



The Chemistry of Life

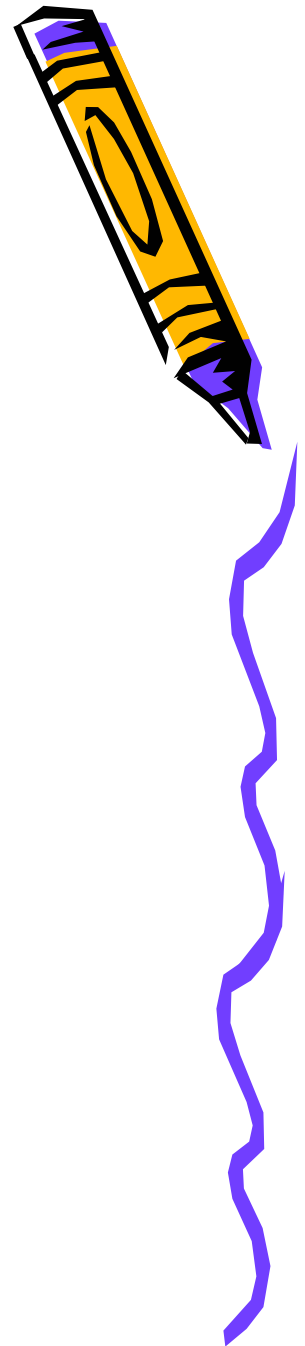
Everything that is known to mankind is made of very small parts called elements.

All of the elements that have been discovered are on the Periodic Table of the Elements.

The smallest structure that can still be identified as a specific element is an Atom



What makes up an atom?



An atom is made of two main areas:

- Nucleus

- The nucleus contains Protons and Neutrons.

- Proton is positively charged

- Neutron has no charge

- Electron Energy Levels

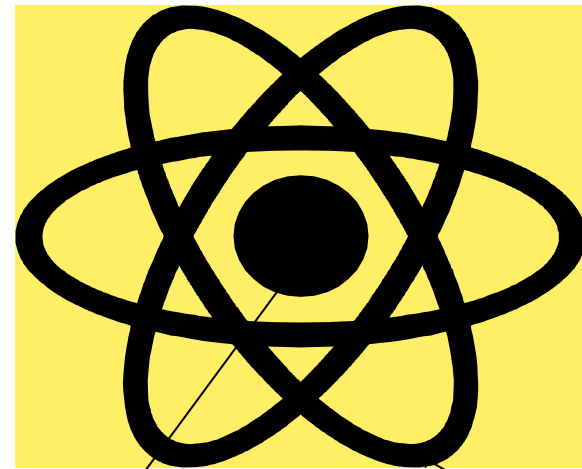
- hold the electrons.

- Electron is negatively charged



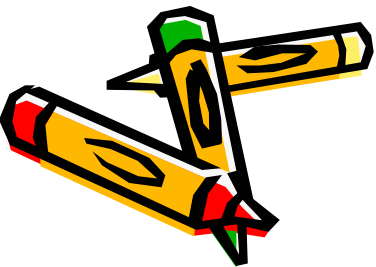
PARTICLES CONT.

