Periodicity

Why do some elements form ions more easily than other ions?

We can understand this using **Periodic Law**

- When elements are arranged in order of increasing atomic number, their physical and chemical properties show a periodic (repeating) pattern.

We already know about some of the patterns

- alkali metals, alkaline earth metals, transition metals, halogens, Noble gases, and metalloids.

There are other patterns as well

- **Electronegativity**
  - Definition: how much an atom will hog the electrons when it's bonded to another atom (unfair sharing)
  - Trend: increases from left to right within a period, and decreases from top to bottom within a group.
  - More positive means higher electronegativity

- **Ionization energies**
  - Definition: energy it takes to remove an electron
  - Trend: generally increase from left to right and decrease from top to bottom of a given group.
  - More positive means harder to remove an electron

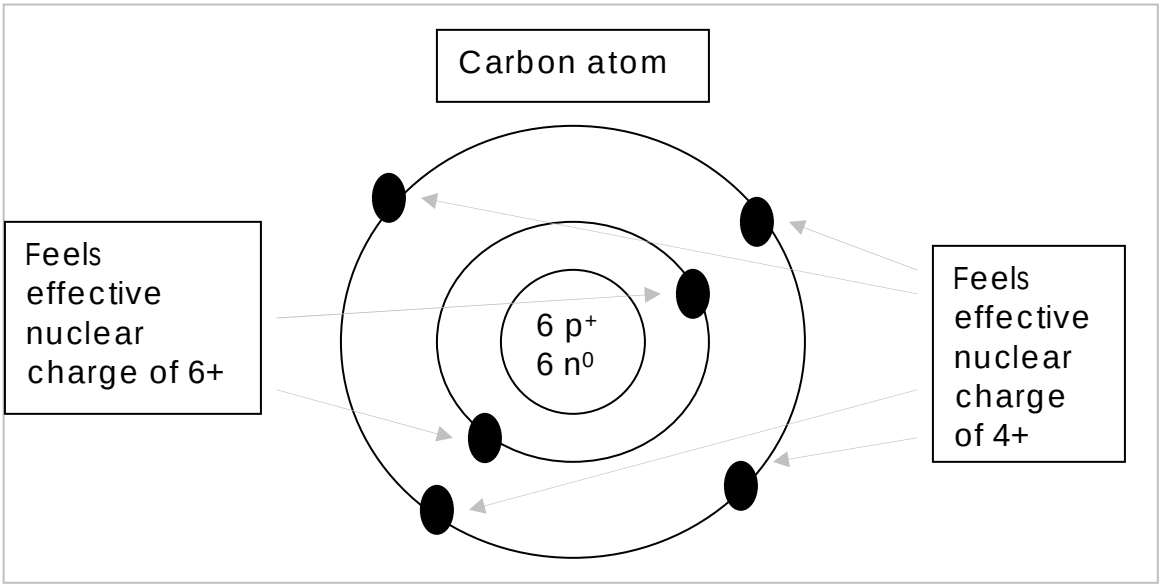
- **Electron Affinity**
  - Definition: how well an anion will hold onto it's extra electron
  - Trend: increase from left to right and decreases from top to bottom
  - More negative means higher stronger hold on added electrons

The above patterns can be explained using other patterns

- **Atomic radius**
  - Definition1: distance from center of nucleus to outer energy level
  - Definiton2: half the distance between the center of two nuclei of a diatomic molecule
  - Trend: decreases from left to right and increases from top to bottom within given groups.

- **Nuclear charge**
  - Definition: the charge in the nucleus which comes from the number of protons.
  - Trend: increase from left to right and increases from top to bottom

- **Shielding effect**
    - Definition: electrons are attracted to the nucleus because opposite charges attract but outer electrons have less attraction because the inner electrons are blocking them
    - Trend: is constant within a given period and increases within given groups from top to bottom.



Making Predictions

1. Compared to nonmetals, are metals more or less likely to form positive ions?
    a. Metals are more likely to form positive ions
2. Why is fluorine likely to gain an electron?
3. Why is sodium likely to lose an electron?
4. Why is calcium likely to lose two electrons?
5. Why does carbon form covalent compounds?
6. Does oxygen share electrons fairly with hydrogen in a water molecule?