10/9/12
LE 1 & LE4

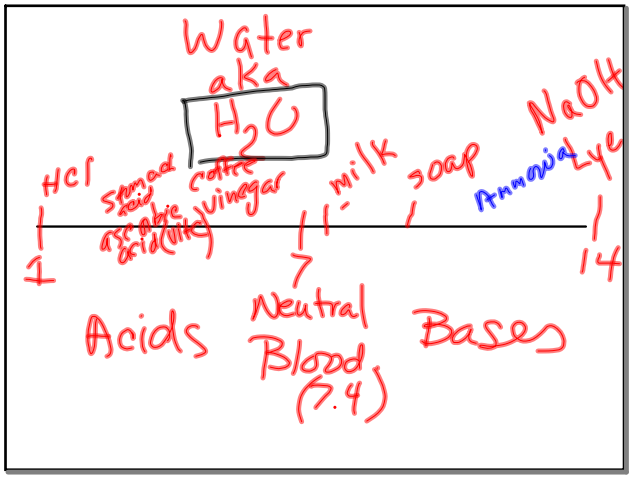
TP: Students will explore the ABC's of Acids, Bases & pH.

Do Now: What happens when you mix equal amounts of hot & cold water?

Homework: P.55-57

Vocabulary (Notebook):
Cohesion, Adhesion, solution, hydronium & hydroxide ions (formula & diagram),
acid, base, pH, buffer, bicarbonate ion (formula)

Oct 3-10:41 PM



Oct 10-10:52 AM

Chemical Properties

Acids: Sour

Bases: Bitter, slippery to touch

Both Acids & Bases are Reactive

Reactive: can cause severe burns

Certain chemicals have the special property of appearing in different colours depending on the pH of the solution they are in. These chemicals are known as acid-base indicators, or just 'indicators'
Indicator example: Bromothymol blue

phenolphthalein solution

Oct 3-11:18 PM

pH, Acids, and Bases

a. Introduction
-Acidic and *Basic* are two ways to describe chemicals that are in solution

- Mixing acids and bases can cancel out their extreme effects
- *Neutral*- a substance that is neither acidic nor basic

-The pH scale measures how acidic or basic a substance is.
-pH can range from 0 to 14

A pH less than 7 is acidic. A pH of 7 is neutral. A pH greater than 7 is basic.

Bronsted-Lowry Model
acid: anything that donates a [H^+] (proton donor)
base: anything that accepts a [H^+] (proton acceptor)
normal Bronsted-Lowery equation: acid + base <=>acid + base

example: $HNO_2 + H_2O <=> NO_2^- + H_3O^+$

Oct 3-10:53 PM

Acid & Base Strength & Properties

Each whole pH value below 7 is *ten times more acidic* than the next higher value.

Example: a pH of 4 is ten times more acidic than a pH of 5 and _____ times more acidic than a pH of 6.

The same holds true for pH values above 7, each of which is *ten times more basic* than the next lower whole value.

Example: a pH of 9 is _____ times more basic than a pH of 8.

Oct 3-10:51 PM

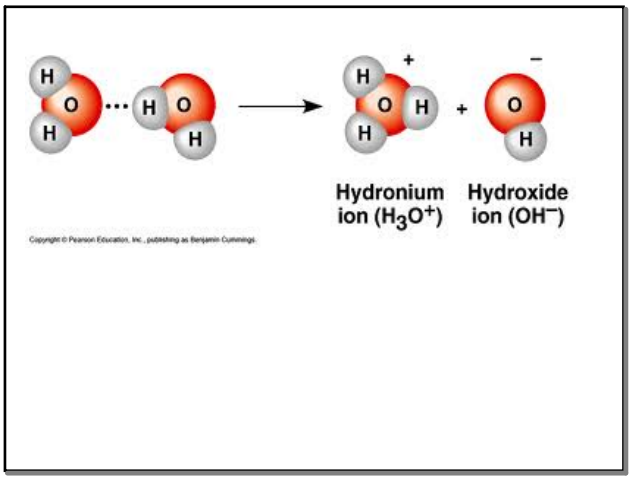
Acids are

The **hydronium ion, $H_3O^+_{(aq)}$** (the aqueous **hydrogen ion, H^+**) is formed by any acidic substance in water.
- Increase in H^+ concentration decreases the pH of a solution
- acids donate protons,