- THE NUMBER OF PROTONS IN THE NUCLEUS OF AN ATOM IS EQUAL TO THE **ATOMIC NUMBER**
- EACH ELEMENT IS DIFFERENT



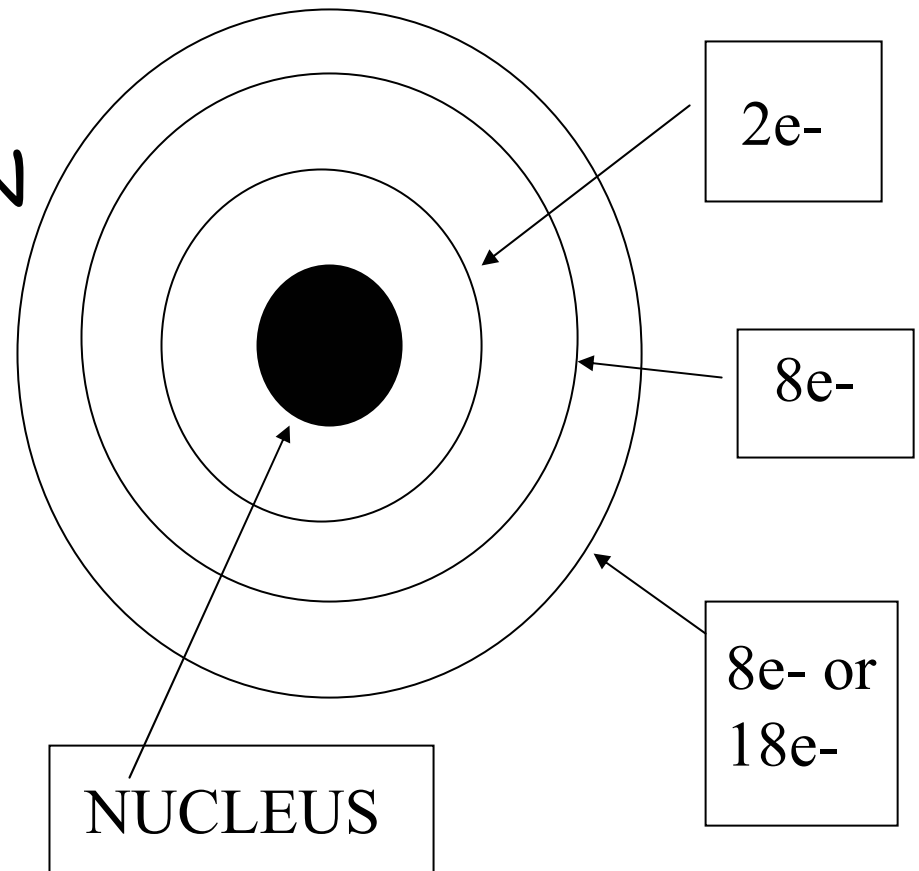
PROTONS AND
NEUTRONS

ELECTRONS



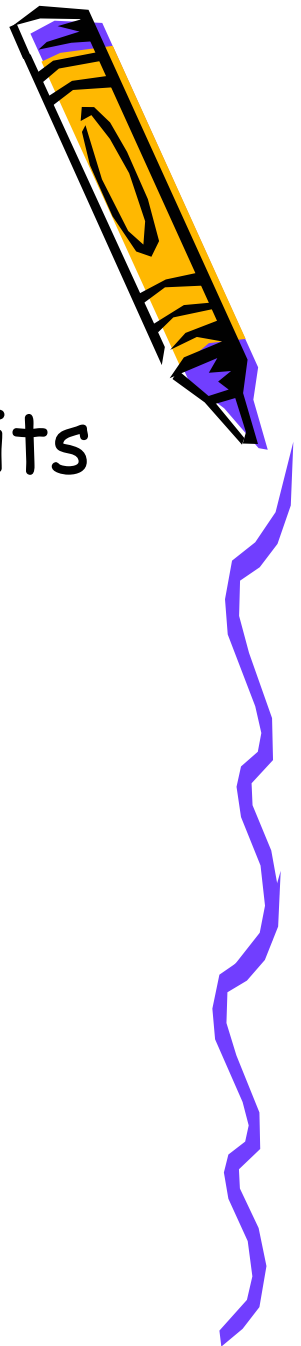
ELECTRON CLOUD

- ELECTRONS MOVE AROUND THE NUCLEUS IN A CLOUD
- THEY OCCUR IN DIFFERENT ENERGY LEVELS

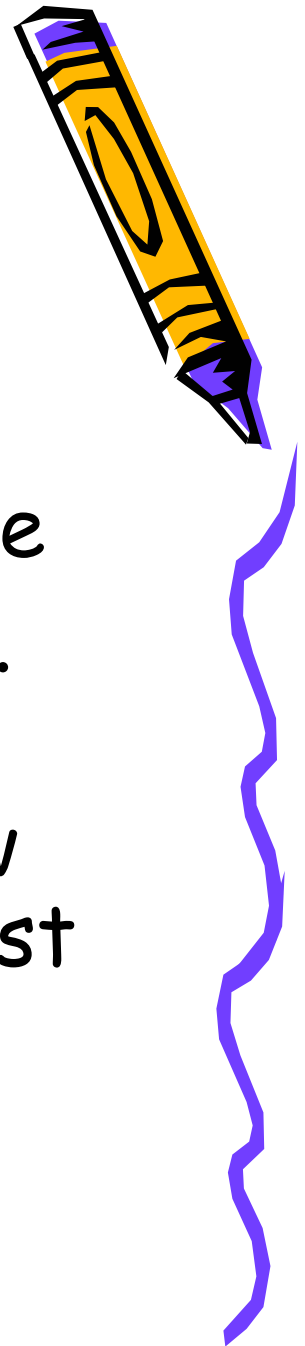


More on electrons....

- An atom is said to be stable when its outermost energy level is full.
- We know how many electrons an element has by looking at the Periodic Table...



How to figure out atomic particles

