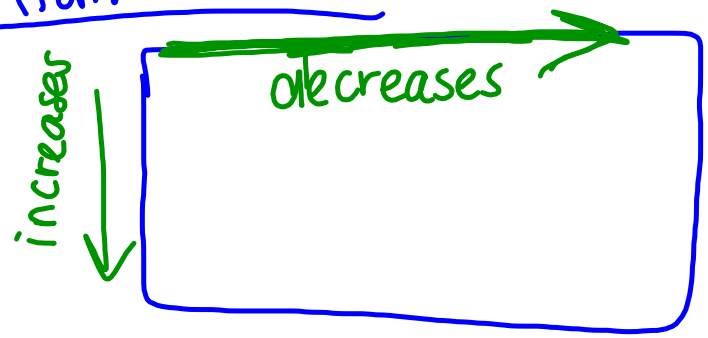
- Mendeleev
  - father of Periodic Table
  - ordered elements in order of increasing atomic mass
- Moseley
  - ordered elements by increasing atomic #
  - created the Modern P.T. (what we use today)
- Representative elements - groups 1, 2, 13-18
- Transition elements - groups 3-12
- Periodic Law
  - when arranged by atomic #, the elements show a repeating + predictable pattern in properties
- Period # = how many energy levels/shells the elements have

  ex) All elements in period 2 have 2 energy levels OR the valence e- are in the 2nd energy level
- Elements in the same group have the same # of valence electrons, so similar chemical properties.
- 2-8-2 (how many e- are in the shell)
  - 1st shell, 2nd shell, 3rd shell
  - Period 3 (3 energy levels)
  - Group 2 (2 valence e-)

metals	nonmetals	metalloids
· left of stairs · conductors · luster/shiny · malleable · ductile (can be made into wire)	· right of stairs · nonconductors · dull · brittle (breaks if hit)	· on staircase, except Al + Po (metals) · mix of metallic + nonmetallic properties

- States of Matter
  - most elements are solid
  - Hg (mercury) is the only liquid metal
  - Br (bromine) is the only liquid nonmetal
  - Group 18 (Noble Gases) are all gases.
  - Other gases: $N_2 Cl_2 H_2 O_2 F_2$
    (~~Br~~ ~~I~~ N Cl H O F w/o Br + I)

- Atomic Radius:

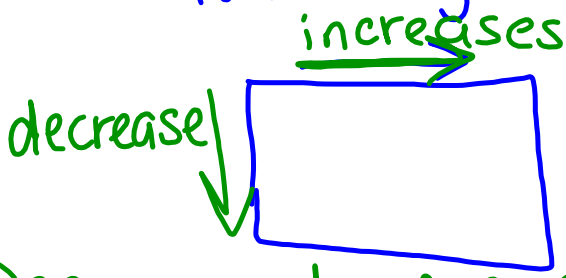


- increases down a group b/c # of shells/energy levels ↑.
- decreases across a period b/c same # of shells, but nuclear charge ↑, attracting the electrons in tighter + making atom smaller

Ionization Energy

↳ energy required to remove an electron

- high = difficult to remove
- low = easy to remove

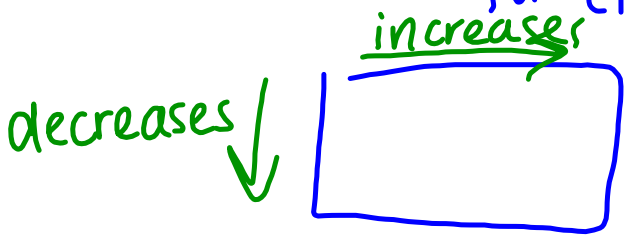


- Decreases down a group b/c the added energy levels reduce the attraction between the nucleus + outer electrons.

Shielding effect

- increases across a period b/c same # of energy levels, but nuclear charge ↑, so there is a stronger attraction between nucleus & outer electrons.

Electronegativity - an atom's attraction for electrons



- Decreases down a group b/c the added energy levels weaken the attraction between the nucleus and outer e-
- Increases across a period b/c nuclear charge increases, so there's a stronger attraction between nucleus & outer e-

· Ionic Radius:
(element w/ a charge)

- Metals tend to lose e- and form positive ions (cation)
  - cations are smaller than the neutral atom

ex) Li^+ is smaller than Li

- Nonmetals tend to gain e- and form negative ions (anions)
  - anions are bigger than the neutral atom

ex) O^{2-} is bigger than O.