

## Atoms and Molecules

(a) Atoms of an element      (b) Molecules of an element  
 (c) Molecules of a compound      (d) Mixture of elements and a compound

## Elements

- basic kind of matter (pure substance)
- there are 92 natural occurring elements on planet Earth

## Periodic Table of Elements

**Legend - click to find out more...**

- H - gas
- Li - solid
- Br - liquid
- Tc - synthetic
- Non-Metals
- Transition Metals
- Rare Earth Metals
- Halogens
- Alkali Metals
- Alkali Earth Metals
- Other Metals
- Inert Elements

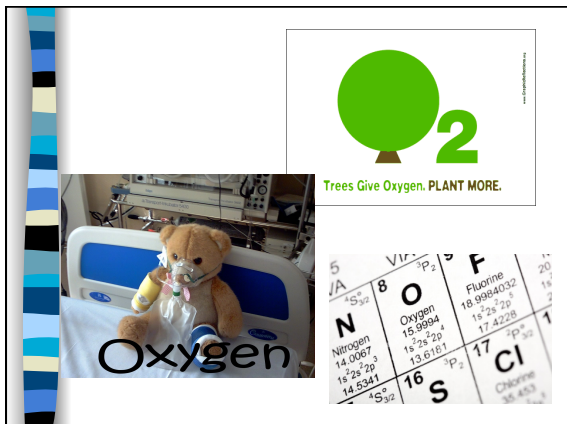
## Elements

- basic kind of matter (pure substance)
- there are 92 natural occurring elements on planet Earth
- 4 of the 92 elements make up 96% of your body
  - H - Hydrogen

**Periodic Table Entry for Hydrogen:**  
 1 IA      2 IIA  
 1 H Hydrogen 1.00794  
 1s  
 13.5984      4 P  
 2S<sup>1/2</sup>

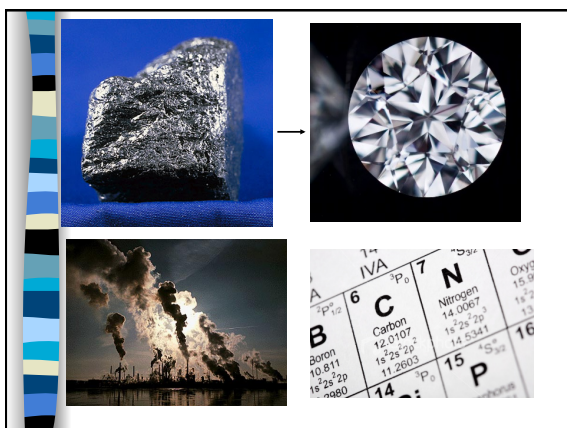
## Elements

- basic kind of matter (pure substance)
- there are 92 natural occurring elements on planet Earth
- 4 of the 92 elements make up 96% of your body
  - H - Hydrogen
  - O - Oxygen



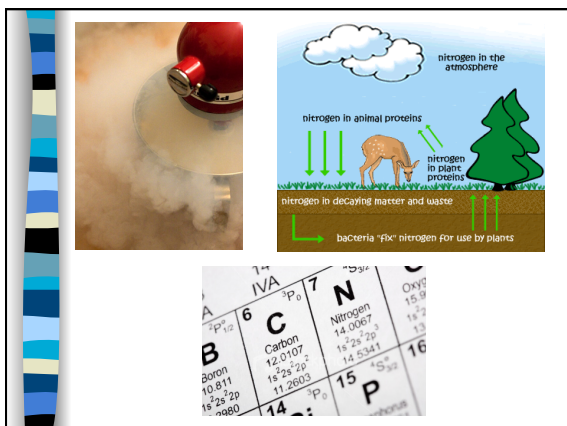
## Elements

- basic kind of matter (pure substance)
- there are 92 natural occurring elements on planet Earth
- 4 of the 92 elements make up 96% of your body
  - H – Hydrogen
  - O – Oxygen
  - C - Carbon




