Periodic Blocks

Representative Elements

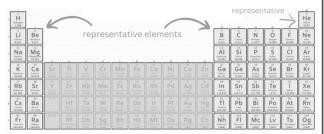
Elements that lose (*cation*, +) or gain (*anion*, -) a fixed number of valence electrons (val e⁻)

Representative Metals

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

Metalloids

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



Representative Non-Metals

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

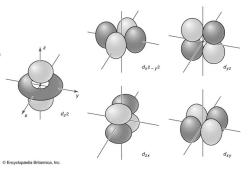
5

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

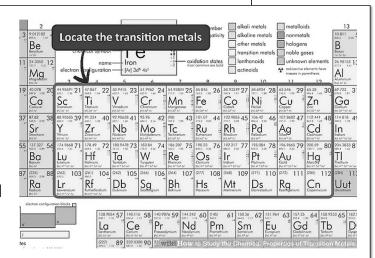
Transition Elements

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

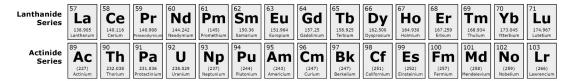
Groups 1B (3) – 10B (12)

7

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.*)



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.

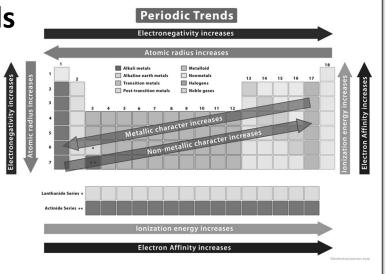
8

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

INCREASING ATOMIC RADIUS

INCREASING ATOMIC RADIUS	1 H 19-dopen 1,00794 3 Li 1-down	4 Be 5012182											5 B	6 C Cuton 12.0107	7 N Nampa	8 O Oropes 15,9994	9 F Passes 18,0084032	2 He httes 4,003 10 Ne Nem 20,1797
	- 11	12											13	14	15	16	17	18
	Na 5-skern 22, 989 2710	Mg 24.3050											Al 26,981536	Si 180m 28,0855	P Phosphore 30,973764	S Natur 32,066	CI (Mone) 35.4527	Ar 39.948
	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
	K %************************************	Ca Calctum 40.078	Sc Scordon 44.935910	Ti Transace 47.867	V Vinadum 50.0415	Cr Chursian 51,9961	Mn Vargance 54.938049	Fe 55,645	Co 58,933200	Ni Nose St.4954	Cu Cupur 63.546	Zn 65.39	Ga Galtum 69.723	Ge Germenen 72.61	As Attento 24,92160	Se Schmuns 78.96	Br termor 79,904	Kr Stopen 83.80
	37	38	39	40	41	42	43	-44	45	46	47	48	49	50	51	52	53	54
	Rb habadaan 85.4678	Sr Structum \$7.62	Ynsus	Zr Znowam 91,224	Nb Notion 97.99638	Mo Mo Mo Mo Mo Mo Mo Mo Mo Mo Mo Mo Mo M	Tc Technology (95)	Ru Ratherians 101.07	Rh Rhalas 100 00150	Pd Parladose 196.42	Ag Silver 107 Mes?	Cd Calman	In Indian	Sn 118.710	Sb 121.260	Te Tobation 127.60	1 126,90417	Xe Xonos 131.29
	55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
	Cs	Ba	La	Hſ	Ta	W	Re	Os	Ir	Pt	Au	Hg	TI	Pb	Bi	Po	At	Rn
	Terium 132.90545	137.327	138.9055	178.49	Tambox 180,9479	183.84	186.207	190.23	192.217	195.078	Geld 196,96655	200.59	Thelium 204,3833	207.2	208.98038	(209)	(210)	(222)
	87	88	89	104	105	106	107	108	109	110	111	112	113	114			-2.655	
	Fr Function (223)	Ra Radium (226)	Ac fertician (227)	Rf Returnstant (261)	Db Dahnium (212)	Sg Subseque (263)	Bh (262)	Hs (268)	Mt Minimum (200)	(209)	(272)	am						

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 etotal in atom increases size

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