Periodic Trends

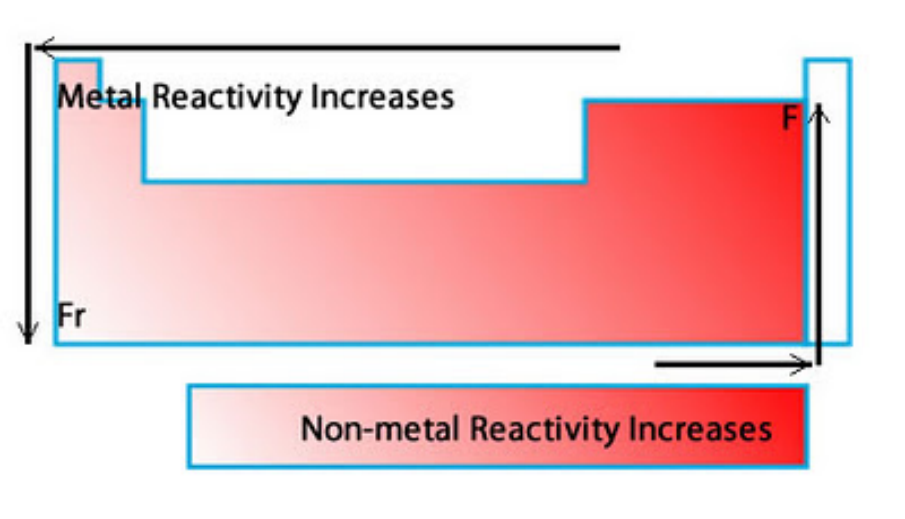
objectives:

1. I can label the parts of the periodic table, including: metals/nonmetals/ metalloids, families/groups, and valence electron trend by group.
2. I can use the periodic table to predict trends of given properties.
3. I can explain the electron trends for metals and nonmetals.
4. I can compare elements' electron attraction to their nuclei in regard to nuclear charge and e- distance by applying Coulomb's Law.
5. I can the use periodic table to predict the trends for atomic radius and ionization energy to estimate an element's reactivity.

Atomic Radius

Ionization Energy

Reactivity



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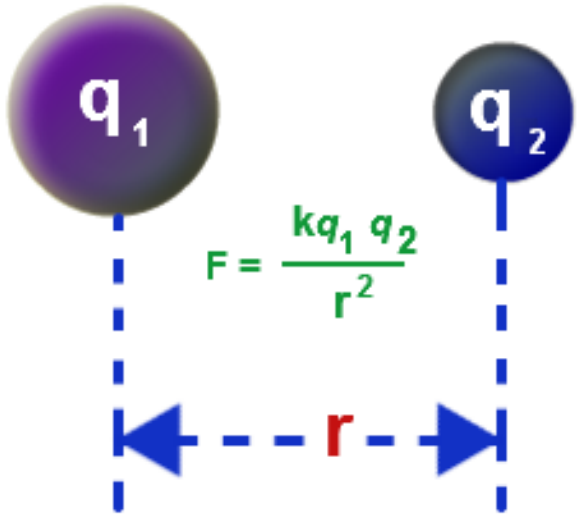
Coulomb's Law

basis stability of atoms and ions and periodic trends

2 variables: distance and charges



Coulomb's law

Distance:

The closer two charges are, the stronger the force between them

Charge:

The greater the charges are, the stronger the force of attraction

F = Force

q = charge of a particle, need + and - to attract

r = radius (distance)

k = constant

Reactivity

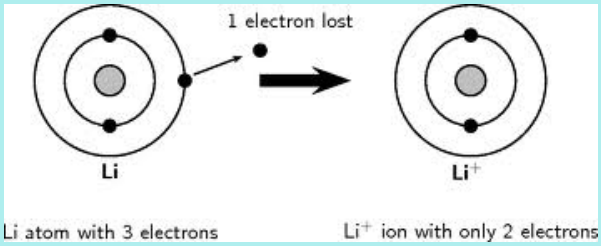
atom is reactive

valence shell not full

e^- are easily gained or lost

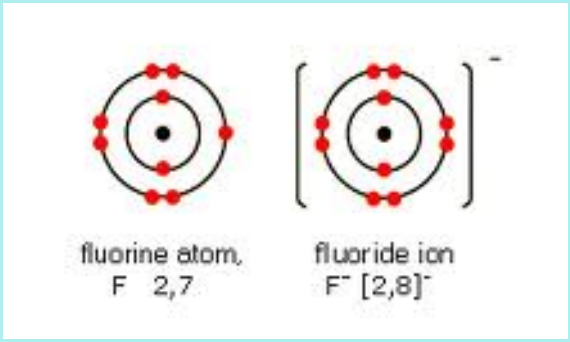
Metals like to lose electrons.

