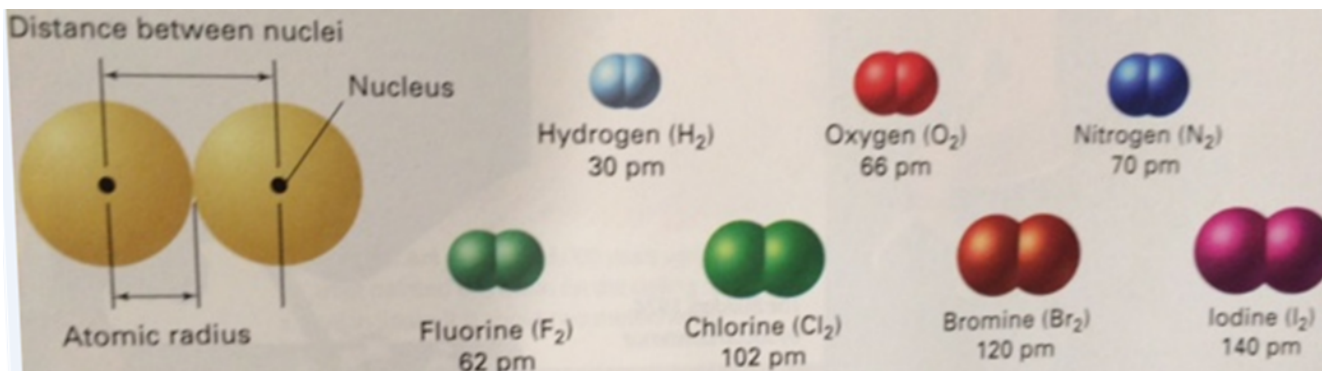# Periodic Trends

Trends in Atomic Size

- The **atomic radius** is one half of the distance between the nuclei of two atoms of the same element when the atoms are joined.

Distance between nuclei

Nucleus

Atomic radius

Hydrogen (H_2) 30 pm

Oxygen (O_2) 66 pm

Nitrogen (N_2) 70 pm

Fluorine (F_2) 62 pm

Chlorine (Cl_2) 102 pm

Bromine (Br_2) 120 pm

Iodine (I_2) 140 pm

- As the elements move down a group, atomic radius increases (increase in number of orbitals in each energy level).

- As elements move across a period, the atomic radius decreases (energy level stays the same in a row)

Trends in Atomic Size

Size generally decreases

Size generally increases
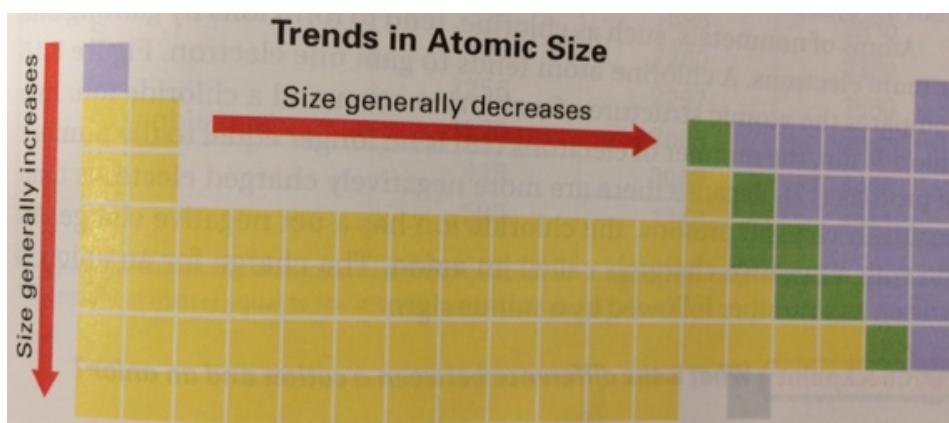
Trends in Ionization Energy

- The energy required to remove an electron from an atom is called **ionization energy**.

