

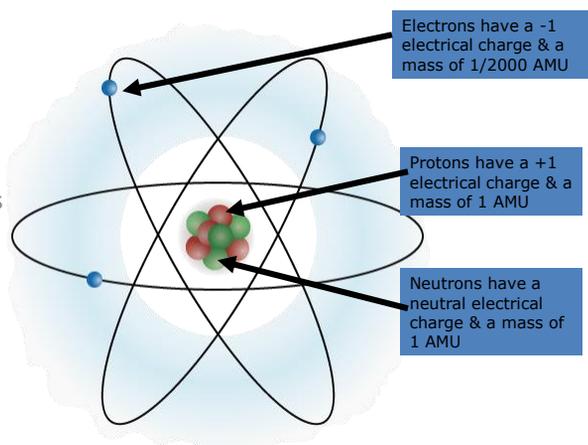
# Life Science

## Chapter 1 Part 2

### Chemical Compounds in Cells

Cells are the basic building blocks of all living things....

Atoms & Molecules are the basic building blocks of cells & all other matter.

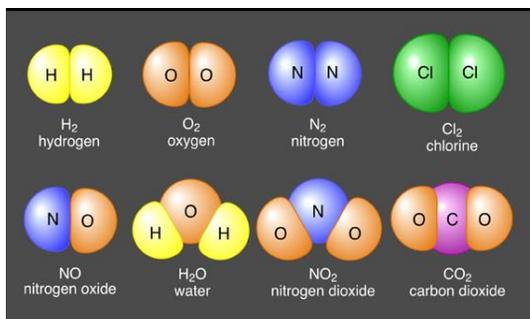


Atoms are composed of 3 basic subatomic particles....

Protons and Neutrons are in the nucleus w/ electrons orbiting the nucleus.

# Elements & Compounds

- **Element:** Substance composed entirely of one type of **ATOM**. About 100 different atoms are known to exist.
- **Compound:** Two or more elements combined chemically in a definite proportion forming a **Molecule**.

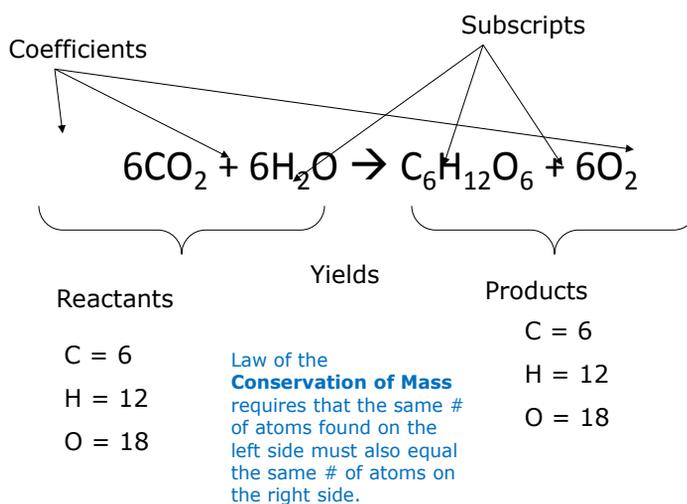


Atoms bind together w/ 2 basic types of bonds:

Ionic – atom “steals” electrons (ie NaCl) - metal + nonmetal

Covalent – atoms “share” electrons ie ( $C_6H_{12}O_6$ ) – 2 or more nonmetals

## Chemical Formulas



## Periodic Table

- **Atomic Number** – the total number of Protons in the nucleus
- **Atomic Mass** – The sum of protons & neutrons in an nucleus
- **Isotope** – types of an element w/ different #'s of neutrons in the nucleus.
- **Mole** – a type of unit used to measure atom numbers:  
 $6.02 \times 10^{23}$

**PERIODIC TABLE OF THE ELEMENTS**  
http://www.kj-qa.com/periodic/

**PERIODIC TABLE OF THE ELEMENTS**

GROUP: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

PERIOD: 1 2 3 4 5 6 7

RELATIVE ATOMIC MASS (A<sub>r</sub>)

GROUP IUPAC: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

GROUP CAS: IA IIA IIIA IVA VA VIA VIIA VIIIA

ATOMIC NUMBER: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

SYMBOL: H He

ELEMENT NAME: HYDROGEN HELIUM

Legend:

- Alkali metal
- Alkaline earth metal
- Transition metal
- Lanthanide
- Actinide
- Semimetal
- Nonmetal
- Chalcogen element
- Halogene element
- Noble gas

STANDARD STATE (25 °C, 101 kPa):

- Ne - gas
- Fe - solid
- Br - liquid
- Tc - synthetic

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For more information and downloads please visit - - - <http://www.periodni.com/en/download.html>

## Organic versus Inorganic

- **Inorganic Compounds** are those that do not contain carbon. (**NaCl**)
- **Organic Compounds**: Most compounds that contain **CARBON** are considered to be organic.
  - Ie:  $\text{CH}_4$ ,  $\text{C}_2\text{H}_2$ ,  $\text{C}_6\text{H}_{12}\text{O}_6$
  - **Exceptions** – these are inorganic  
not organic:
    - $\text{CO}_2$  (carbon dioxide gas)
    - $\text{CO}$  (carbon monoxide gas)

## 4 Types of Organic Molecules

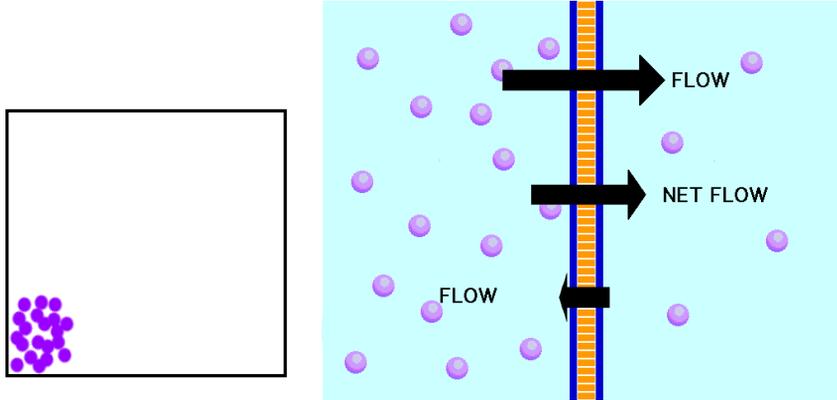
- **Carbohydrates:** and energy rich made of simple sugars & contain: Carbon, Hydrogen & Oxygen
  - Rice, pasta, starch, glucose & sugars
- **Proteins:** Large organic molecules made of amino acids & contain carbon, nitrogen, oxygen, hydrogen and sometimes sulfur.
  - Enzymes, meat, eggs, fish, muscle
- **Lipids:** Energy rich organic molecule made up of fatty acids & glycerides that contain carbon, hydrogen and oxygen. Contain more energy potential than carbohydrates.
  - Fats, oils & waxes
- **Nucleic Acids:** Very Large organic molecules that are made up of nucleotides & contain: carbon, nitrogen, oxygen, hydrogen and phosphorus.
  - DNA, rRNA, mRNA & tRNA

## Passive & Active Transport

- **Active transport:** requires energy to be expended by the cell. Often moving substances from low concentration to high concentration. Often uses “Transport Proteins” which grab molecules outside the cell and pull them inside the cell: example insulin requires a transport protein to enter the cell.
- **Passive Transport:** movement of substances w/out added energy
  - **Diffusion:** Movement of a substance from a higher concentration to that of a lower concentration.
  - **Osmosis:** diffusion of water molecules from a high concentration to a lower concentration

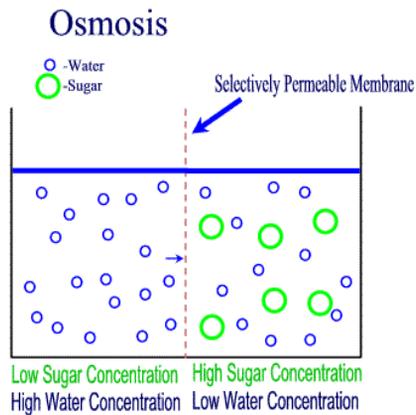
# Diffusion

- Movement of substance from an area of high concentration to low concentration.



# Osmosis

- The water molecules move across the membrane to try and equalize the concentrations of water on both sides of the membrane.



# Active Transport

- Moving substance from low [] to high [], requires the use of energy.