The **hydroxide ion, $OH^-_{(aq)}$**, is formed by any soluble base forming an **alkaline/ basic** solution.
- Increase in OH^- concentration increases the pH of a solution.
- bases are proton receptors

Water is a neutral because its pH is 7:
the oxonium/hydrated proton ion concentration equals the hydroxide ion concentration

Oct 3-11:48 PM



Oct 3-11:36 PM

Examples

Acids	Neutrals	Bases

Oct 3-11:12 PM

10/10/12
LE1
LE4

TP: Students will differentiate the parts of the atom and chemical bonds

Do Now:
1. Explain the difference between an atom and a molecule.
2. What is matter?

Atom make bonds
Atoms smallest unit of an element
Atoms make up molecules

Homework
Due Friday:
Outline of Chapter 2 sections 1-3

Oct 10-8:07 AM

Biol Periodic Table
Found in Living Things
Hydrogen H
Nitrogen N CHO's
Oxygen O +
Carbon C CHON's
(Ca, S, Se, P)
Water = H_2O
?organic 2 of 3

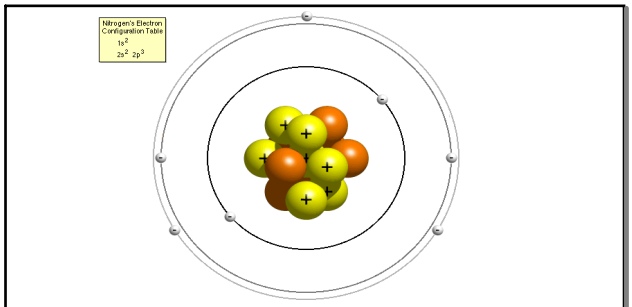
Oct 11-10:49 AM

Atoms
- smallest unit of matter that cannot be broken down by chemical reactions
- Nucleus is in the center, composed of
- protons, P , Positive charge, large mass
- and neutrons, N, no charge (Neutral), same mass as P
- (Hydrogen only has 1 *P* in nucleus)
- Electrons have a negative charge, move around nucleus in a "Cloud", small mass

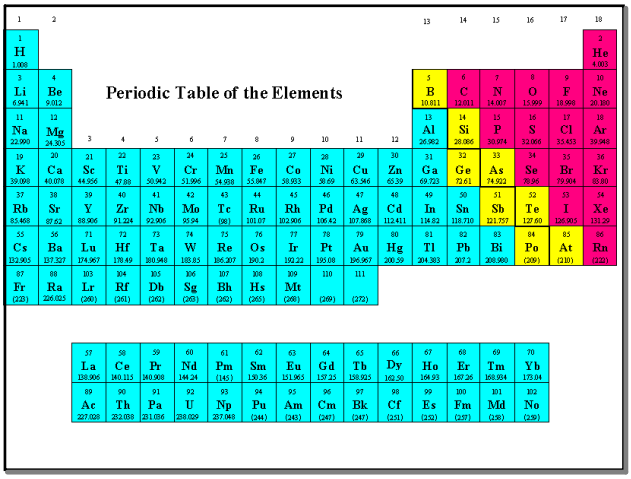
Elements
- *substance made up of atoms that all have same # P*
- *EX: All atoms of Carbon have 6 protons*
- *Atom is the smallest unit that has all the chemical properties of an element*
- *Atoms of same element with different # of Neutrons in nucleus are Isotopes*
- ***Arranged on periodic table***

-from left to right by increasing number of protons in nucleus
-elements in column have same # of Valence electrons (this means that they react similarly

Oct 11-9:03 AM



Oct 11-9:37 AM



Oct 11-9:39 AM

Compound
- substance made up of atoms of two or more different elements joined by chemical bonds

Molecule
-group of atoms held together by chemical forces
- smallest unit of matter that can exist by itself and have all of a substance's chemical properties

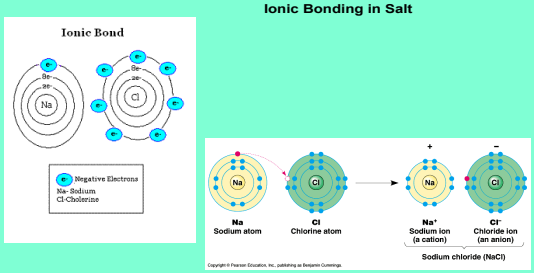
Chemical Bonds
-force that hold two or more elements together
-several types:

