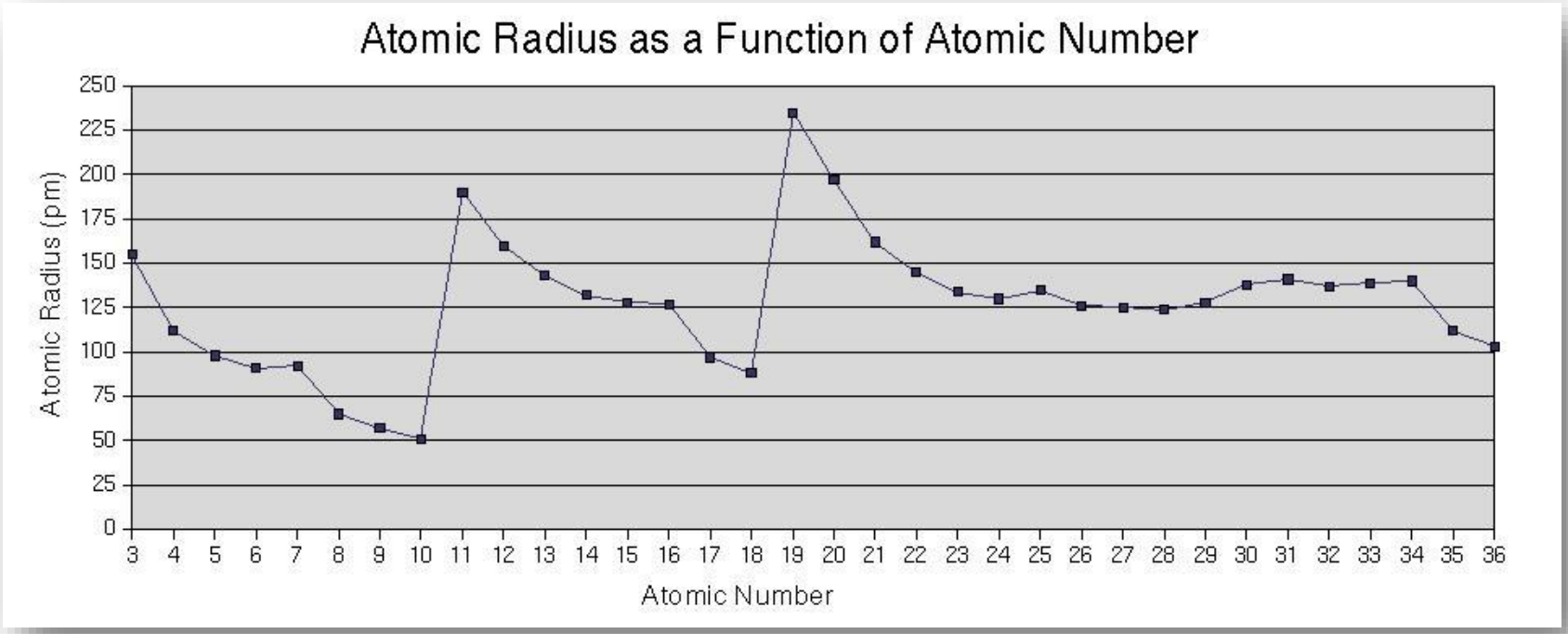
Section 3: Periodic Trends

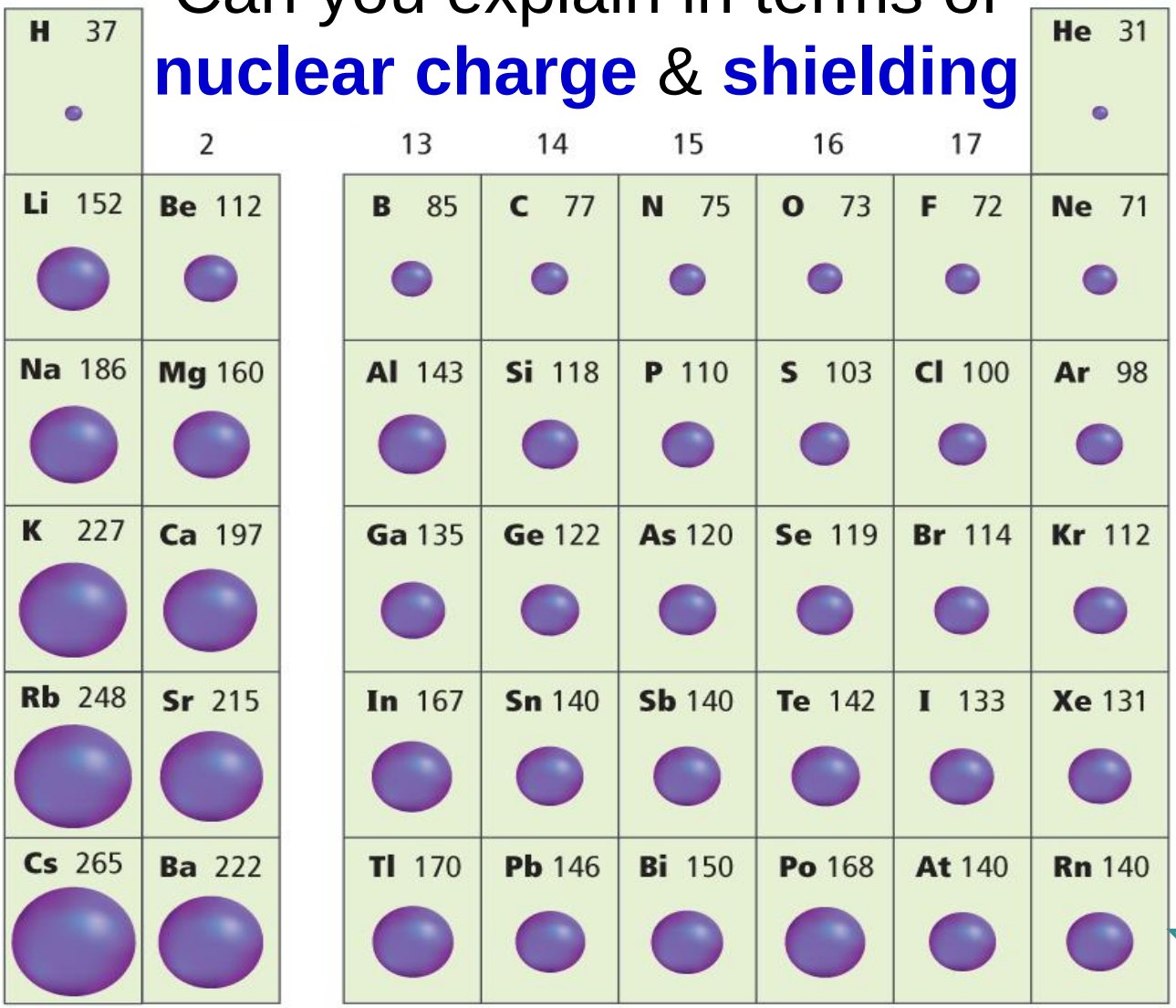


Periodic Trends

Atomic Radius *decreases*

