# Periodic Table:

**Trends:**

- atomic radius:
    - increases ▲ going down
        - \* WHY: b/c more energy levels, therefore it gets bigger
    - decreases ▼ going across
        - \* WHY: b/c protons are being added to nucleus which is making the pull from the nucleus stronger, since no electrons are added.
- Ionization energy:
    - increases going across
        - \* radii smaller, nuclear charge increases, therefore more energy is required to pull off electrons.
    - decreases going down
        - \* atomic radii increase, the pull is minimum therefore the nuclear charge is weaker and the IE, is lower.
- nuclear charge:
    - increases going down and across
- shielding effect:
    - increases going down
    - stays constant across the table
- electron affinity:
    - decreases going down
    - increases going across
- electronegativity:
    - decreases going down
    - increases going across

**mass spectrometry:**

the most accurate method of determining the atomic masses of isotopes. One determines the relative abundance of the isotopes of the element and their isotopic masses and then the mean of these is the atomic mass.

STEPS: 1. **Vaporization**          **\* Volcanoes In Australia Don't Detonate**
2. **Ionization**
3. **Acceleration**
4**. Deflection**
5. **Detection**

1. convert into a gas
2. bombard it with electrons and take away the valence electrons, converting them into gaseous ions.
3. acceleration = force / mass
4. the smaller the mass the greater the deflection
5. the greater the charge, the greater the deflection
6. deflected by using an electric field or magnetic field

**purpose:** to determine the %age abundance of isotopes.

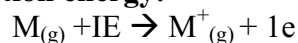RAM: relative atomic mass of an atom compared to the atomic mass of carbon 12.

EX: with Rubidium 85 being 5.8 cm long and Rubidium 87 being 2.2 cm long

$$\% \ ^{85}Rb = \frac{5.8}{8.0} \ x \ 100 = 72.5\%$$

$$\% \ ^{87}Rb = \frac{2.2}{8.0} \ x \ 100 = 27.5\%$$

RAM = 72.5%(85) + 27.5%(87)

= 85.51 amu

**Ionization energy:**

$M_{(g)} + IE \rightarrow M^+_{(g)} + 1e$

- the first ionization energy needed to remove the first electron.
- Low IE indicates that electron is easily lost. ALAKALI metals (group 1)
- High IE = inert gases (group viii)
- Factors that affect IE
  - o Nuclear charge
  - o Radius
  - o Sublever
  - o Half filled shells ( are more stable than other fractions)

**Electron affinity:**

$X_{(g)} + e^{-1} \rightarrow X_{(g)}^{-1}$ + energy.
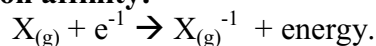
- energy released when an electron is added to a neutral atom
- 1$^{st}$ is always exothermic
- 2$^{nd}$ always endothermic b/c adding electron to an energy level where already there are electrons so therefore causes repulsion ns energy is needed.
- energy released b/c electron is added and so now is more stable
- highest electron affinities: group 4 and 6
- lowest: 1 and 2

**Electronegativity:**

- a measure of the attraction of an atom for the electrons in the bond bw itself and another atom.
- Most EL: is fluorine
- Noble gases have no electronegativity values
- Dipole moment: difference in electronegativity measured in units of debye
- Covalent          0-0.6
- Polar covalent    0.6-1.6
- Ionic bonds       >1.6They have to