- Covalent Bond- *atoms that share an electron*
  -E not shared equally between elements results in one end of molecule with a negative charge, the other end has a positive charge
  -This is a Polar molecule
  EXAMPLE: Water (H_2O is a polar molecule)

- Ionic Bond- *atom loses/gains electrons to achieve a stable valence level*
  -results in a positive or negative charge
  - ION- a charged particle
  EXAMPLE: Table Salt (NaCl)

Oct 11-9:19 AM

Ionic Bonding in Salt



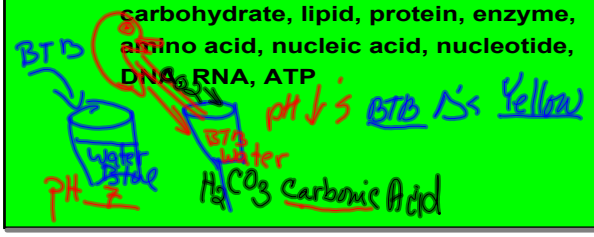
Oct 11-9:34 AM

TP: Students will explore the relationship of Water and pH to Acids & Bases through lab work analysis
10/15/12
LE1 & LE4

Do Now:
1. Explain why the BTB (bromothymol blue) changed color.
2. What is a solution?
Activity: Acid& Base Review sheet: complete for HW

Homeostasis

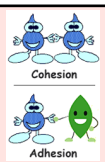
Homework
Vocab: solution, acid, base, pH, buffer, carbohydrate, lipid, protein, enzyme, amino acid, nucleic acid, nucleotide, DNA, RNA, ATP



Oct 15-9:10 AM

Properties of Water

Most of the unique properties of water result due to the weak hydrogen bonds between water molecules



- **Ice Floats**- frozen water has a crystal structuremwith empty space
  - Density of Ice (0.92 g/cm^3) is less than Water (1.0 g/cm^3)
- **Water absorbs & Retains Heat**- H bonds are made & broken, so water can absorb energy without changing temperature; also why it takes longer to cool
- **Water molecules stick to each other**- H bonds hold the molecules together like people holding hands in a crowd (**Cohesion**)
- **Water molecules stick to other polar molecules (Adhesion)**

Oct 15-9:19 AM

Solutions

Solution- a mixture in which ions or molecules of one or more substances are evenly distributed in another substance
- many substances are transported throughout living things as solutions of water
- dissolved substances can move more easily within & between cells
- Water is known as the universal Solvent, as it dissolves many substance but it does not dissolve nonpolar substances (Oils)

Acids & Bases
- Some water molecules break apart to form ions- Hydronium & Hydroxide ions-
- Hydronium ion = H_3O^+
- Hydroxide ion = OH^-
- In pure water these ions are present in equal number
- In Solutions, *some substances change the balance of these ions:*
- Acids are compounds that tend to form extra hydronium ions when dissolved in
  EX: Stomach acid - HCl- to dissolve food
- Bases are compounds that form extra hydroxide ions when dissolved in water
  EX: Drain Cleaner- Sodium Hydroxide- NaOH

pH H_2SO_4

$H_3O + OH = 2$ H_4O_8 H_2O

Oct 15-9:32 AM

Buffers

Definition:
substances that enable solutions to resist pH changes when an acid or base is added.

Importance:
Buffers are very important in helping organisms maintain a constant pH. (Maintain homeostasis)

All living things are water-based, which means that they must maintain liquids within themselves at a precise pH level.

Example: bicarbonate ion> HCO_3^-

What will bicarbonate tend to neutralize, an acid or a base?

Oct 3-11:25 PM

Importance of pH in Water

The pH of water determines the solubility & biological availability (amount that can be utilized by aquatic life) of chemical constituents such as
nutrients (phosphorus, nitrogen, and carbon) and
heavy metals (lead, copper, cadmium, etc.).

Example
In the case of heavy metals, the degree to which they are soluble determines their toxicity. Metals tend to be more toxic at lower pH because they are more soluble.

Example
Proteins work best in a neutral pH.
Basic or Acidic solutions denature proteins (change their shape) so they no longer work in living things

Oct 15-9:56 AM

Oct 15-9:14 PM