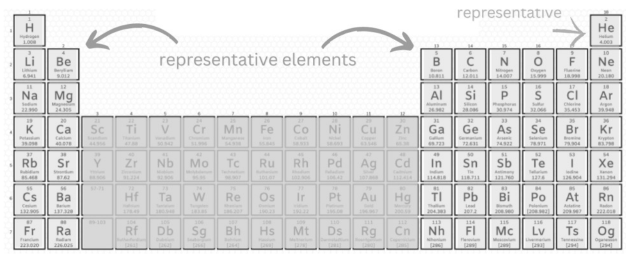
Periodic Blocks



Representative Elements

Elements that lose (*cation, +*) or gain (*anion, -*) a fixed number of valence electrons (val e^-)

Representative Metals

Groups 1A (1), 2A (2), and Al
Lose a fixed number of electrons

Representative Non-Metals

Groups 4A, 5A, 6A, 7A, and 8A
(*Above Zig-Zag Line*)
Gain a fixed number of electrons

Metalloids

B, Si, Ge, As, Sb, Te, Po, At (*Zig Zag Line*)
Can lose (*cation, +*) or gain (*anion, -*) electrons (e^-)

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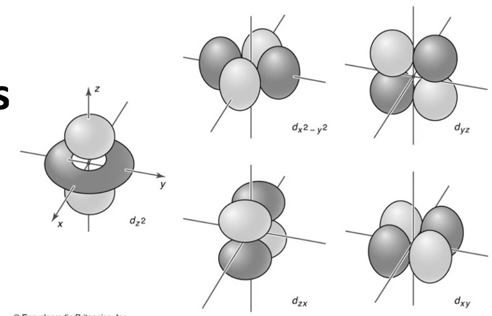
Subatomic Particles

Transition Metals and d-orbitals

Transition metals have electrons that sit right below the valance electrons (*s and p orbitals*) and can act like valence electrons and be lost to obey the octet rule (*8 valence e^-*)

Elements in the center of the transition metals (3B – 6B) can often form 4 or more different ions, while a few only form a single ion (*like Vanadium, 1B, +3 ion*)



D-Orbital Set

10 electrons in 5 d sub orbitals
d_{xy}, d_{yz}, d_{zx}, d_{z^2}, $d_{x^2-y^2}$

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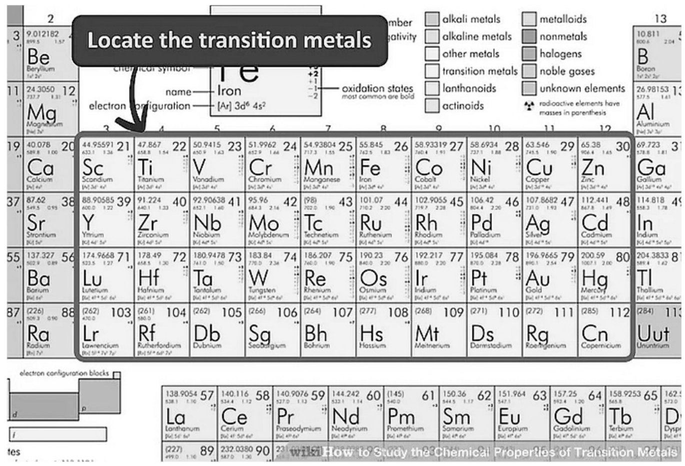
Periodic Blocks

Transition Elements

Elements in the *b groups* on the periodic table

The following elements below the zig-zag line are commonly also considered transition elements

3A (13): In, Tl
4A (14): Sn, Pb
5A (15): Bi



Transition Elements

Groups 1B (3) – 10B (12)

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Periodic Blocks

Rare Earth Elements

Elements in the very bottom (*extended table, center*) of the table. Rare Earth elements are commonly unstable with no or few stable *isotopes*. These elements are common in nuclear radiation (*U, Pu, Ac, Ce, etc.*)

