

ELECTRON CONFIGURATION AND THE PERIODIC TABLE

two elements wide

Helium is part of the "s" block!

↓

IA

IIA

1 H He

2 Li Be

3 Na Mg

4 K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn

5 Rb Sr Y Zr Nb Mo Tc Ru Rh Pd Ag Cd

6 Cs Ba La Hf Ta W Re Os Ir Pt Au Hg Tl Pb Bi Po At Rn

7 Fr Ra Ac Rf Db Sg Bh Hs Mt

ten elements wide

III B IV B V B VI B VII B VIII B I B II B

III A IV A V A VI A VII A VIII A

Al Si P S Cl Ar

Ga Ge As Se Br Kr

In Sn Sb Te I Xe

Tl Pb Bi Po At Rn

inner transition metals go here

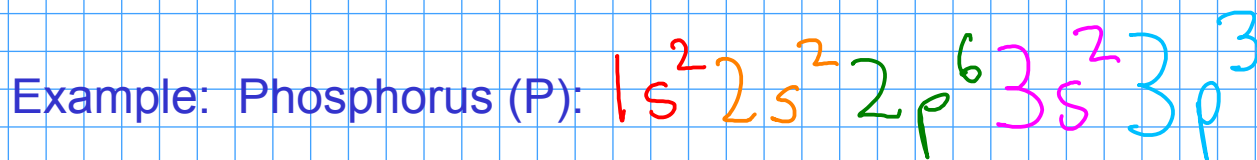
"s" block: last electron in these atoms is in an "s" orbital!

"p" block: last electron in these atoms is in a "p" orbital!

"d" block: last electron in these atoms is in a "d" orbital

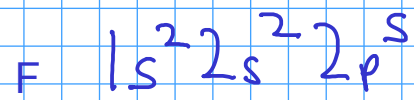
- To write an electron configuration using the periodic table, start at hydrogen, and count up the electrons until you reach your element!

1	IA	II											IIIA	IVA	VA	VIA	VIIA	VIIIA	He
2	Li	Be											B	C	N	O	F	Ne	
3	Na	Mg	IIIB	IVB	VB	VIB	VII B	VIII B	IB	IIB	Al	Si	P	S	Cl	Ar			
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	
6	Cs	Ba	La*	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn	
7	Fr	Ra	Ac*	Rf	Db	Sg	Bh	Hs	Mt	*"inner" transition metals go here									

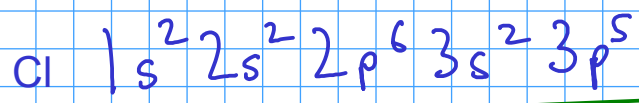
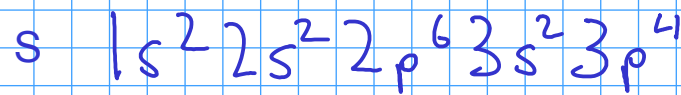


Phosphorus has five valence electrons!

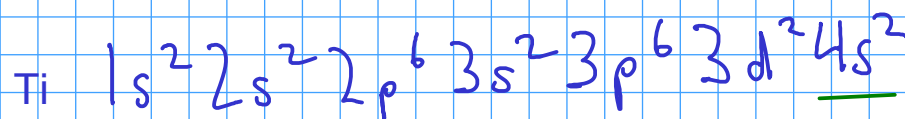
EXAMPLES:



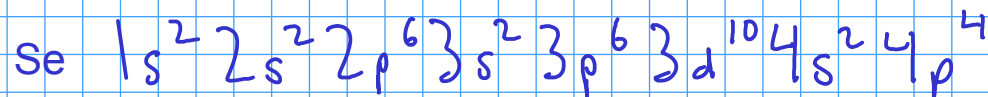
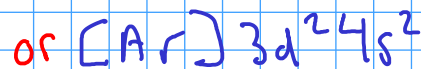
Remember - valence electrons are ALL of the electrons in the outermost SHELL! (may have more than one SUBSHELL)!



TITANIUM is a transition metal that commonly forms either +2 or +4 cations. The 4s electrons are lost when the +2 ion forms, while the 4s AND 3d electrons are lost to form the +4!



You can order the subshells in numeric order OR in filling order



Noble gas core notation. Use the previous noble gas on the table, then add the electrons that it doesn't have to the end.

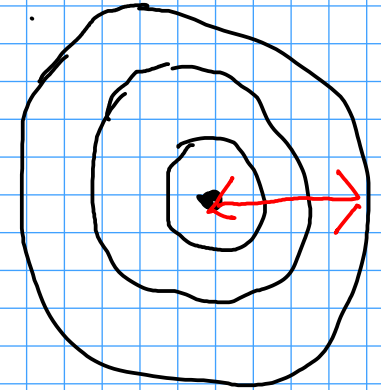


PERIODIC TRENDS

- Some properties of elements can be related to their positions on the periodic table.