- measured when element is in a gaseous state

- first ionization energy tends to decrease from top to bottom within a group (less force of attraction from nucleus)

- increase from left to right across a period (stronger force of attraction from nucleus)

Ionization energy increases

Ionization energy decreases

Periodic Trend:
Ionization Energy

* Lanthanides

** Actinides
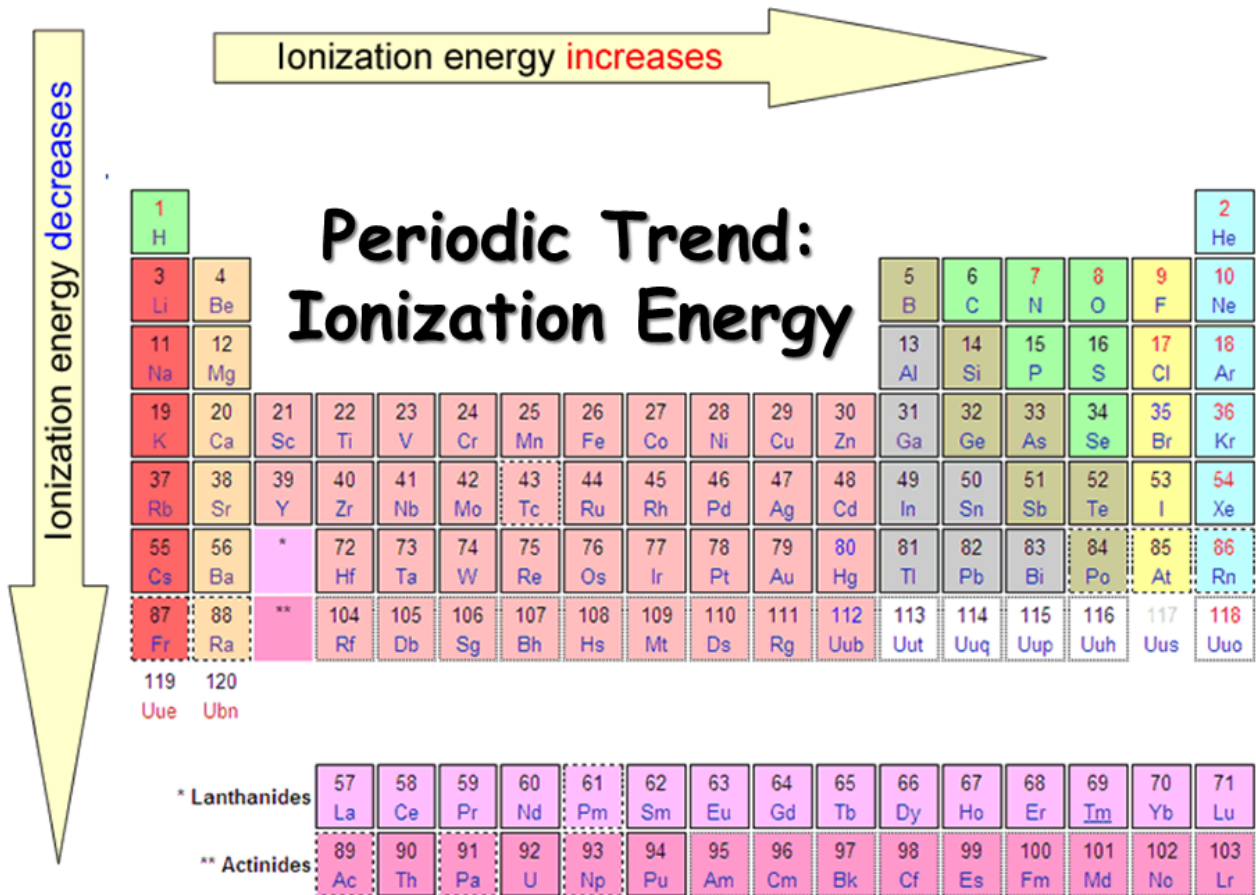
Trends in Ionic Size

When metals form compounds with nonmetals, metal atoms tend to lose electrons (cations) while the nonmetals tend to gain electrons (anions)

- Cations are always smaller than the atoms from which they form.

- Anions are always larger than the atoms from which they form.

- In general

  > as cations and anions move across periods they decrease in size.

