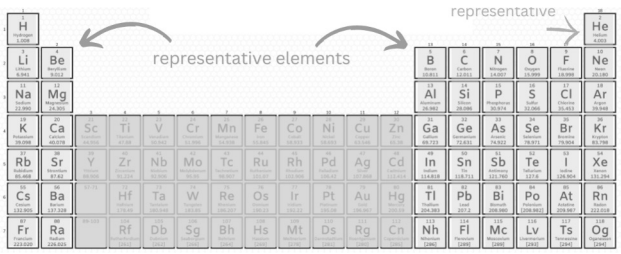
Periodic Blocks

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

Ion Charge

Charge of an ion is based on the group on the periodic table

Cation (+ ion): Ions formed due to gaining electrons (*metals*)
Anion (- ion): Ions formed due to losing electrons (*non-metals*)

Group	Val e^-	Charge	Group	Val e^-	Charge	Group	Val e^-	Charge
1A (1)	1	1+	**3A (13)**	3	3+	**6A (16)**	6	2-
2A (2)	2	2+	**4A (14)**	4	4+ / 4-	**7A (17)**	7	1-
1B – 10B (3 – 12)	2 (Varies)	Varies	**5A (15)**	5	3-	**8A (18)**	8	No Charge

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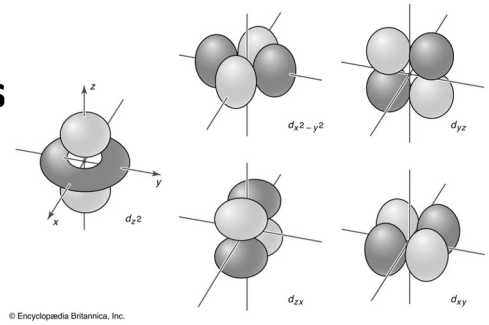
Subatomic Particles

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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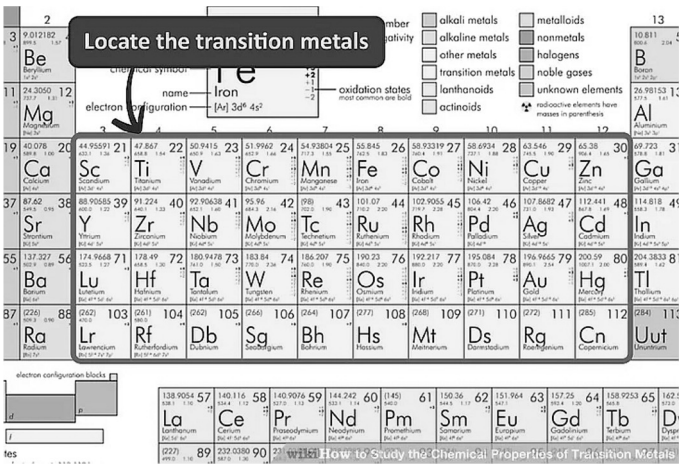
Periodic Blocks

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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Subatomic Particles

Counting Valence Electrons (e^-) [*Transition Metals*]

Valence Electrons are based on group on the table
Transition Metals can have 1 – 7 valence electrons (*base 2*)

Group	3B (3)	4B (4)	5B (5)	6B (6)	7B (7)	8B (8)	8B (9)	8B (10)	1B (11)	2B (12)
Element	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn
Possible Valence electron and cation charge	(+)3	(+)3 (+)4	(+)2 (+)3 (+)4 (+)5	(+)2 (+)3 (+)4 (+)6	(+)2 (+)3 (+)4 (+)5 (+)7	(+)2 (+)3 (+)6	(+)2 (+)3	(+)2 (+)3	(+)1 (+)2 (+)3	(+)2

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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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