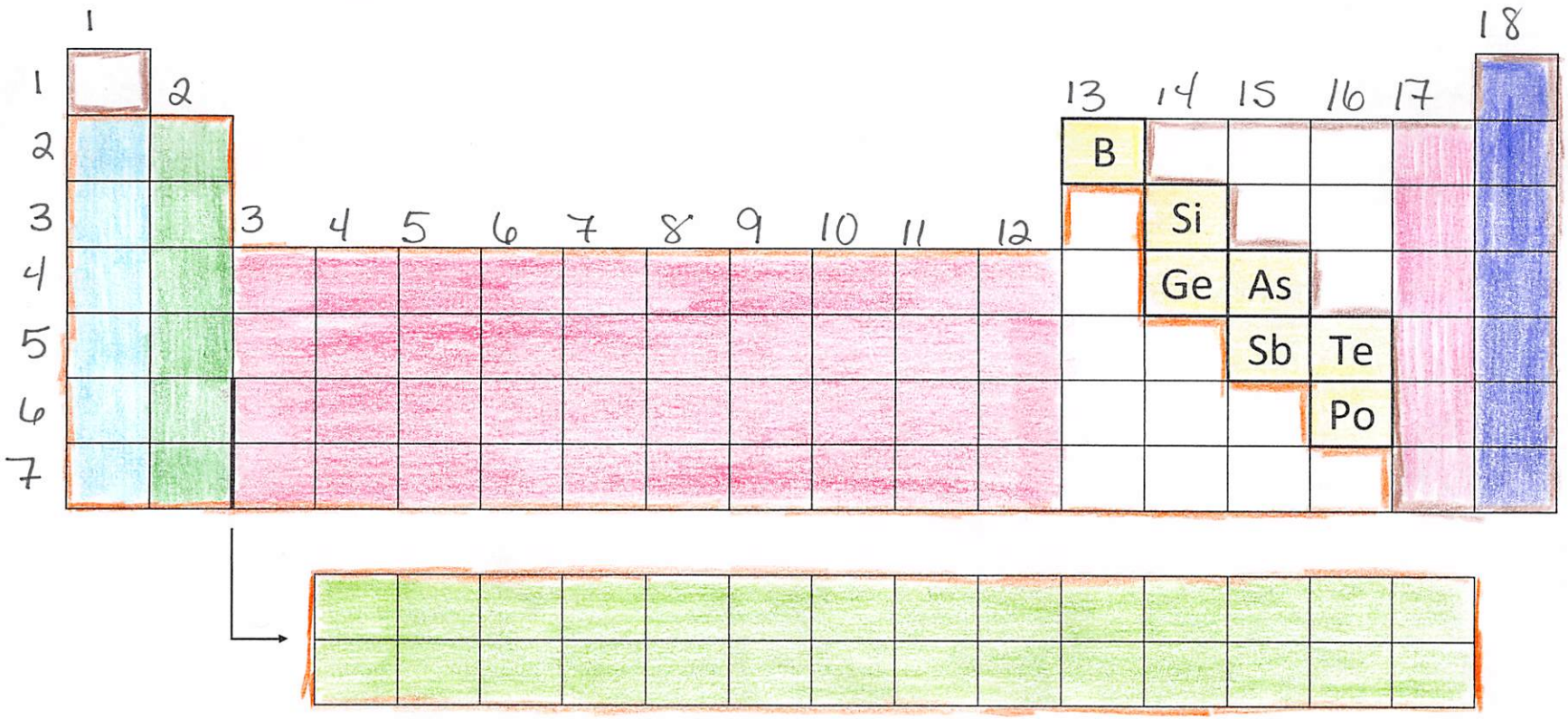
Name: _____ Periodic Table

Legend

- metals
- nonmetals
- metalloids (semi-metals)
- alkali metals
- alkaline earth metals
- transition metals
- inner transition metals
- halogens
- noble gases

group: family - vertical columns - have similar properties

period: horizontal rows



The Periodic Table PT

↳ father of the P.T. - Dmitri Mendeleev
- organized it in order of increasing atomic mass

↳ modern PT arranged in order of increasing atomic #

Metals - make up most of the PT
↳ lustrous - shiny
↳ malleable - bendable
↳ ductile - drawn into wire
↳ good conductors of heat & electricity
↳ solid @ room temp. (except mercury)

Nonmetals
↳ dull solids or gases @ room temp. (Bromine is the only liquid)
↳ insulators (nonconductors)
↳ brittle if solid

Metalloids
↳ have properties of both metals & nonmetals

Alkali Metals - Group 1
↳ called alkali b/c they form alkaline (basic) solutions in water
↳ most reactive metals
↳ soft
↳ silvery-white

Alkaline Earth Metals - Group 2
↳ also produce alkaline solutions in water
↳ found as minerals in the ground (earth)
↳ reactive but not as much as group 1
↳ slightly harder than group 1
↳ silver

Transition Metals - Groups 3 → 12
↳ called transition b/c the metals' metallic character changes as you move left to right

Inner Transition Metals - bottom 2 rows
↳ also called Rare Earth Metals
↓
not rare - just hard to distinguish from each other & extract

Halogens - Group 17
↳ called this b/c halogen means "salt former" in Latin, they form salts when bonded to metals
↳ most reactive nonmetal
↳ gases, liquids, & solid at room temp.

