Periodic Table

- Table arrangement:
  1) Properties by Henry Mosely
  ★ 2) Mendeleev - atomic masses
  3) Modern Table - atomic number (# of p

Groups	vs.	Periods
#1-18		#1-7
vertical		horizontal
- all elements have same # of valence e⁻		- all elements have same # of energy levels

ex.) Boron
3 - valence e⁻
2 energy levels

Generals

Metals

~80% of table is Metals (left side)

- shiny
- good conductors
- malleable
- ductile
- high m.p. & b.p.
- all are solids except for 1 liquid = Hg

Metalloids

B
Si
Ge As
Sb Te
Po At

stairstep line

- separate Metals from non-metals
- act like Metal or non-metal depending

Non-metals

right side of table

- dull
- poor conductor
- brittle
- soft
- low m.p./b.p.
- gases, solids & liquids

1 liquid only = Br

Group 1 - alkali Metals

- most reactive metal group Li → Fr
  ★ Hydrogen is NOT included in this group
- all have 1 valence e⁻ which is easily lost
- reactivity increases down this group

MOST Metallic element is Francium (Fr) lower left

Group 2 - Alkaline Earth Metals

- all have 2 valence e⁻
- somewhat reactive
- ~~comp~~ commonly found in compounds rather than alone Ca vs. $CaCl_2$

Groups 3-12 - Transition Metals

- relatively stable/unreactive

★★ used in compounds to produce colorful solutions ★★

- purples/blues/reds/yellows = solutions

Group 17 - Halogens (non-metals)

- all have 7 valence electrons
  (1 more to achieve octet)
- most reactive non-metal group F → At
  - reactivity decreases going down group
- all phases of matter in this group
  gas = F, Cl liquid = Br solid = I, At

Group 18- Noble Gases

- don't react /inert/ no chemical reactivity due to octet
  - ↳ 8 valence e⁻ or a filled valence energy level

* all are gases @STP

Periodic Law & Trends

↳ properties of elements are a function of their atomic number that is ~~reap~~ repeating pattern as you read L→R

↳ atomic radius, ionization energy & electronegativity

Atomic Radius (size of the atom)

- across L→R the size decreases due to increasing nuclear charge (# of p^+) attracting/pulling in electrons closer to nucleus

- down T→B the size increase due to increase in the number of energy levels

Ionization energy - energy needed to remove an electron from an atom

[metals form + charge = lose
non-metals form - charge = gain]

- across L→R the IE increases due to increasing nuclear charge attracting/pulling the electrons closer to nucleus
- down the IE decreases because electro are placed in energy levels farther from the nucleus with shielding from inner e-

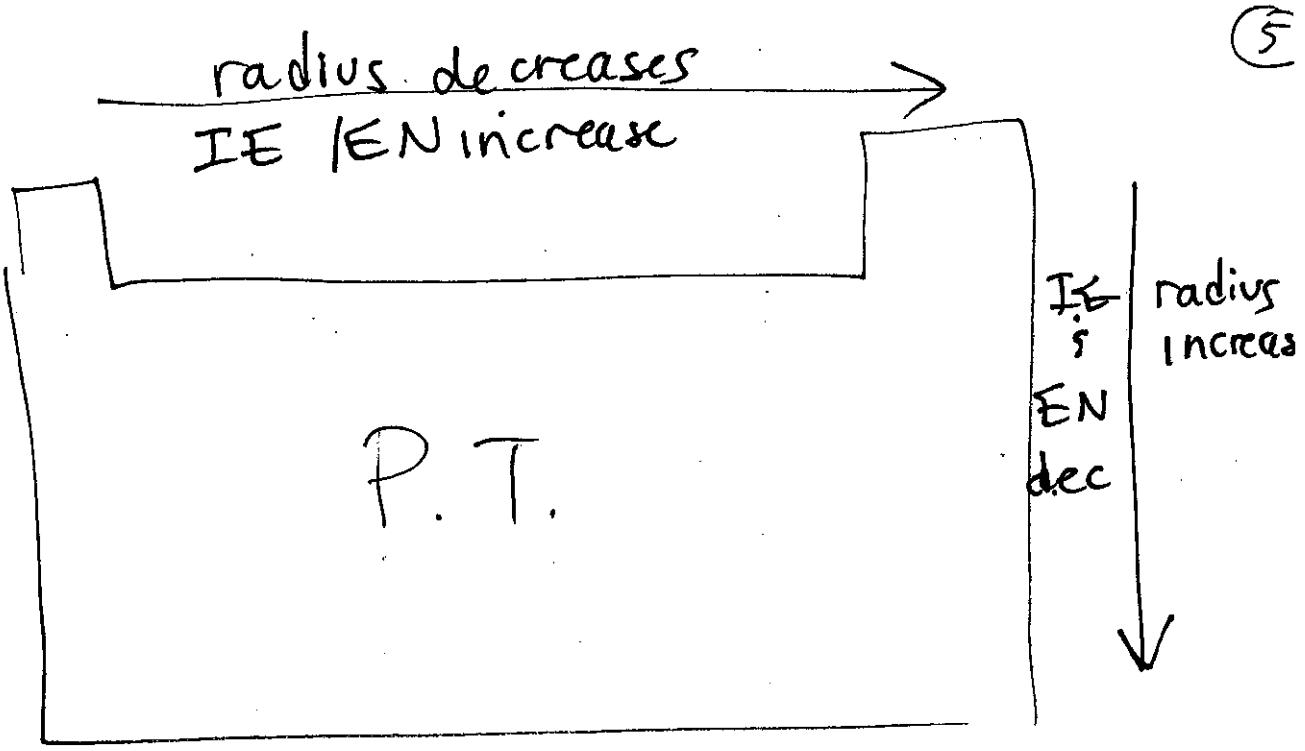
Electronegativity ≡ Attraction for e-

0 - 4.0

↑ poor attraction

↑ great attraction

- across the table EN increases due to an increasing nuclear charge
- down the table EN decreases due to increasing # of energy levels

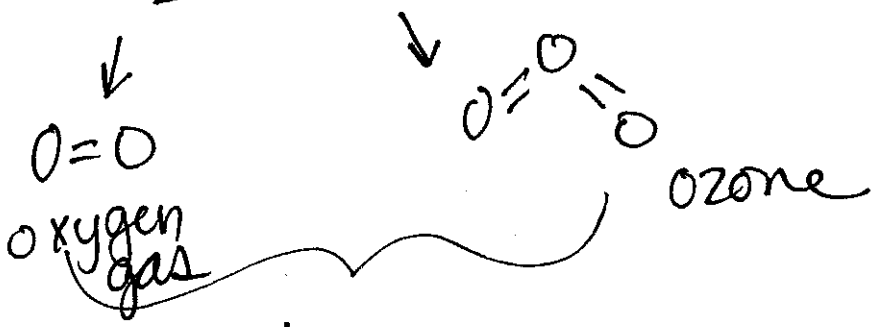


Misc :

allotropes ex. C-12 vs. C-14

same element but different molecular structures leads to different properties

O_2 vs. O_3



molecular structure change properties

allotropes