$Li \longrightarrow Li^+$



Non-metals like to gain electrons

$F \longrightarrow F^-$



atom is not reactive

Full valence shell=stability

lowest energy state

I'm full!

noble gases

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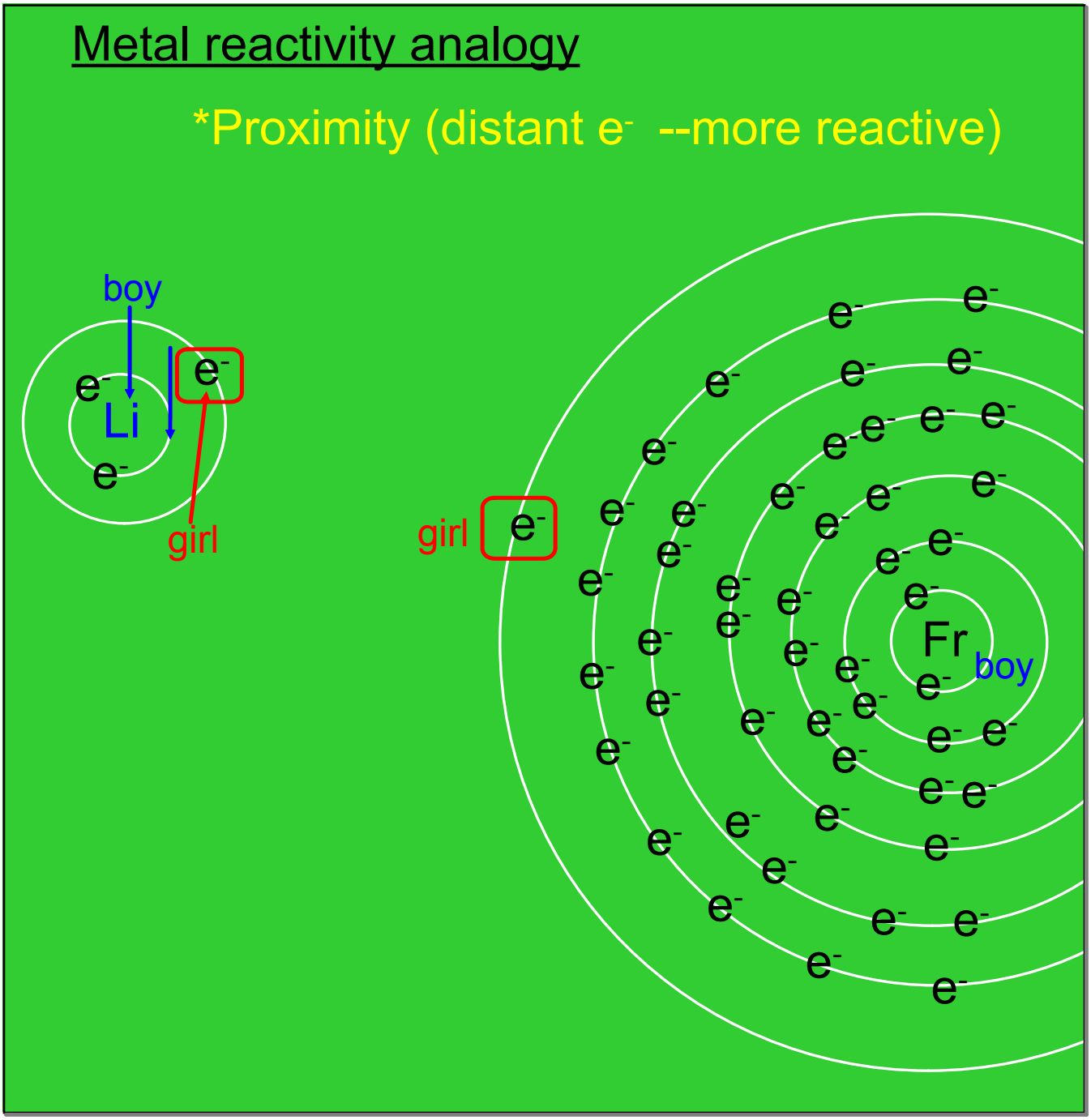
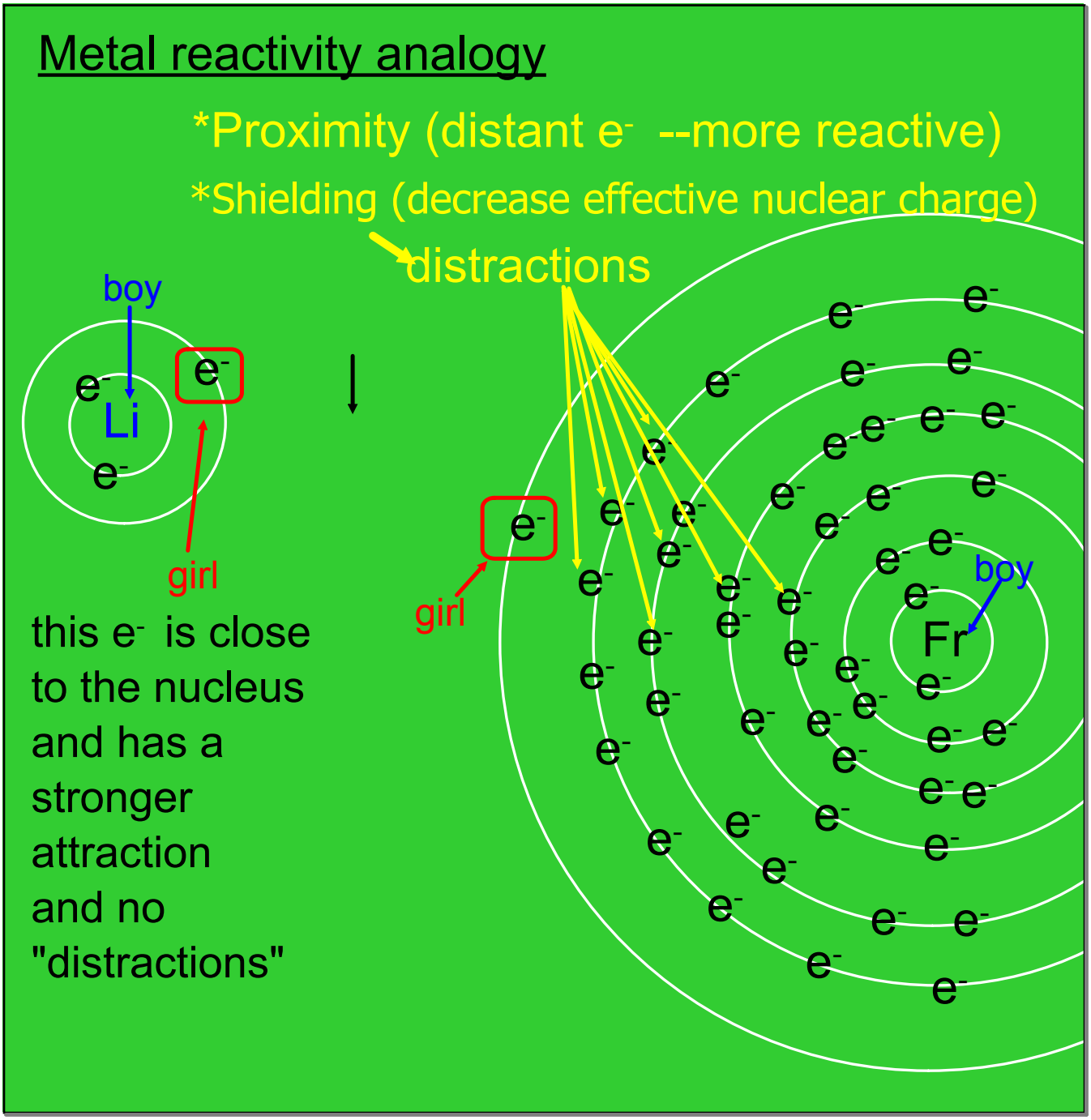

Metal reactivity analogy
*Proximity (distant e- --more reactive)
boy
Li
girl
girl
Fr
boy