Can you explain in terms of **nuclear charge** & **shielding**

Atomic Radius *increases*

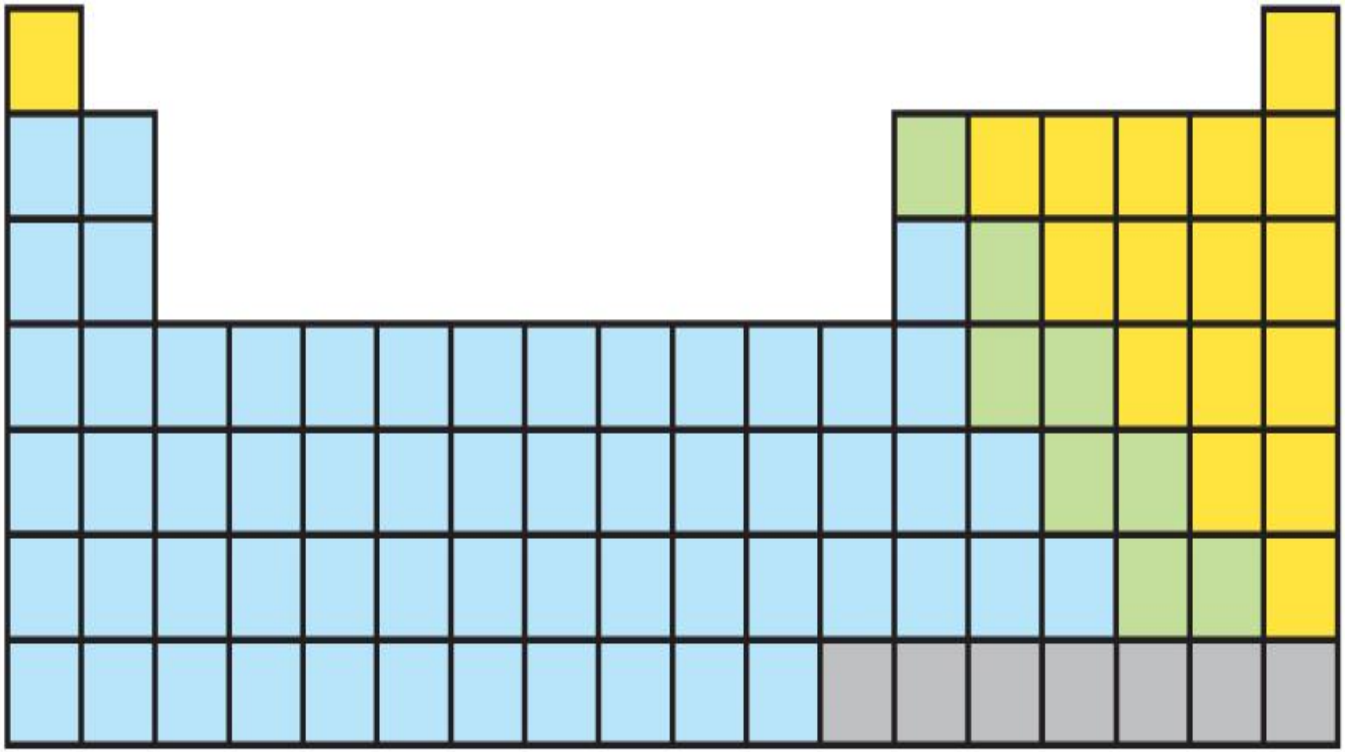


Periodic Trends

Atomic Radius *decreases*

Ionization Energy *???*

Electronegativity *???*



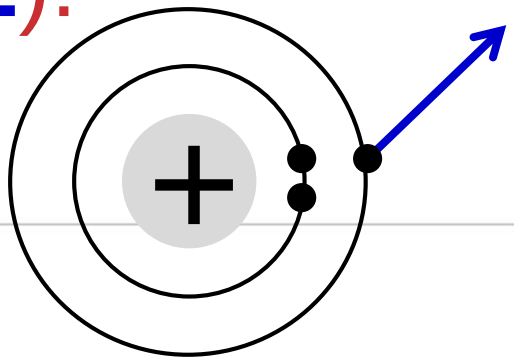
Electronegativity *???*

Ionization Energy *???*

Atomic Radius *increases*

Ionization Energy (IE):