## Elements

- basic kind of matter (pure substance)
- there are 92 natural occurring elements on planet Earth
- 4 of the 92 elements make up 96% of your body
  - H – Hydrogen
  - O – Oxygen
  - C – Carbon
  - N - Nitrogen



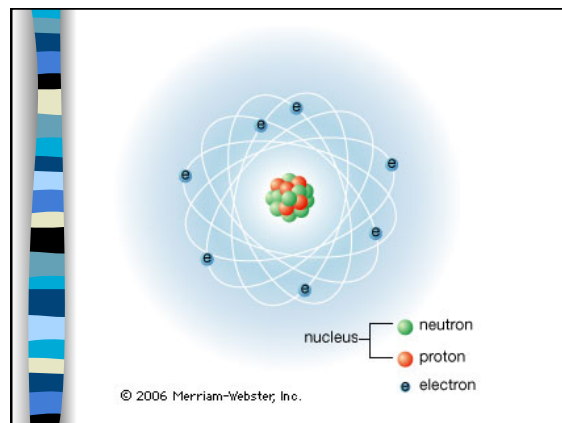
## Atom



- smallest unit of an element known to exist
- Every atom has a center (nucleus) composed of protons and neutrons.

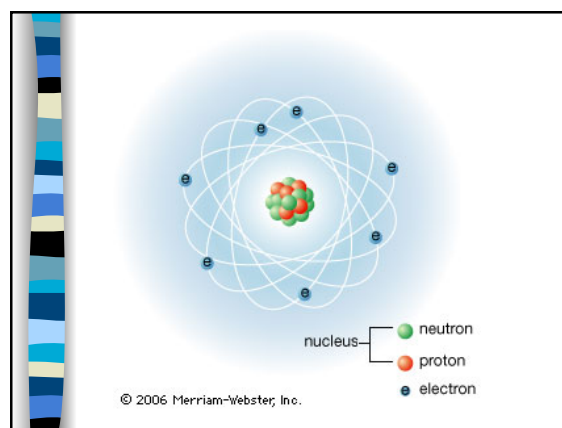
## Proton

- Positive charge (+)
- The number of protons determines what atom it is
- The number of protons in the same element are always the same
- Found in nucleus of atom



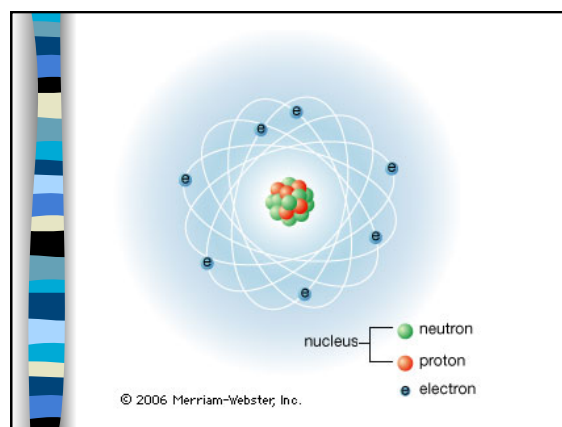
## Neutrons

- Neutral charge
- Found in nucleus of atom



## Electron

- negative charge
- Orbits nucleus at high speeds
  - $3.00 \times 10^8$  m/s



## Atomic Number

- number of protons
- number of protons tells its position on the periodic table
- number of protons = number of electrons

## Periodic Table of Elements

Legend - click to find out more...

