Periodic Trends

"I can" compare trends of different atoms on the periodic table

Assignment 3H

Electrons and the Atom
Due Wednesday, 9/26/22

Assignment 3I

Energy of Ions
Due Thursday, 9/27/22

Assignment 3J

Periodic Trends
Due Friday, 9/28/22

CP Chemistry Agenda

Wednesday, October 26, 2022

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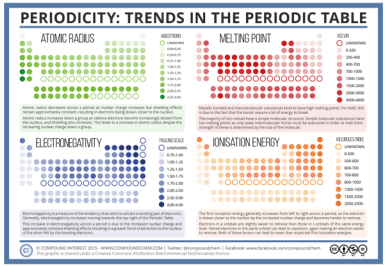
Periodic Trends

All properties of atoms can be compared to each other based on position of atom / ion on the periodic table.

Common Periodic Trends

Atomic Radius
Ion Radius
Ionization Energy
Electron Affinity
Electronegativity
Metallic / Non-Metallic Character
Melting Point / Freezing Point



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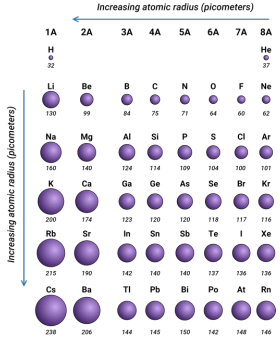
Periodic Trends – Atom Size



Group Trend (*top to bottom*)
Atoms get **larger** from **top to bottom** *due to more inner electrons farther from nucleus*

Period Trend (*left to right*)
Atoms get **slightly smaller** from left to right *due to more protons pulling on the same outer valance electrons.*

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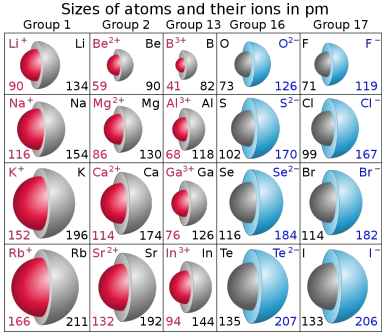
Periodic Trends - Ion Size

Sizes of atoms and their ions in pm



Neutral Atom/Cation (*+ ion*)
Cations are always **smaller than** the **neutral atom**
Cations are smaller due to losing valance electrons

Neutral Atom/Anion (*- ion*)
Anions are always **larger than** the **neutral atom**
Anions are larger due to increased shielding of added inner electrons in ion

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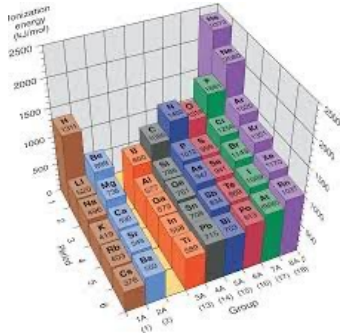
Periodic Trends – Ionization Energy



Group Trend (*top to bottom*)
Ionization Energy goes **slightly down** from top to bottom.
Larger atoms have more e⁻ shielding / e⁻ removal easier.

Period Trend (*left to right*)
Ionization Energy goes **up** across the table.
Non-metals do not want to lose electrons requiring more energy to lose electrons.

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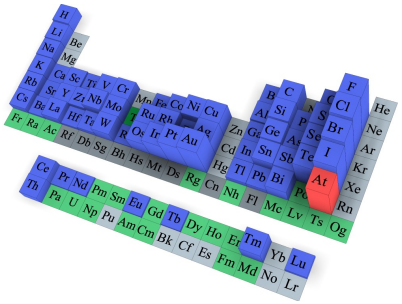
Periodic Trends – Electron Affinity



Group Trend (*top to bottom*)
Electron Affinity goes **slightly down** from top to bottom.
Larger atoms are slightly more stable, have lower e⁻ desire

Period Trend (*left to right*)
Electron Affinity goes **up** across the table.
Non-metals want to gain electrons increasing desire to obtain electrons

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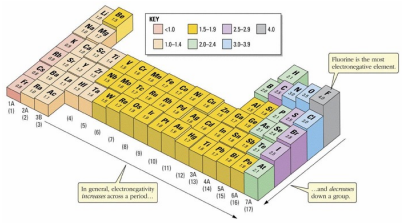
Periodic Trends – Electronegativity



Group Trend (*top to bottom*)
Electronegativity goes **slightly down** from top to bottom.
Larger atoms are less likely to share electrons.

Period Trend (*left to right*)
Elecronegativity goes **up** across the table.
The closer an atom is to 8 val. e⁻ the more it is likely to share electrons to get an octet of e⁻

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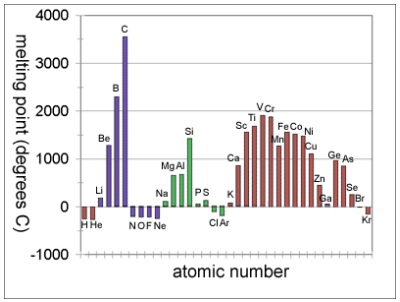
Periodic Trends – Melting / Boiling Point



Metals tend to have **higher** melting and boiling points than non-metals.
Metals have electron structures that lead to stronger solids that are harder to melt and boil.
Harder = Higher MP/BP

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