Oct 5-2:36 PM

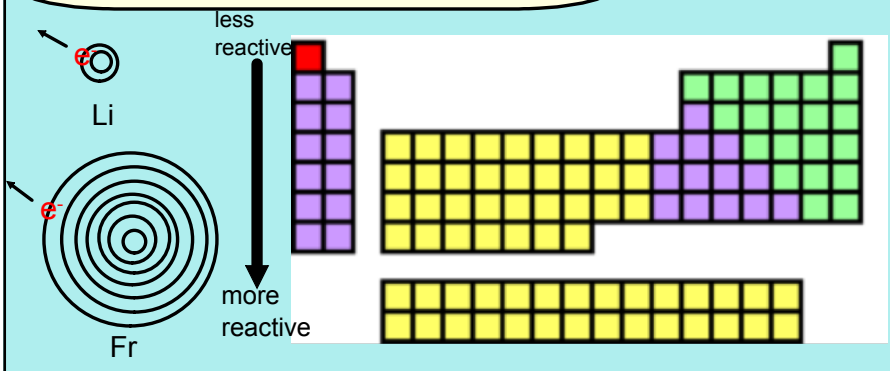

Metal reactivity analogy
*Proximity (distant e- --more reactive)
*Shielding (decrease effective nuclear charge)
distractions
boy
Li
girl
this e- is close to the nucleus and has a stronger attraction and no "distractions"
girl
boy
Fr

difference between
metals and non-metals
lose e^- gain e^-

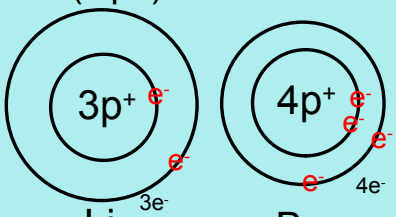
Reactivity of **metals**

Metals --- lose electrons.

Therefore, the farther away the e^- is,
the easier it is to lose
and the more reactive it is



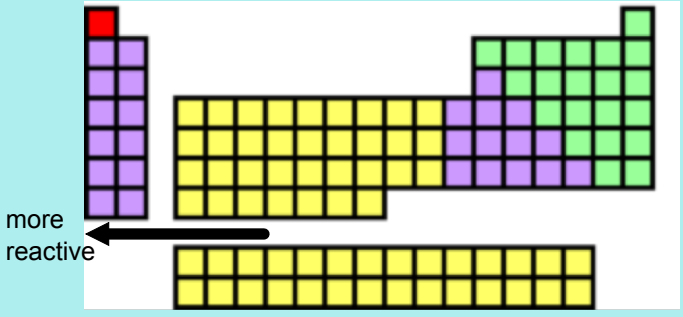
Alkali Metals (Gp1) Vs. Akaline Earth Metals (Gp2)



Li
#3

Be
#4

Li (Gp 1) is more reactive than Be (Gp 2)
-Li e^- is less attracted to nucleus than Be
-easier (less energy) to lose 1 e^- on Li
-Coulomb's Law -- Distance and Charge



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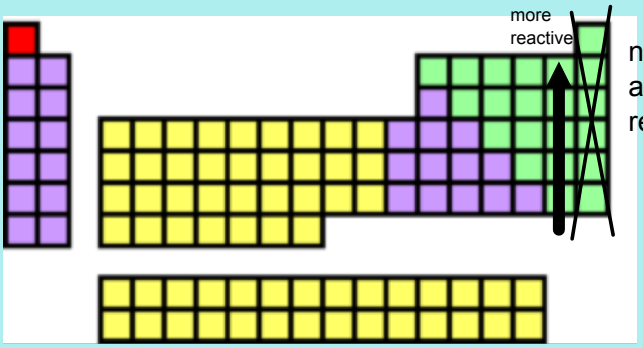
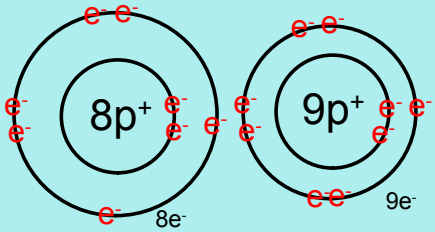
Reactivity of **Non-metals**

Non-metals --- gain e^-.