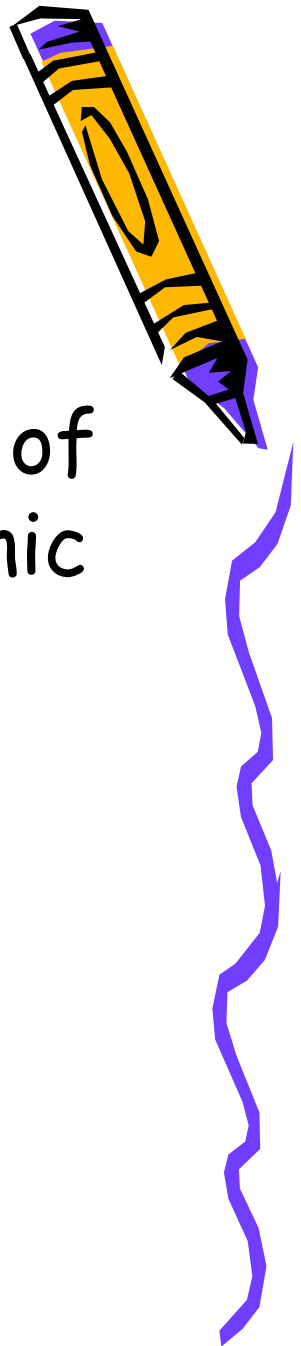


- The atomic number = # of Protons and under normal circumstance, the
- # of Protons = the # of Electrons.
- We can tell how an atom will bond with other atoms by looking at how many electrons are in the outermost energy level (valence electrons)

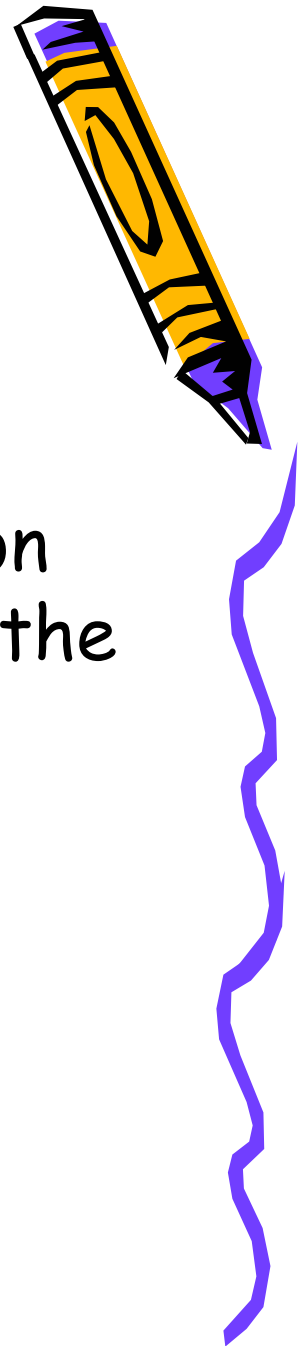


Combining of elements

- There are several different types of bonds. The first two are called Ionic and Covalent.
- Covalent bonds occur when two or more atoms will **SHARE** their electrons to complete their outermost energy levels



