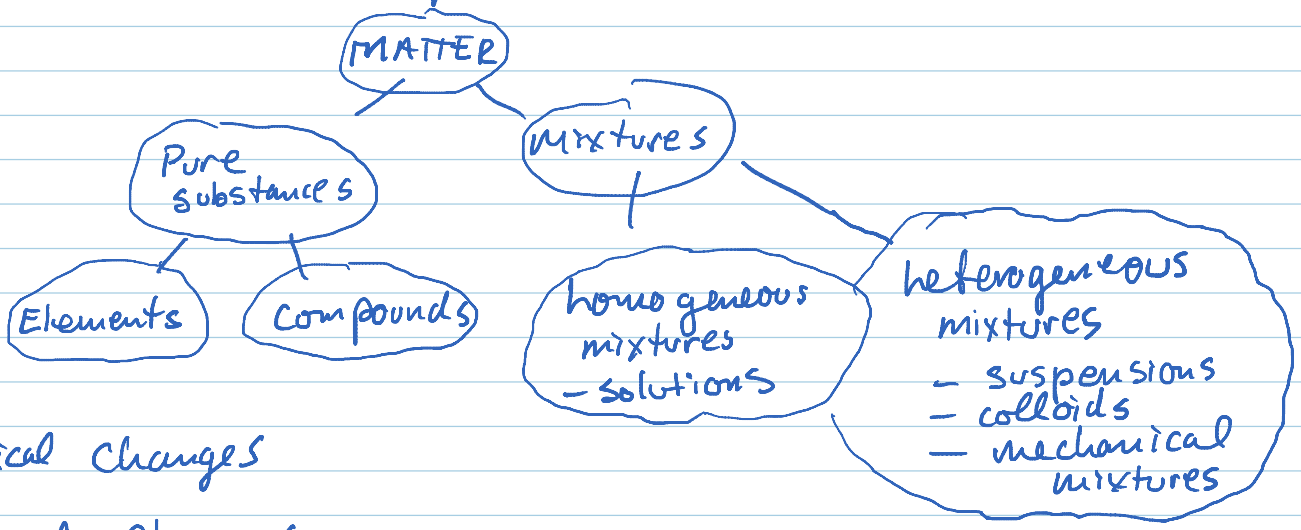
CHEMISTRY TOPICS

Friday, January 16, 2015
9:32 AM

Physical and Chemical Properties



Chemical Changes

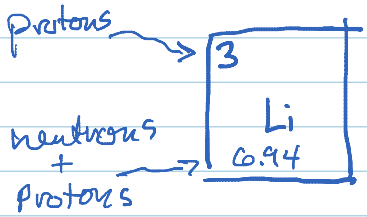
Physical Changes

History of the atom

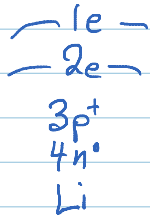
- Dalton - Billiard Ball
- Lavoisier - Law of conservation of mass
- JJ Thompson - electrons - Plum pudding / Raisin Bun
- Rutherford - nucleus - solar system model
- Bohr - specific electron energy levels
- Quantum Mechanics - electron probability "clouds"

Structure of the atom

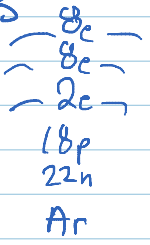
- Isotopes
  - same # p^+
  - diff # n°



- Bohr electron level diagrams
  - Neutral atoms: # p^+ = # n°



VALENCE SHELL



Octet Rule
↳ atoms are most stable with a complete valence shell.

- Ions - Gain or lose electrons to achieve

Net charge = $(17p^+) + (18e^-) = -1$

18 n°
17 p+
Cl^-
chloride

CATIONS are PAWSitive
ANIONS are negative

PERIODIC TABLE

- Metals
  - conduct electricity
  - form cations
- Non-metals
  - don't conduct electricity (except C)
  - form anions

- Alkali Metals
- Alkaline earth metals
- Metalloids
- Halogens
- Noble Gases

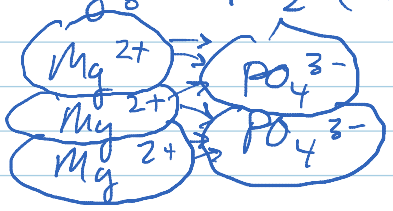
columns = groups (families)
Rows = periods

IONIC COMPOUNDS

- solid at room temp
- some soluble
  - ⇒ all ionic solutions are ELECTROLYTES

Cation + Anion

$Mg_3(PO_4)_2(aq)$



electrons are permanently transfered

⇒ Crystal Lattice... NOT molecules

- Don't use prefixes in names

Acids
e.g. $H_2SO_4(aq)$
↑ start with hydrogen
↑ aqueous solutions

Bases
$Ca(OH)(aq)$
↑ Contain hydroxide

ide → hydro_ic
ate → ___ic
ite → ___ous

pH 0 – 6.9 | Neutral 7 | 7.1 – 14

Sour | Bitter

Litmus red | Blue

	Sour	Bitter
Litmus	red	Blue
Bromothymol blue	yellow	Blue
Phenol phthelein	colourless	Pink

- React with metals to form $H_2(g)$

MOLECULAR COMPOUNDS

- Composed of only NON METALS
- Covalent bonds (sharing electrons)
- Solutions don't conduct electricity (non-electrolytes)
- (s), (l) or (g) at room temperature

Naming – Prefixes

di phosphorous penta oxide
2 5

P_2O_5

Common Names to memorize

ammonia - NH_3
hydrogen peroxide – H_2O_2
ethanol – CH_3CH_2OH
methanol – CH_3OH
glucose – $C_6H_{12}O_6$
sucrose – $C_{12}H_{22}O_{11}$
propane = C_3H_8
methane – CH_4

Polyatomic Elements

H_2
O_2
Cl_2
F_2
P_4
S_8
I_2 etc

Chemical Reactions
- Signs of chemical change
- Endothermic

- Exothermic

5 Reaction Types

1) Formation (COMPOSITION)

Element + Element → Compound

$1\,S_{8(s)} + 8\,O_{2(g)} \rightarrow 8\,SO_2$

$1\,S_{8(s)} + 16\,Na_{(s)} \rightarrow 8\,Na_2S_{(s)}$

Na^+ Na^+ S^{2-}

2) Deformation (DECOMPOSITION)

Compound → Element + Element

$C_6H_{12}O_6 \rightarrow 6\,C + 6\,H_2 + 3\,O_2$

3) Single Replacement

Compound + Element → New Compound + New Element

$Ca_3N_2 + 2Al \rightarrow 3Ca + 2AlN$

Al^{3+} N^{3-}

4) Double Replacement.

5) Hydrocarbon Combustion

MOLES

$n = \frac{m}{M}$

n: moles

m: mass (g)

M: molar mass (g/mol)

C
12.01