- H - gas
- Li - solid
- Br - liquid
- Tc - synthetic
- Non-Metals
- Transition Metals
- Rare Earth Metals
- Halogens
- Alkali Metals
- Alkali Earth Metals
- Other Metals
- Inert Elements

## Atomic Mass (weight)

- Number of protons and neutrons

40 amu

↑  
ALKALI METALS

## Atomic Mass (weight)

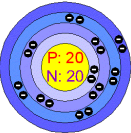
- Number of protons and neutrons

40 amu                  23 amu

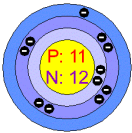
↑  
ALKALI METALS

## Atomic Mass (weight)

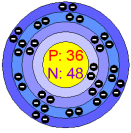
- Number of protons and neutrons



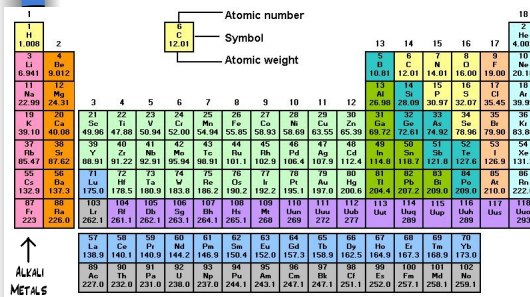
40 amu



23 amu

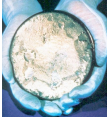


84 amu



↑  
ALKALI METALS

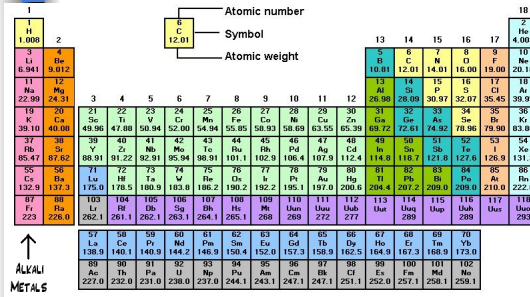