 > as cations and anions move down groups they generally increase in size.
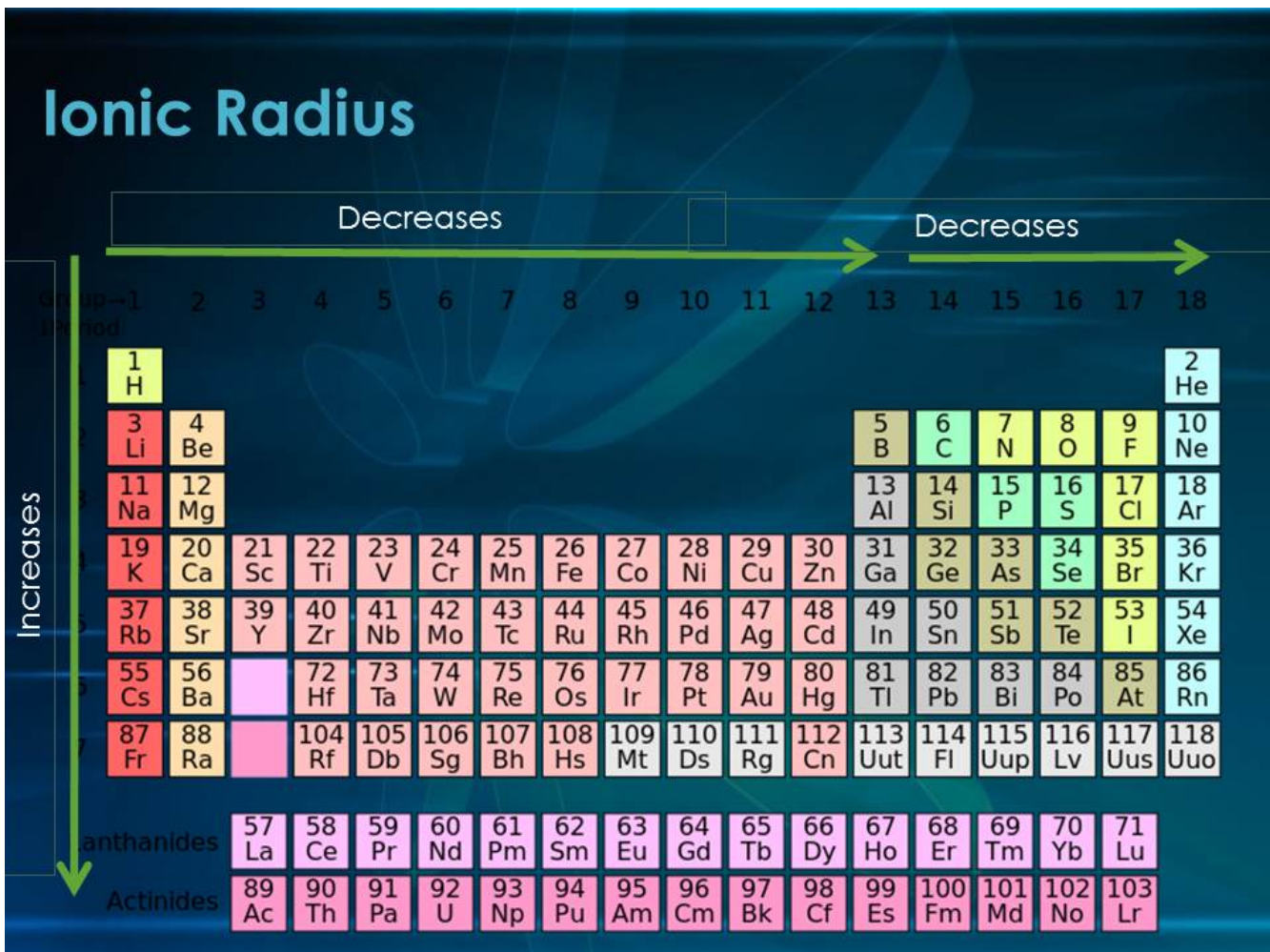
Trends in Electronegativity

- Electronegativity is the ability of an element to attract electrons when the atom is in a compound.

- In general

  > electronegativity values decrease from top to bottom within a group (because they are further from the nucleus).

  > for representative elements, the values tend to increase from left to right across a period. (because they are closer to the nucleus).