Therefore, the closer the e^- is,
the easier it is to gain
and the more reactive it is.



noble gases
are not
reactive



O
#8

F
#9

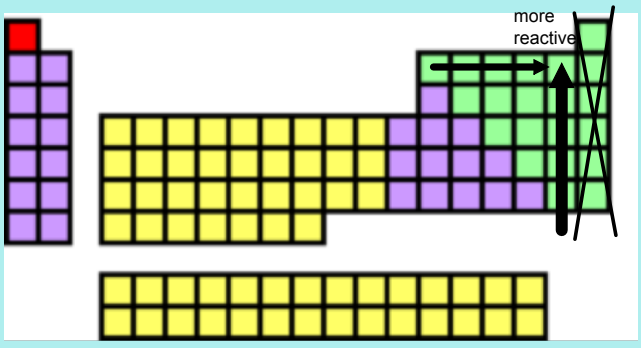
F (Halogen) is more reactive than O

-e^- is attracted to F nucleus

-easier (less energy) to gain 1 e^- on F

-Coulomb's Law -- Distance and Charge

less distance and more charge



noble gases
are not
reactive

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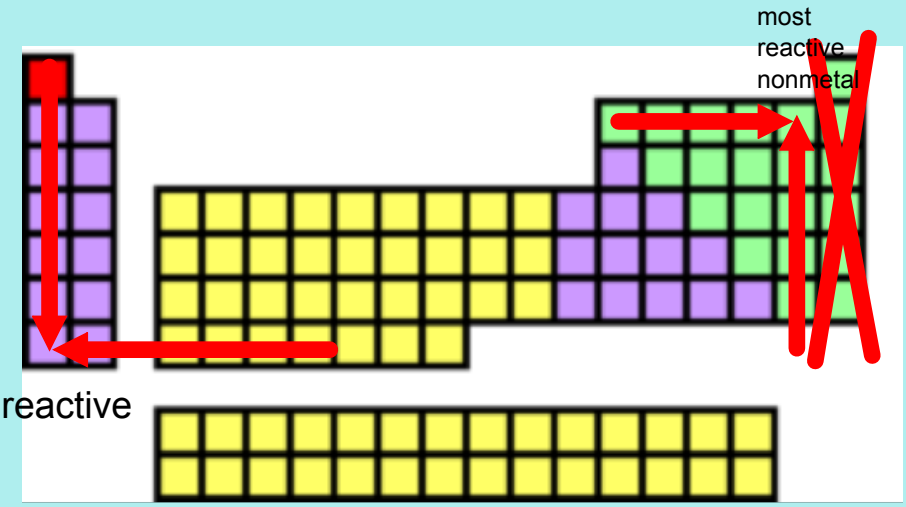
Reactivity



most reactive metal

noble gases are not reactive

Oct 4-9:12 PM

1. Metals tend to (gain/lose?) electrons

2. Nonmetals tend to (gain/lose?) electrons

3. Which atom has the bigger radius? Why?

a. Mg (#12) or Cl (#17)
b. Mg(#12) or Ra (#88)

4. Which atom is more reactive? Why?

a. K(#19) or Ca (20)
b. Mg(#12) or Ra (#88)
c. Cl (#17) or F(#9)

5. Which atom has the smaller ionization energy? Why?

a. K(#19) or Ca (20)
b. Mg (#12) or Cl (#17)
c. Mg(#12) or Ra (#88)

Oct 15-10:40 AM

1. Metals tend to (gain/lose?) electrons

2. Nonmetals tend to (gain/lose?) electrons

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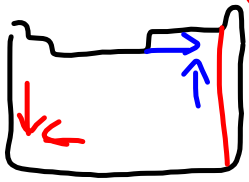

5. Which atom has the smaller ionization energy? Why?

a. K(#19) or Ca (20)
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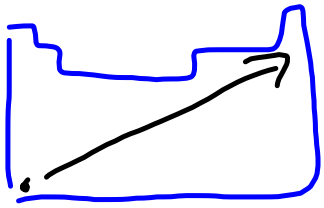
c. Mg(#12) or Ra (#88)



Coulomb Law Distance or charge

same shell

Mg +12 -12

Cl +17 -17

more force smaller

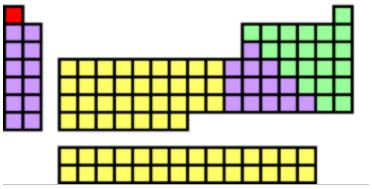
Periodic Trends:

Radii

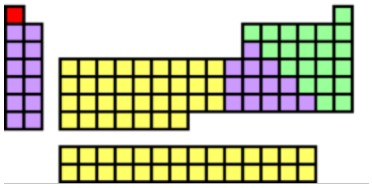
smallest atoms here

biggest atoms here

Reactivity



Ionization Energy



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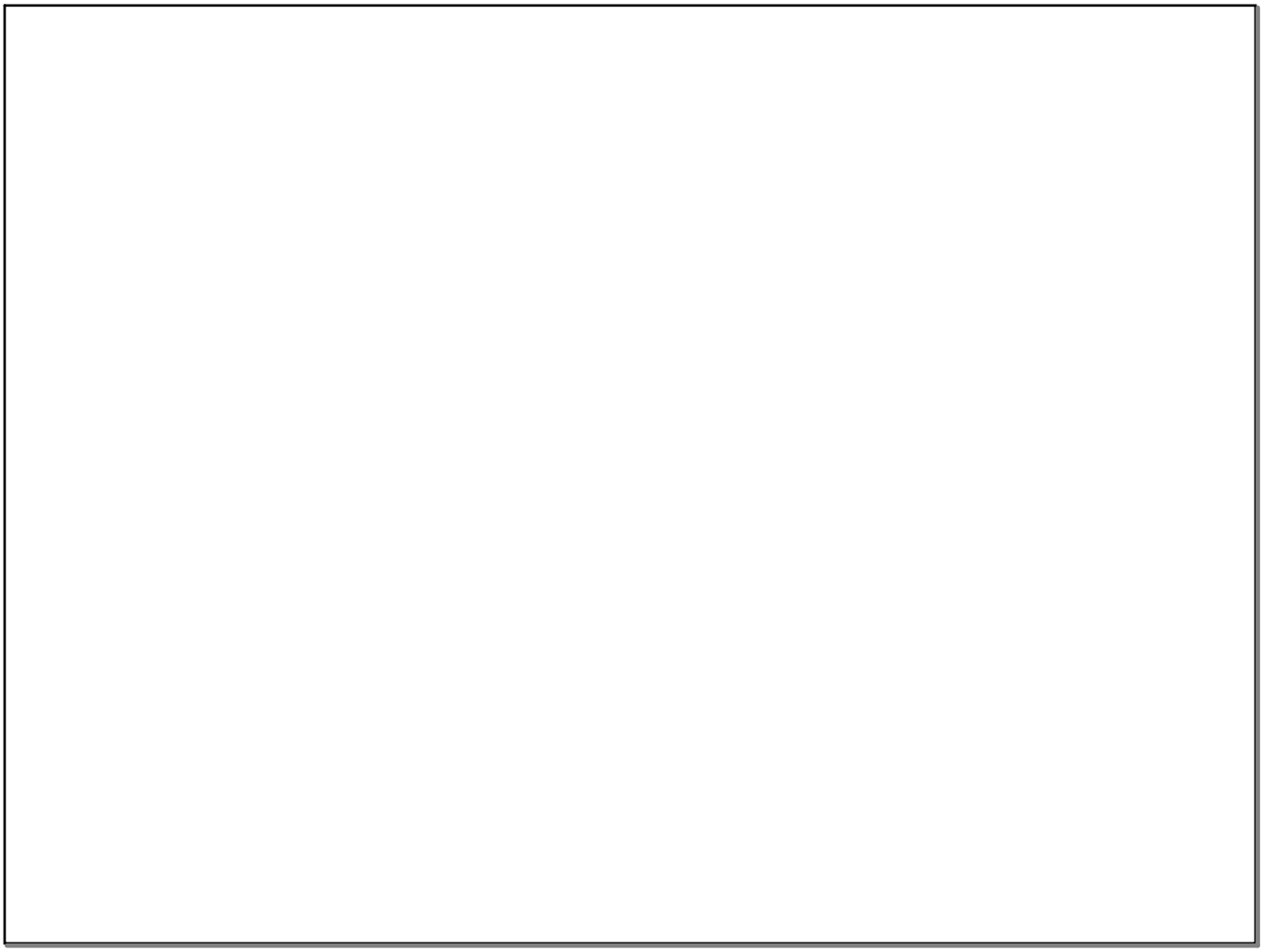

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