## Isotope



- Atoms with the same number of protons, but different number of neutrons

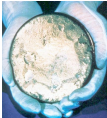
Uranium-235

Uranium-238



↑  
ALKALI METALS

## Isotope



- Atoms with the same number of protons, but different number of neutrons

Uranium-235

92 protons

143 neutrons

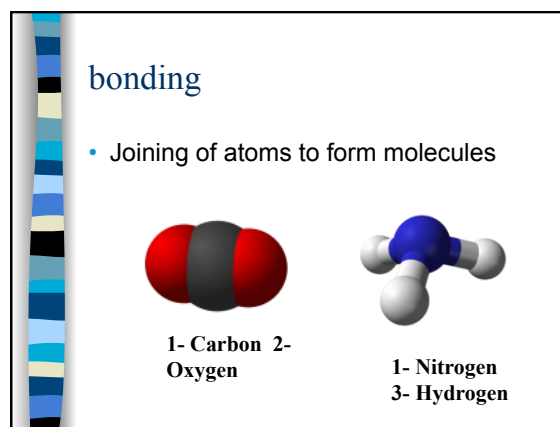
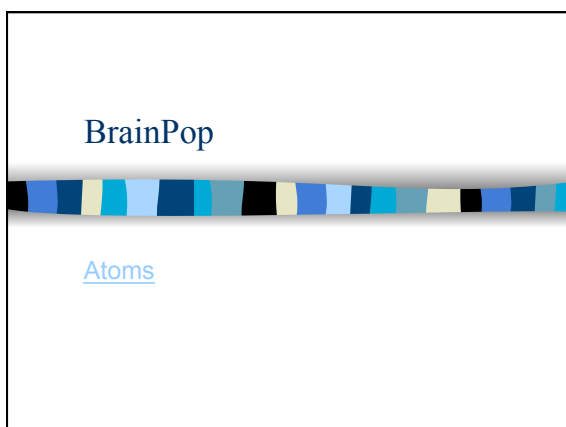
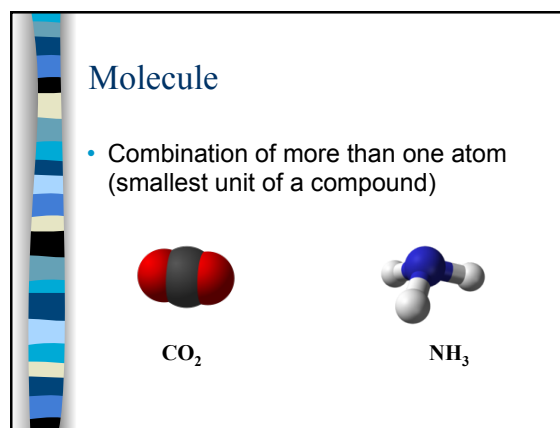
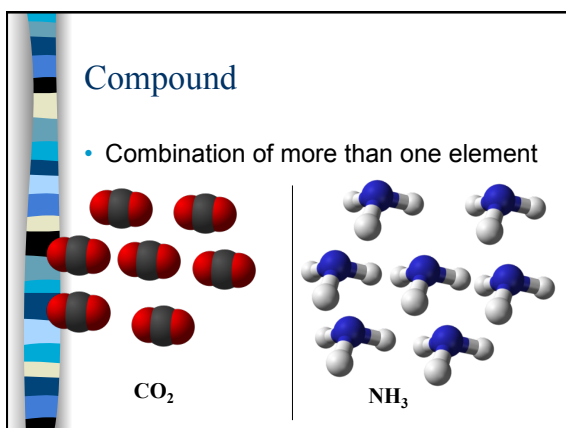
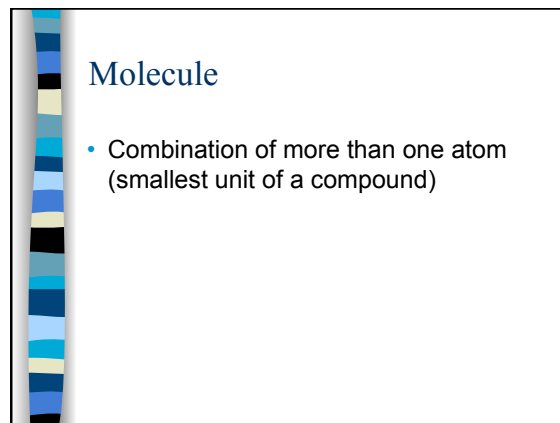
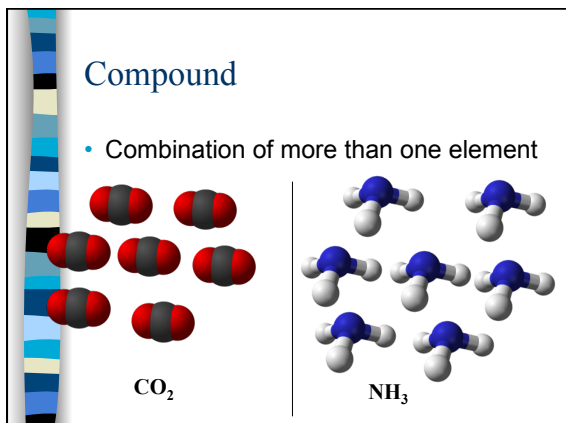
Uranium-238

92 protons

146 neutrons

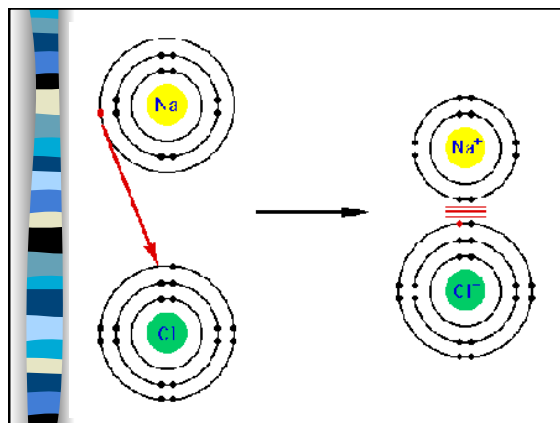
## BrainPop

### Isotopes



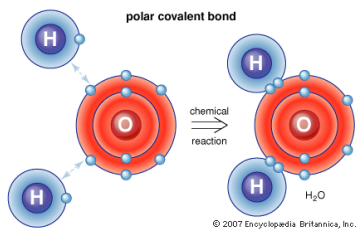
## Ionic Bonding

- Transferring or joining of electrons between atoms
  - One loses electrons, the other gains electrons