ATOMIC RADIUS

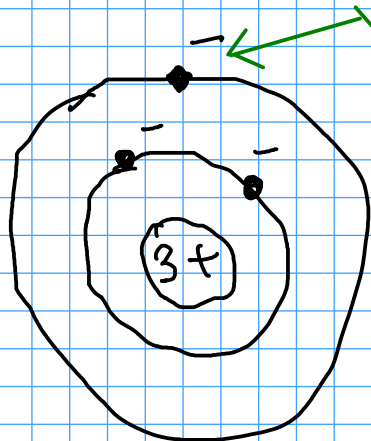
- The distance between the nucleus of the atoms and the outermost shell of the electron cloud.
- Relates to the size of the atom.
- As you go DOWN A GROUP (↓), the atomic radius INCREASES.



- Why? As you go down a period, you are ADDING SHELLS!

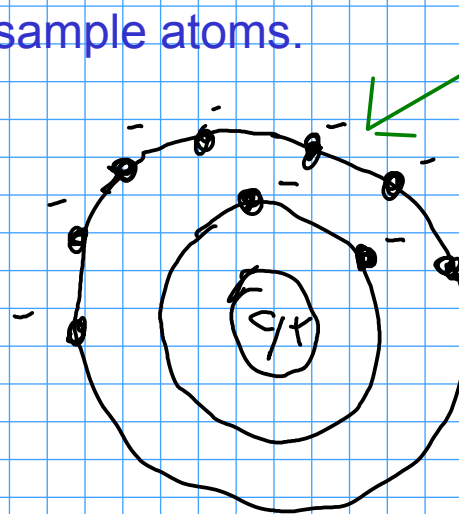
- As you go ACROSS A PERIOD (← →), the atomic radius DECREASES

Why? Let's look at some sample atoms.



lithium

Outer electron sees an effective +1 charge (shielded from +3 nucleus by 2 electrons)



fluorine

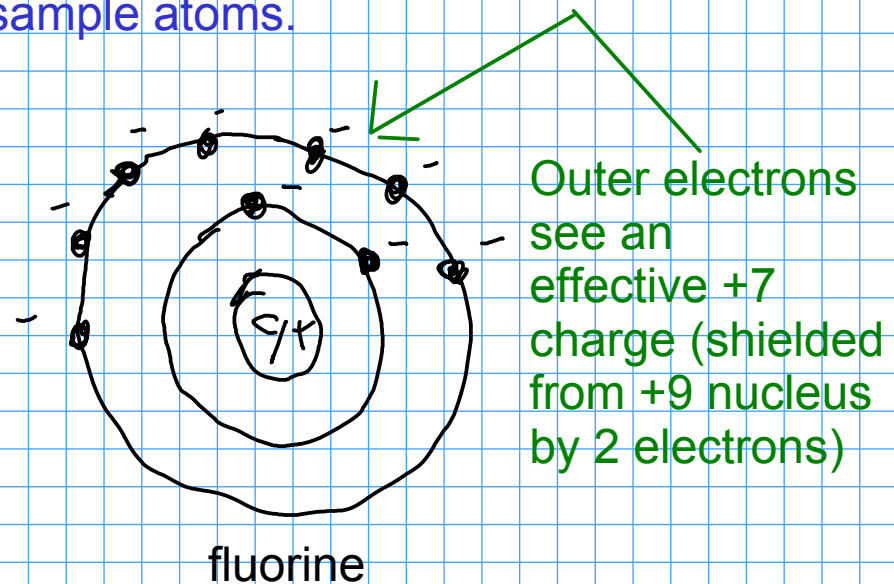
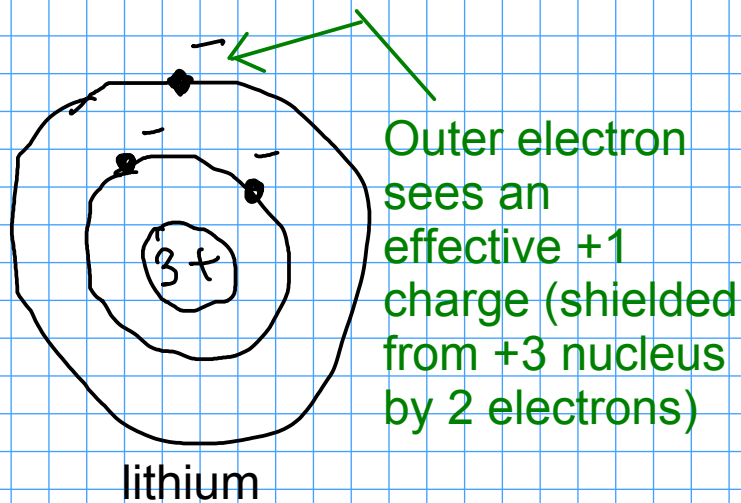
Outer electrons see an effective +7 charge (shielded from +9 nucleus by 2 electrons)

... so fluorine's outer shell is pulled closer to the nucleus than lithium's!

IONIZATION ENERGY

- The amount of energy required to remove a single electron from the outer shell of an atom.
- Relates to reactivity for metals. The easier it is to remove an electron, the more reactive the metal.
- As you go DOWN A GROUP (↓), the ionization energy DECREASES.
 - Why? As you go down a period, you are ADDING SHELLS. Since the outer electrons are farther from the nucleus and charge attraction lessens with distance, this makes electrons easier to remove as the atoms get bigger!
- As you go ACROSS A PERIOD (⇔), the ionization energy INCREASES.

- Why? Let's look at some sample atoms.



... since fluorine's outer electrons are held on by a larger effective charge, they are more difficult to remove than lithium's.

