

Trends of the Periodic Table

Atomic Radius- the radius of a neutral atom, measured by 1/2 the distance between nuclei when bonded to another like atom.

Trend

Increases down a group because an extra principle energy level is added

Decreases across a period because an extra proton and electron is added for each atom, which increases the attraction of the nucleus to the surrounding electrons

Ionization Energy-the energy it takes to remove one electron from a neutral atom in gaseous state

High ionization energy- very difficult to remove an electron

Low ionization energy- very easy to remove an electron

Trend

Decreases down a group, increases across a period

Note:

Smaller atoms hold their outer electron more tightly, making it harder to remove an electron, therefore it takes more energy to remove them

Larger atoms do not hold their outer electrons as tightly, making it easier to remove an electron, therefore it takes less energy to remove them

Electron shielding- the reduction of the attractive forces between the positively charged nucleus of an atom and the outermost electrons

Electronegativity- the tendency of an atom to attract bonding electrons to itself when bonded to another atom.

Note:

The smaller the atom, the more it will pull bonded electrons towards its nucleus, therefore higher electronegativity.

Noble Gases are not included in this trend because they are unreactive

Trend	Down a Group	Across a Period	Include Noble Gases in trend	Highest Value
Atomic Radius	Increases	Decreases	Yes	Francium
Ionization Energy	Decreases	Increases	Yes	Helium
Electronegativity	Decreases	Increases	No	Fluorine

Trend	Atomic Radius	Ionization Energy	Electronegativity
Smaller Atoms	↓ Lower	↑ Higher	↑ Higher
Larger Atoms	↑ Higher	↓ Lower	↓ Lower

Ionic Radius- the radius of an atom after it has gained or lost an electron

Anion- a negative ion, an atom that has gained electrons

Cation- a positive ion, an atom that has lost electrons

The radius of a cation will be much smaller than the original neutral atom

The radius of an anion will be much bigger than the original neutral atom.

Isoelectronic- an atom or ion with the same number of electrons as another ion or atom

For isoelectronic ions...

the greater the positive charge the smaller the radius

the greater the negative charge the larger the radius

Reactivity

Metals- the bigger the atom, the more reactive

Large atomic radius

Smaller ionization energy-easier to take electrons, because they are excellent electron givers

Non metals- the smaller the atom, the more reactive

Excellent electron takers

Smaller atomic radii

High ionization energy- very hard to take electrons

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Group 1- Alkali Metals- soft metals, highly reactive (+1)

Group 2- Alkaline Earth metals, hard metals, quite reactive (+2)

Group 3-12 Transition Metals- d-block metals, somewhat reactive (variable positive charges)

Inner Transition metals- Lanthinides/Actinides, f block metals

Halogens Group 17- distinct colors, 2 gases, 1 liquid, 1 sold, poisonous, quite reactive

Noble Gas- unreactive (inert) colorless gases, unreactive because of stable electron configurations