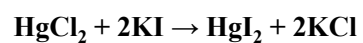
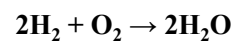
## Covalent Bonding

- Sharing of electrons between atoms



## Chemical Reaction

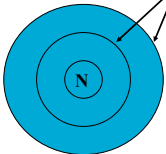
- Involve electron bonding with the rearrangement of atoms
- Always get something new



**Sulfuric acid  
and sugar →  
carbon and  
steam**

## Octet Rule

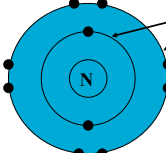
\*Electrons in rings or orbits (almost weightless)



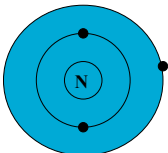
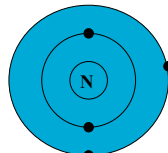
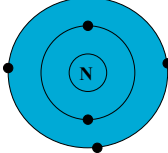
\*In a neutral atom, number of electrons = number of protons

\*electrons fill the 1<sup>st</sup> shell (closest to nucleus) with a max of 2e- and a max of 8e- in every shell thereafter

\*If outside shell of an atom is not full, then it's not stable (happy) because it wants 8 electrons

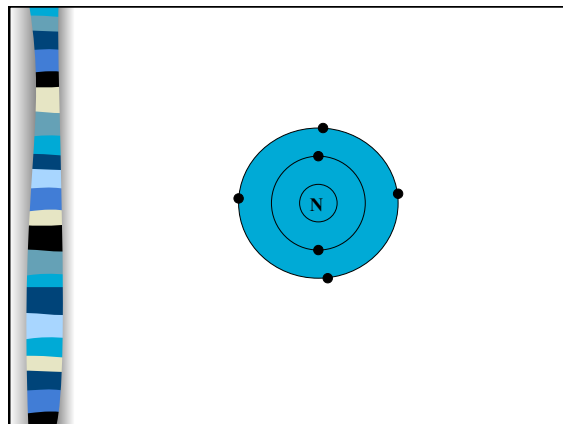
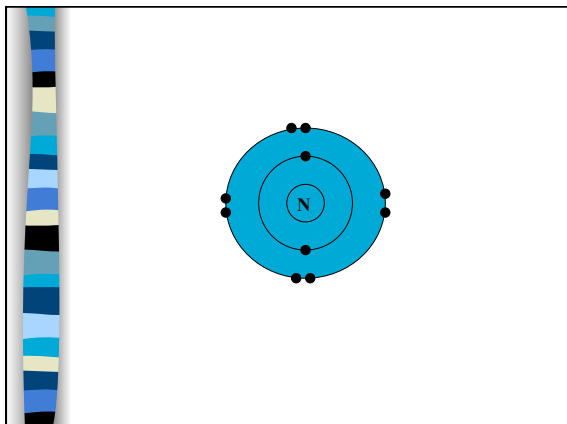


**\*if there are 1, 2, or 3 electrons in outer shell, the atom will give up the electrons, giving it positive charges**

**\*if there are 1, 2, or 3 electrons in outer shell, the atom will give up the electrons, giving it positive charges**

**\*if there are 4 electrons in outer shell, it can give them up, gain them, or share them.**



\*if there are 1, 2, or 3 electrons in outer shell, the atom will give up the electrons, giving it positive charges

\*if there are 4 electrons in outer shell, it can give them up, lose them, or share them.

\*if there are 5, 6, or 7 electrons in outer shell, the atom will take electrons from another to make a full outer shell, this will give it a negative charge