Noble Gases - Group 18
↳ called noble b/c they are unreactive just like the nobility would not interact w/ commoners

Periodic Trends

Valence e⁻ → e⁻'s in the highest orbital in an atom

valence shell

Ex) Na (11e⁻) $1s^2 2s^2 2p^6 \boxed{3s^1}$ 1 valence e⁻

S (16e⁻) $1s^2 2s^2 2p^6 \boxed{3s^2 3p^4}$ 6 valence e⁻

Ti (22e⁻) $1s^2 2s^2 2p^6 3s^2 3p^6 \boxed{4s^2 3d^2}$ 4 valence e⁻

↓ down a group - all elements have the same # valence e⁻

→ across a period - # valence e⁻ increases

Valence e⁻ control the properties an element has : how it reacts to other elements

Metallic Character -

↓ down a group - metallic character increases

→ across a period - metallic character decreases

Atomic Radius - ½ the distance b/w 2 identical atoms bonded together

↓ down a group - radius increases b/c the farther down the group you go, the more core e⁻'s there are shielding the valence e⁻'s from the full effect of the proton's + charge so that valence e⁻ exists farther away

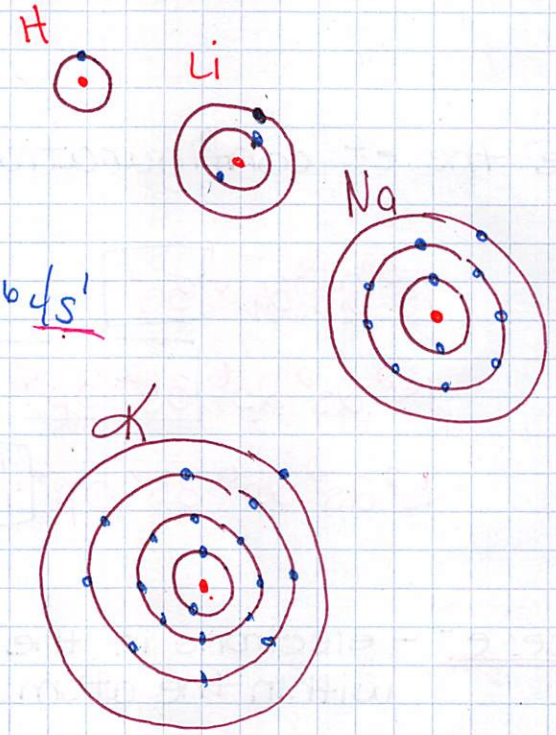
→ across a period - radius decreases b/c shielding remains constant while the attraction b/w increased amounts of p⁺ : e⁻ increases

H $1s^1$

[He]2s Li $1s^2 2s^1$

[Ne]3s Na $1s^2 2s^2 2p^6 3s^1$

K $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$

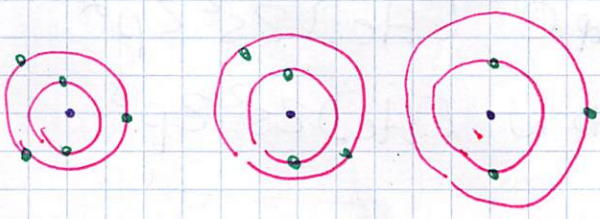


Be [He] $2s^2$

Mg [Ne] $3s^2$

Ca [Ar] $4s^2$

Sr [Kr] $5s^2$



Write the e⁻ configurations for:

Na $1s^2 2s^2 2p^6 \boxed{3s^1}$

S $1s^2 2s^2 2p^6 \boxed{3s^2 3p^4}$

Ti $1s^2 2s^2 2p^6 3s^2 3p^6 \boxed{4s^2} 3d^2$

Valence e⁻ - electrons in the highest orbital within the atom

- valence e⁻ play a major role in the properties of an element and how it reacts to other elements and compounds

Na - has 1 valence e⁻
S - has 6 valence e⁻
Ti - has 2 valence e⁻

~~Al~~ ~~Ne~~

5p B $[He]\,2s^2 2p^1$

6p C $[He]\,2s^2 2p^2$

7p N $[He]\,2s^2 2p^3$

B. $1s^2 \boxed{2s^2 2p^1}$

Al. $1s^2 2s^2 2p^6 \boxed{3s^2 3p^1}$

Ga $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^1$

35 Cl 34.968 852
37 Cl 36.965 903
35.453
24.248
75.76 %

Ionization Energy - amount of energy needed to remove a valence e^- from an atom

↓ down a group - energy decreases b/c it's easier to remove an e^- that is farther away from the nucleus.

→ across a period - energy increase ↑ b/c

Electronegativity - amount of attraction one atom's nucleus has for another atom's e^-'s.