Bonding continued...

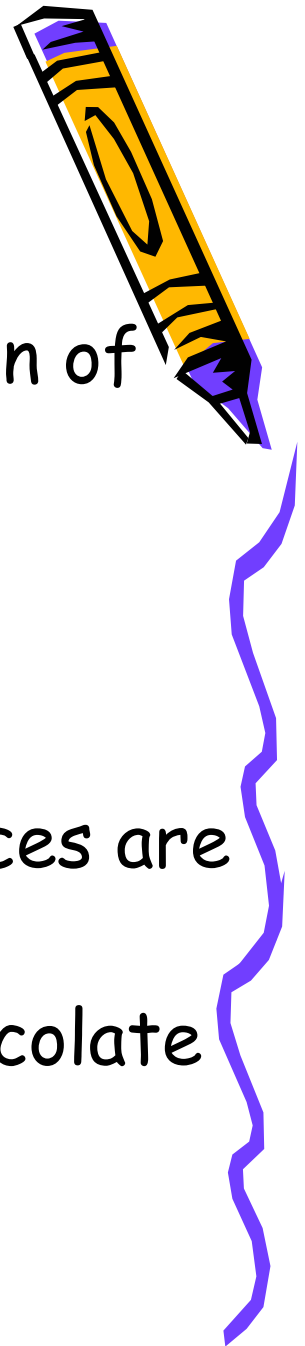


- Ionic Bonds however, do not share.
- One of the atoms will give up an electron and the other will take it away...leaving the two atoms electrically charged.
- This charge holds them together... remember opposites attract.
- Like Sodium and Chlorine



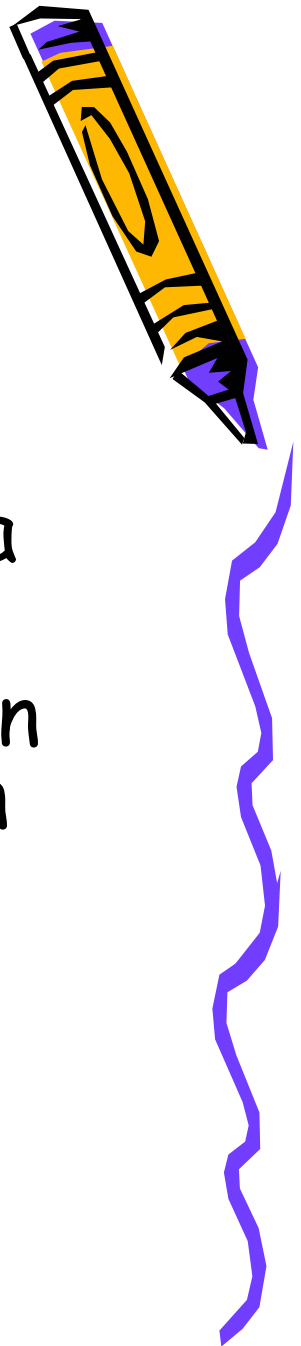
Mixtures Vs. Solutions

- A mixture is when you have a combination of more than one substance, but are not combined chemically...
- You can still see each of the different substances (like a salad)
- -A solution is when one or more substances are distributed evenly with one another...
- You cannot see each substance (like Chocolate Milk)



Water

- Water is called a polar molecule
- Polar Molecule: when there is an unequal distribution of charge in a molecule
- Water is polar because the oxygen pulls the electrons from hydrogen more than the hydrogen pulls...
- This gives water some pretty strange properties...