- energy required to remove an e^-



Down a Group: decreases ↓

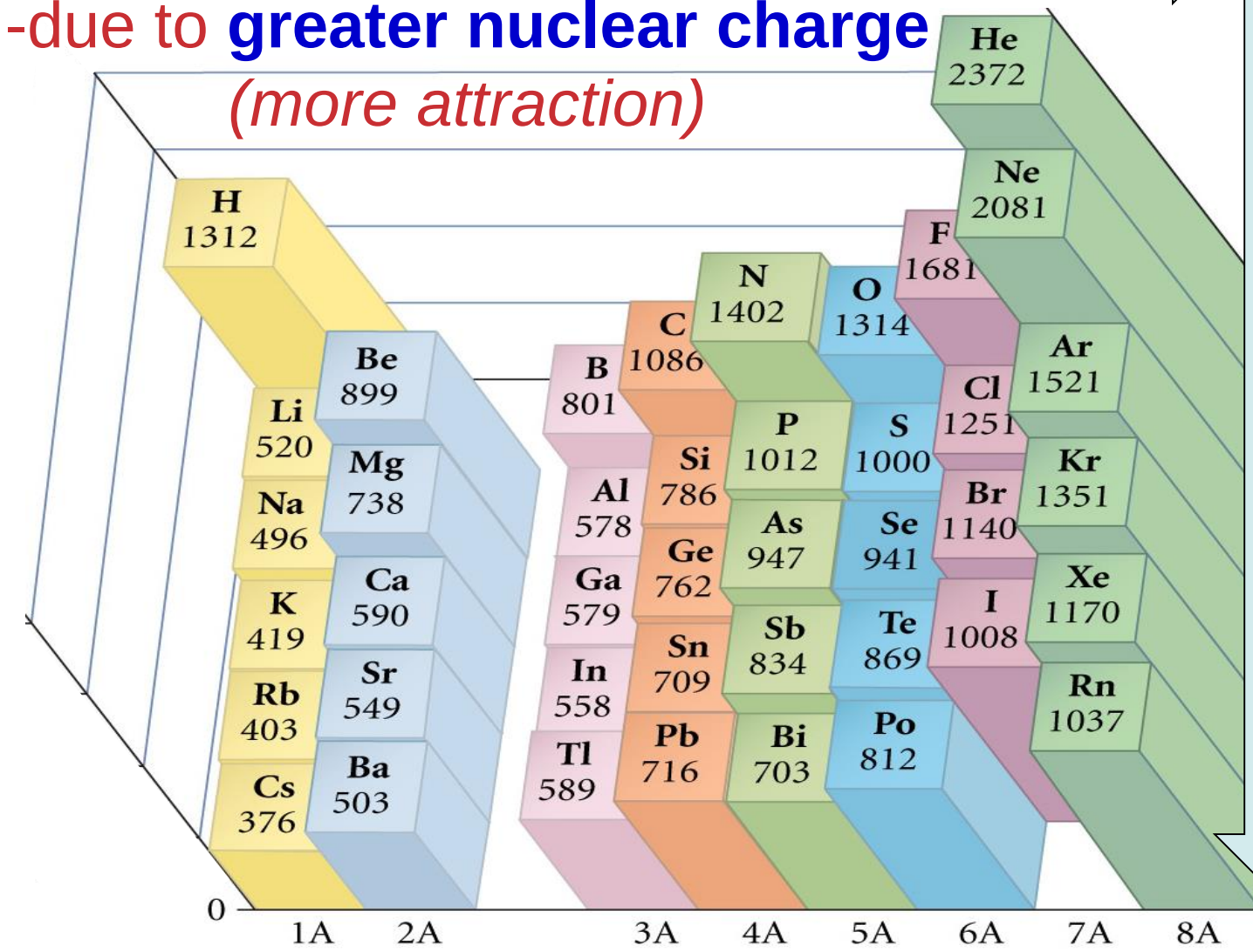
Across a Period: increases ↑

WHY?

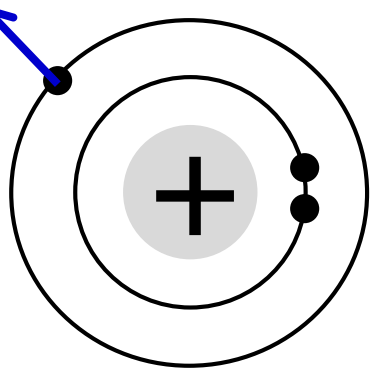
First IE Trends

increases across a period

-due to **greater nuclear charge**
(more attraction)