↓ down a group - electronegativity decreases b/c shielding

→ across a period - electronegativity increases b/c there is no shielding

ex) increasing radius: In → Pd → V

increasing ion. energy: V → Pd → In

ex) decreasing radius: Te → Se → F

decreasing electronegativity: F → Se → Te

Periodic Table of the Elements

metallic character decreases →

radius decreases

ionization energy increases

electronegativity increases

metallic character increases ↓

radius increases

ionization energy decreases

electronegativity decreases

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	1+	2+	3+	4+/-	3-	2-	1-	0										
	1e	2e	3e	4e	5e	6e	7e	8e										
1	Hydrogen 1 H 1.01																	Helium 2 He 4.00
2	Lithium 3 Li 6.94	Beryllium 4 Be 9.01											Boron 5 B 10.81	Carbon 6 C 12.01	Nitrogen 7 N 14.01	Oxygen 8 O 16.00	Fluorine 9 F 19.00	Neon 10 Ne 20.18
3	Sodium 11 Na 22.99	Magnesium 12 Mg 24.31											Aluminum 13 Al 26.98	Silicon 14 Si 28.09	Phosphorous 15 P 30.97	Sulfur 16 S 32.07	Chlorine 17 Cl 35.45	Argon 18 Ar 39.95
4	Potassium 19 K 39.10	Calcium 20 Ca 40.08	Scandium 21 Sc 44.96	Titanium 22 Ti 47.88	Vanadium 23 V 50.94	Chromium 24 Cr 52.00	Manganese 25 Mn 54.94	Iron 26 Fe 55.85	Cobalt 27 Co 58.93	Nickel 28 Ni 58.69	Copper 29 Cu 63.55	Zinc 30 Zn 65.39	Gallium 31 Ga 69.72	Germanium 32 Ge 72.61	Arsenic 33 As 74.92	Selenium 34 Se 78.96	Bromine 35 Br 79.90	Krypton 36 Kr 83.80
5	Rubidium 37 Rb 85.47	Strontium 38 Sr 87.62	Yttrium 39 Y 88.91	Zirconium 40 Zr 91.22	Niobium 41 Nb 92.91	Molybdenum 42 Mo 95.94	Technetium 43 Tc [98]	Ruthenium 44 Ru 101.07	Rhodium 45 Rh 102.91	Palladium 46 Pd 106.42	Silver 47 Ag 107.87	Cadmium 48 Cd 112.41	Indium 49 In 114.82	Tin 50 Sn 118.71	Antimony 51 Sb 121.76	Tellurium 52 Te 127.60	Iodine 53 I 126.90	Xenon 54 Xe 131.29
6	Cesium 55 Cs 132.91	Barium 56 Ba 137.33	57-70	Lutetium 71 Lu 174.97	Hafnium 72 Hf 178.49	Tantalum 73 Ta 180.95	Tungsten 74 W 183.84	Rhenium 75 Re 186.21	Osmium 76 Os 190.23	Iridium 77 Ir 192.22	Platinum 78 Pt 195.08	Gold 79 Au 196.97	Mercury 80 Hg 200.59	Thallium 81 Tl 204.38	Lead 82 Pb 207.20	Bismuth 83 Bi 208.98	Polonium 84 Po [209]	Astatine 85 At [210]	Radon 86 Rn [222]
7	Francium 87 Fr [223]	Radium 88 Ra [226]	89-102	Lawrencium 103 Lr [262]	Rutherfordium 104 Rf [261]	Dubnium 105 Db [262]	Seaborgium 106 Sg [266]	Bohrium 107 Bh [264]	Hassium 108 Hs [269]	Meitnerium 109 Mt [268]	Darmstadtium 110 Ds [271]	Roegentium 111 Rg [272]	Copernicium 112 Cn [277]	Nihonium 113 Nh [284]	Flerovium 114 Fl [289]	Moscovium 115 Mc [288]	Livermorium 116 Lv [293]	Tennesine 117 Ts [294]	Oganesson 118 Og [294]

Lanthanum 57 La 138.91	Cerium 58 Ce 140.12	Praseodymium 59 Pr 140.91	Neodymium 60 Nd 144.24	Promethium 61 Pm [145]	Samarium 62 Sm 150.36	Europium 63 Eu 151.97	Gadolinium 64 Gd 157.25	Terbium 65 Tb 158.93	Dysprosium 66 Dy 162.50	Holmium 67 Ho 164.93	Erbium 68 Er 167.26	Thulium 69 Tm 168.93	Ytterbium 70 Yb 173.04
Actinium 89 Ac [227]	Thorium 90 Th 232.04	Protactinium 91 Pa 231.04	Uranium 92 U 238.03	Neptunium 93 Np [237]	Plutonium 94 Pu [244]	Americium 95 Am [243]	Curium 96 Cm [247]	Berkelium 97 Bk [247]	Californium 98 Cf [251]	Einsteinium 99 Es [252]	Fermium 100 Fm [257]	Mendeleevium 101 Md [258]	Nobelium 102 No [259]

created by
K Harris