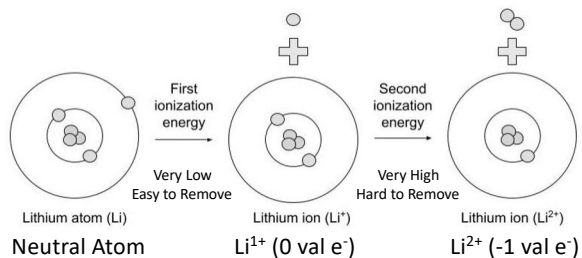


Formation of Ions

Ionization Energy

Energy required to remove an electron from atom to form an ion



3

Formation of Ions

Ionization Energy Trends

INCREASING IONIZATION ENERGY

Not every element always falls the IE trend, for example noble gases (8A/18) don't form ions (*full octet*)

Ionization Energy

Group Trend (*left to right*)
Increases Across Table

More val e^- make it harder to remove val e^- from atom

Period Trend (*up and down*)
Decreases Down Table

Electrons in higher Energy Levels are pushed away from nucleus by inner e^-

4

Formation of Ions

Metallic Character Trends

Metallic Character is an atoms desire to lose electrons and form an empty outer (valence) level for the atoms.

Metallic Character

Group Trend (*left to right*)
Decreases Across Table

More val e^- make it harder to lose e^- (*metals lose e^-*)

Period Trend (*up and down*)
Increase Down Table

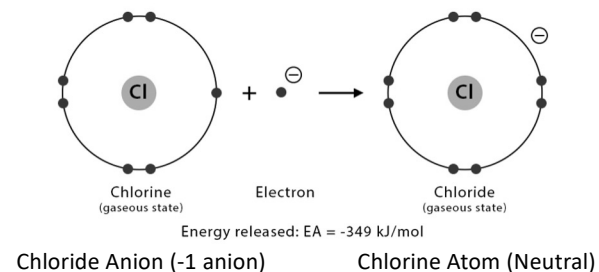
Larger atoms have an easier time removing e^- due to the larger amount in inner e^-

5

Formation of Ions

Electron Affinity

Energy lost or gained when an atom gains an electron

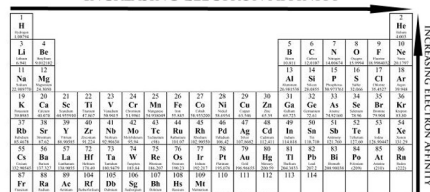


6

Formation of Ions

Electron Affinity Trends

INCREASING ELECTRON AFFINITY



Metals (groups 1A – 3A + transition elements) do not lose electrons, so the electron affinity values are much higher than expected

Electron Affinity

Group Trend (*left to right*)
Increases Across Table

Atoms closer to an octet of e^- lose more energy when forming ions

Period Trend (*up and down*)
Decreases Down Table

Lower atoms are pulled less by p^+ and lose less energy

Formation of Ions

Comparing Ionization Energy and Electron Affinity

Energy required to remove an electron from atom to form an ion

Element Type	Ionization Energy	Electron Affinity
Metals (0 – 4 Valence Electrons)	Low IE (<i>easy to lose e^-</i>) Atoms want to lose e^-	Low EA (<i>Low desire to gain e^-</i>) Atoms don't want e^-
Non-Metals (5 – 8 Valence Electrons)	High IE (<i>hard to lose e^-</i>) Atoms don't want to lose e^-	High EA (<i>High desire to gain e^-</i>) Atoms want to gain e^-

In general: Atoms always want to lose heat (q), - to become more stable

7

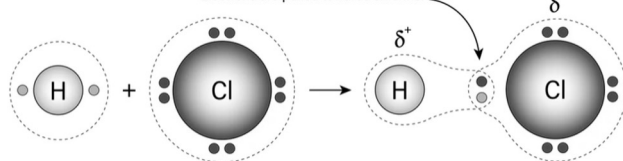
8

Formation of Ions

Electronegativity

Atoms ability to attract electrons towards itself

Electrons are pulled towards chlorine.



Electronegativity: $H(2.2) < Cl(3.6)$

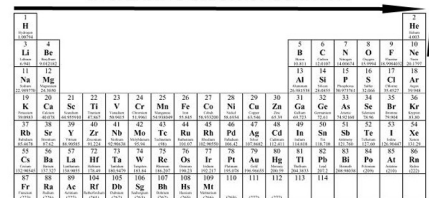
Metals/Hydrogen – Low Electroneg. Non-Metals – High Electroneg.

Higher Electronegativity = More pull on electrons towards itself in bond

Formation of Ions

Electronegativity Trends

INCREASING ELECTRONEGATIVITY



Metals (groups 1A – 3A + transition elements) want to lose electrons, so they generally have a low attraction to their own valence electrons

Electronegativity

Group Trend (*left to right*)
Increases Across Table

Atoms have a stronger attraction to e^- the closer they are to an octet of e^-

Period Trend (*up and down*)
Decreases Down Table

Lower atoms have more inner e^- to the val. e^-

9

10