decreases down a group

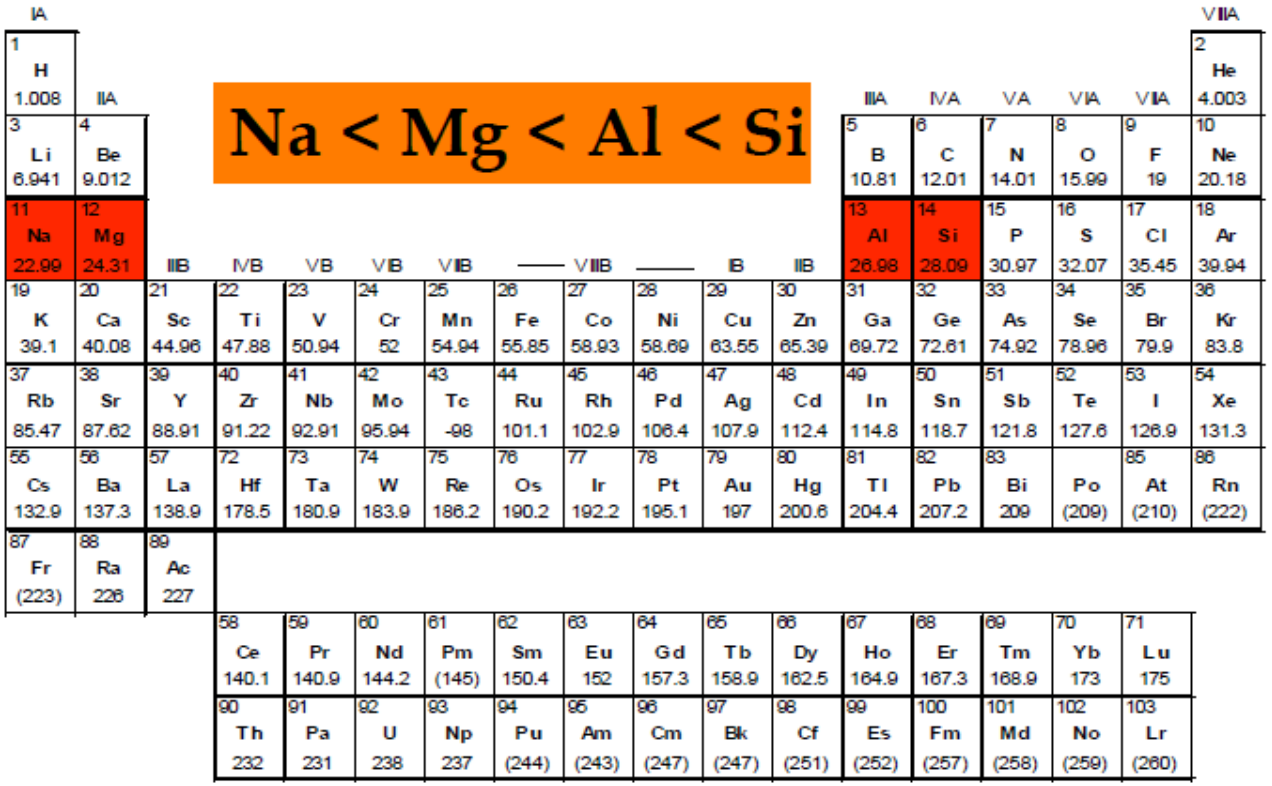


-due to ***more shielding***
(less attraction)

Example of Ionization Energy Trend

- Arrange the following elements in order of increasing first ionization energy.

Mg, Na, Si, Al



Electronegativity (EN) Trends

- atom's **ability to attract** bonded **e⁻'s**

increases across a period

-due to **greater nuclear charge** *(more attraction)*

H 2.1							He --
Li 1.0	Be 1.6						Ne --
Na 0.9	Mg 1.3						Ar --
K 0.8	Ca 1.3						Kr --
Rb 0.8	Sr 1.0						Xe 2.6
Cs 0.8	Ba 0.9						Rn --
Fr 0.7	Ra 0.9						