Electronegativity Trend
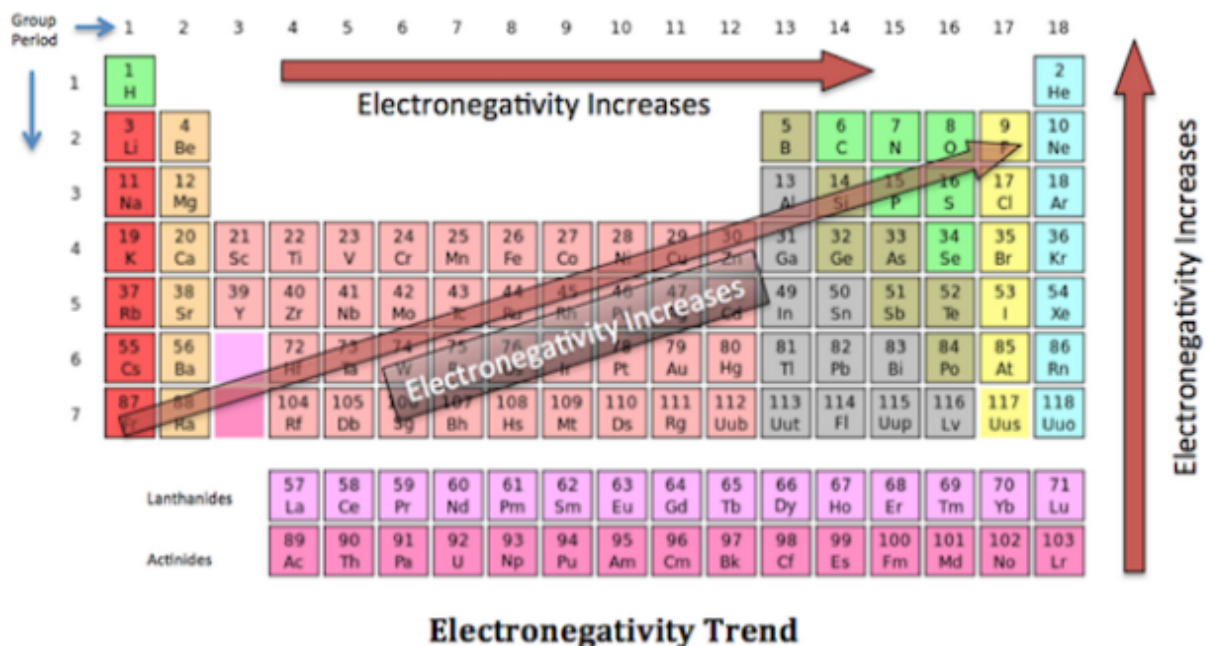
Summary of Trends (Pg. 178)
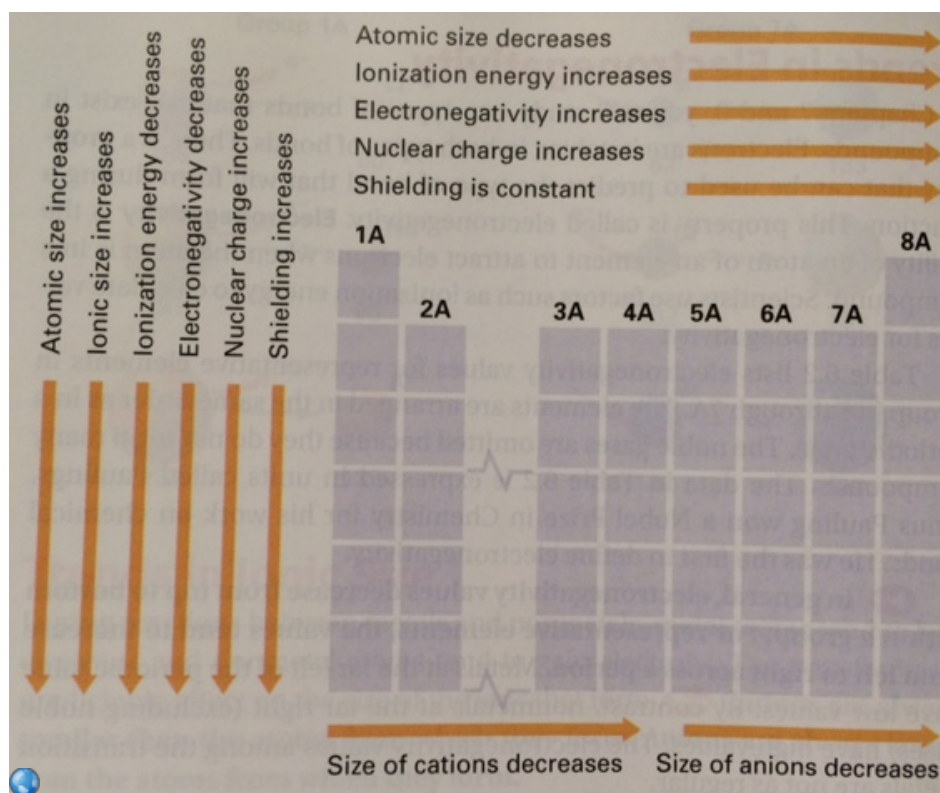
Video Recap:

https://www.youtube.com/watch?
v=hePb00CqvP0&ab_channel=ProfessorDaveExplains

Try Questions on page

Pg. 178 # 16-23

and Pg. 181 #36-39,41-43

*In order to answer some of the questions on ionization energy, you may need to skim the section on page 173 and look at table 6.1.