

Modern Atomic Theory

- John Dalton proposed that matter was made up of atoms
- Matter can be broken into pure substances
 - elements are made up of small particles called atoms
 - compounds are made up of elements that are combined together in a way so that it has new properties
 - mixtures are elements combined together in a way so that the properties of the elements are retained

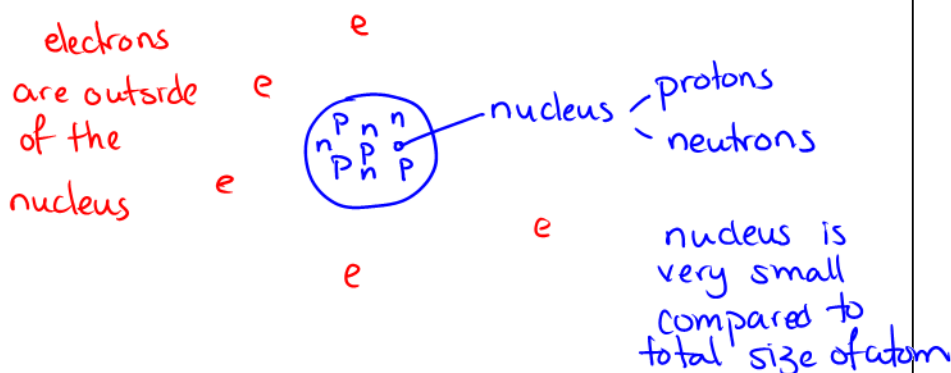
matter is "stuff"

Sodium is an element
Chlorine is an element

Sodium chloride is a compound that is very different from the elements

Structure of the Atom

- Atoms are composed of 3 different subatomic particles.
These can be placed in 2 different places in the atom:



Particle	Symbol	Electric Charge	Location	Mass
proton	p	+	nucleus	1 amu
neutron	n	0	nucleus	1 amu
electron	e	-	outside	0

amu: atomic mass unit

The Periodic Table

atomic number - # of protons in nucleus, - # of electrons before any chemical reaction

chemical symbol

common ion charge

other ion charge

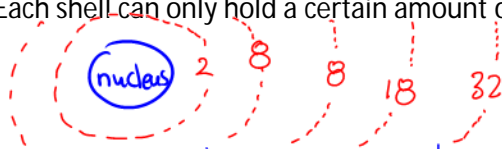
chemical name

relative atomic mass - round this to nearest whole number => atomic mass

atomic mass
- # of p + n
 $26 + n = 56$
 $n = 30$

Bohr Model of the Atom (solar system model)

- Electrons are arranged in energy shells like orbits
- Each shell can only hold a certain amount of electrons



- The valence shell is the outermost electron shell
- Electrons in this valence shell are called valence electrons, and are the only electrons that can be given away or shared with other atoms to create chemical compounds

Sodium atom

atomic # = 11

atomic mass = 23



the valence shell contains 1 electron.

Organization of the Periodic Table (<http://bit.ly/1tfkSRL>)

- Dmitri Mendeleev discovered that atoms had properties that were periodic or repeated in patterns
- He arranged these into the periodic table of elements
- Rows are called periods and are arranged by increasing atomic number
 - metals are on the left side of the table
 - nonmetals are on the right side.
 - metalloids form a staircase between metals and non-metals
- Columns are called periods or families and elements in the same column/family have similar chemical properties.

Properties of Families in the Periodic Table

- Group 1 is called the alkali metals. These are very reactive elements.
- Group 2 are called alkali earth metals, and are somewhat reactive
- Group 17 are called halogens. These non-metals are very reactive
- Group 18 are called the noble gases. They do not react with anything
- Group 3-12 are called transition metals and include elements that we are familiar with as metals

Group 1 and 17 are very reactive because their valence shells are very close to being full or empty.