

Atomic Radius

- Measures as distance from nucleus to the outermost electron
- Unit commonly used is pm
– picometer = $10^{-12}m$
- Example: iodine atomic radius 140pm

Atomic radius DECREASES across a period?

Periodic Table of the Elements

- It is smaller to the right.
- Why?
 - More protons in the nucleus → higher electrical force pulls electrons closer to nucleus. (higher ENC...)

Atomic radius INCREASES down a group?

Periodic Table of the Elements

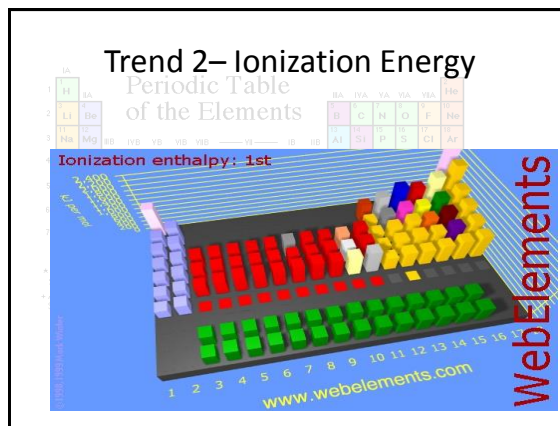
- It is larger down the group.
- Valence electrons are at higher energy levels and are not bound as tightly to the nucleus (lower ENC and Higher shielding)

Example:

Which is larger: a lithium atom or a fluorine atom?

Which is larger: an arsenic atom or a sulfur atom?

* Lanthanide Series
* Actinide Series



Ionization energy

- Ionization energy is the amount of energy needed to remove an electron from a gaseous atom.

- First ionization energy – 1+
- Second ionization energy – 2+

* Lanthanide Series	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
* Actinide Series	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

Ion

- Positive ion ---removal of electron
- Negative ion--- addition of electron

* Lanthanide Series	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
* Actinide Series	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

How does ionization energy change down a group?

- The first ionization energy decreases as you move down a group.
- Why?
 - The size of the atom increases.
 - Electron is further from the nucleus (lower ENC)

* Lanthanide Series	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
* Actinide Series	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

How does ionization energy change across a period?

- The first ionization energy increases as you move from left to right across a period.
 - ENC increases while shielding is constant.
 - Attraction of the electron to the nucleus increases.

* Lanthanide Series	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
* Actinide Series	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