Lanthanide Series	57 La 138.905 Lanthanum	58 Ce 140.116 Cerium	59 Pr 140.908 Praseodymium	60 Nd 144.242 Neodymium	61 Pm (145) Promethium	62 Sm 150.36 Samarium	63 Eu 151.964 Europium	64 Gd 157.25 Gadolinium	65 Tb 158.925 Terbium	66 Dy 162.500 Dysprosium	67 Ho 164.930 Holmium	68 Er 167.259 Erbium	69 Tm 168.934 Thulium	70 Yb 173.045 Ytterbium	71 Lu 174.967 Lutetium
Actinide Series	89 Ac (227) Actinium	90 Th 232.038 Thorium	91 Pa 231.036 Protactinium	92 U 238.029 Uranium	93 Np (237) Neptunium	94 Pu (244) Plutonium	95 Am (243) Americium	96 Cm (247) Curium	97 Bk (247) Berkelium	98 Cf (251) Californium	99 Es (252) Einsteinium	100 Fm (257) Fermium	101 Md (258) Mendelevium	102 No (259) Nobelium	103 Lr (266) Lawrencium

Rare Earth Elements consist of two groups: *Lanthanides* and *Actinides*

Elements above Uranium (*U*) are called *trans-uranium elements* and (*with exception of Np and Pu*) do not occur in nature naturally.

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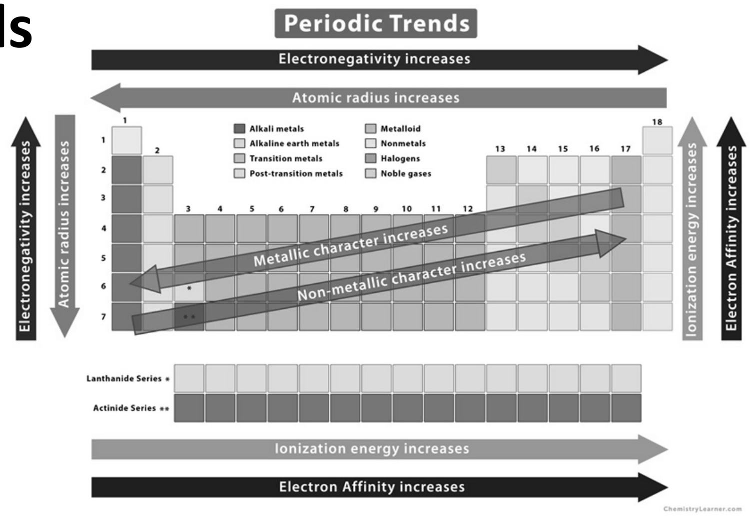
Periodic Trends

A *periodic trend* is a relationship between atoms on main properties of atoms

Properties of atoms inc.
- Atomic Size
- Ion Size
- Ionization Energy
- Metallic Character
- Electron Affinity
- Electronegativity



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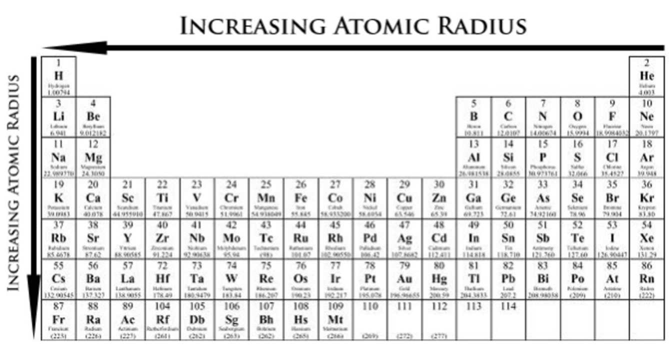
Atomic Size

Atomic Size Trends



The periodic trend for atomic size is much more important than the group trend

Atomic Size

Group Trend (*left to right*)
Decreases Across Table

More protons with the same EL pull e$^-$ more

Period Trend (*up and down*)
Increases dramatically down the groups on the table

More EL as more total e$^-$ total in atom increases size

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