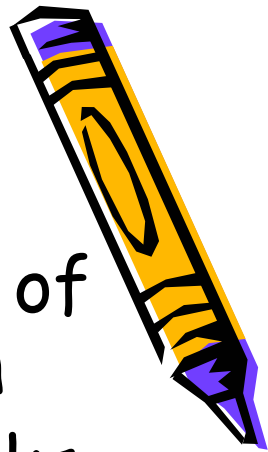
Water Continued...

- Water resists temperature changes
- Water expands when it freezes
- Water is "sticky"
- Because it is polar, the molecules are electrically attracted
- This means that they can hang onto one another.



Diffusion

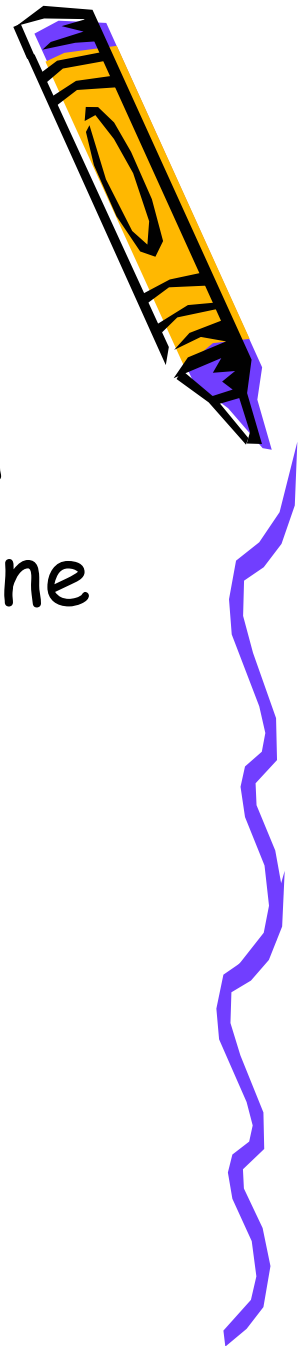
- The movement of molecules from areas of high concentration to low concentration
- Diffusion is a slow process and only works really well over short distances...
- (With enough time it can work over long distances though...lots of time...)
- Diffusion will continue until
- Dynamic Equilibrium occurs
- -This is when there is no difference in concentration.



- Remember: An atom is unstable unless its outermost energy level is full.
- To make an energy level full, most atoms need 8 electrons in the outer level.
- The element carbon has 4 valence electrons (outer most electrons).
- This means that carbon can bond with many different types of element to create a full energy level.
- In fact carbon is so great at making bonds that every known living thing uses carbon as its main ingredient. Even humans are carbon-based.



Types of compounds



- Polymers

Remember Legos? Small pieces that came together to create one large object...

That's a polymer. A polymer is when smaller molecules come together to make one large molecule.



Carbohydrates:

- A carbon-based (organic) compound made from hydrogen, oxygen and carbon.
- "Carbs" are used to store and release energy.
- Carbohydrates come in many forms, the smallest is the monosaccharide.
- Two monosaccharides can combine to create a disaccharide...
- Or many monosaccharides could come together to form a polysaccharide.
- Lipids
 - (A.K.A. Fats)
 - Cells use lipids for energy storage, insulation, and protective coatings.



Proteins

- A protein is a type of polymer that is made up of Amino Acids.
- Proteins are the building blocks for most of the structures in an organism.
- (Muscles, chemical reactions, regulation of the body systems)
- Enzymes are special proteins that can change the rate of reactions in the body.
- Enzymes are involved in almost every body process...from digestion to breathing



Nucleic Acids:

- Type of polymer made up of small units called nucleotides.
- Used to store vital cell information.
- DNA and RNA are types of nucleic acids