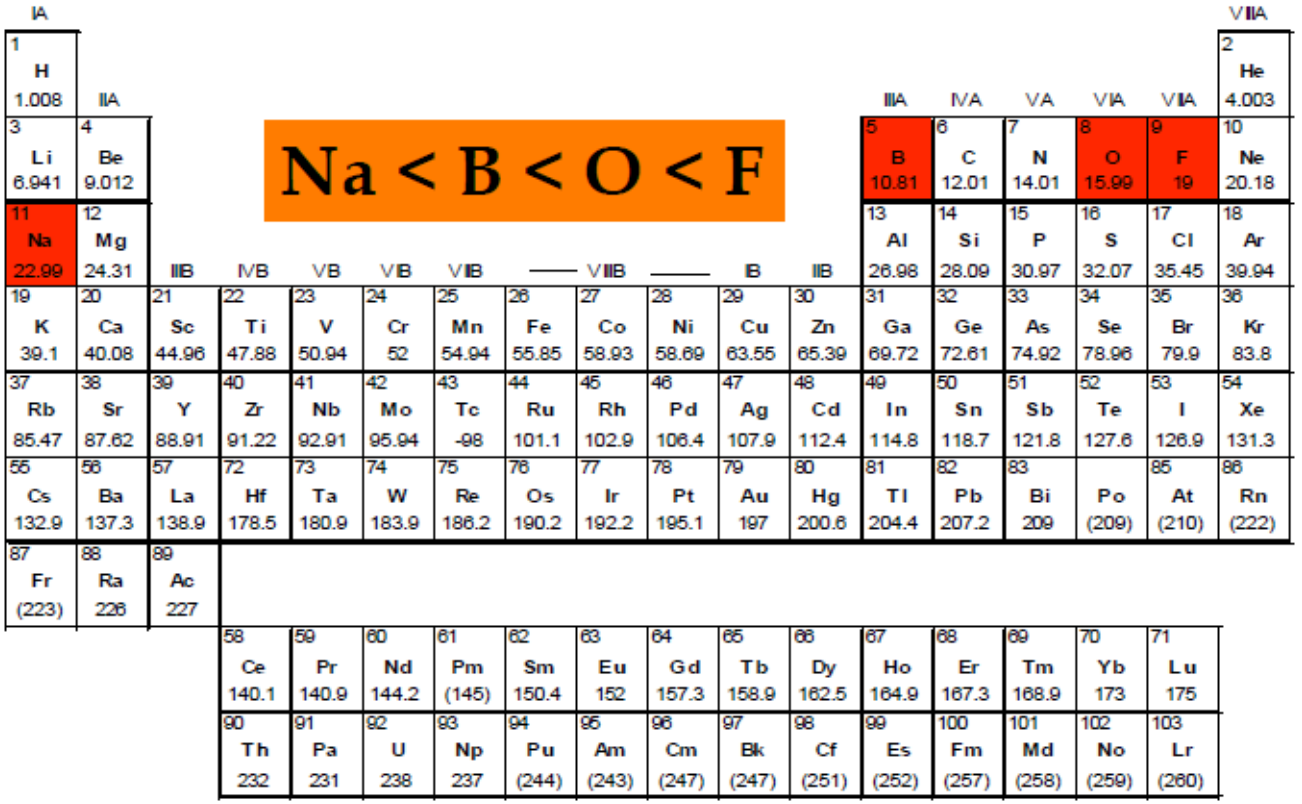
B 2.0	C 2.5	N 3.0	O 3.5	F 4.0	
Al 1.6	Si 1.9	P 2.2	S 2.5	Cl 3.0	
Ga 1.6	Ge 2.0	As 2.2	Se 2.6	Br 2.8	
In 1.8	Sn 2.0	Sb 2.1	Te 2.1	I 2.7	
Tl 2.0	Pb 2.3	Bi 2.0	Po 2.0	At 2.2	
	Uuq				

decreases down a group

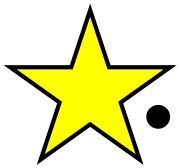
-due to ***more shielding*** *(less attraction)*

Example of Electronegativity Trend

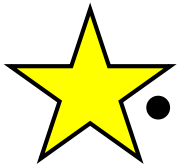
- Arrange the following elements in order of increasing electronegativity: B, Na, F, O



Overall Reactivity – Very Important!

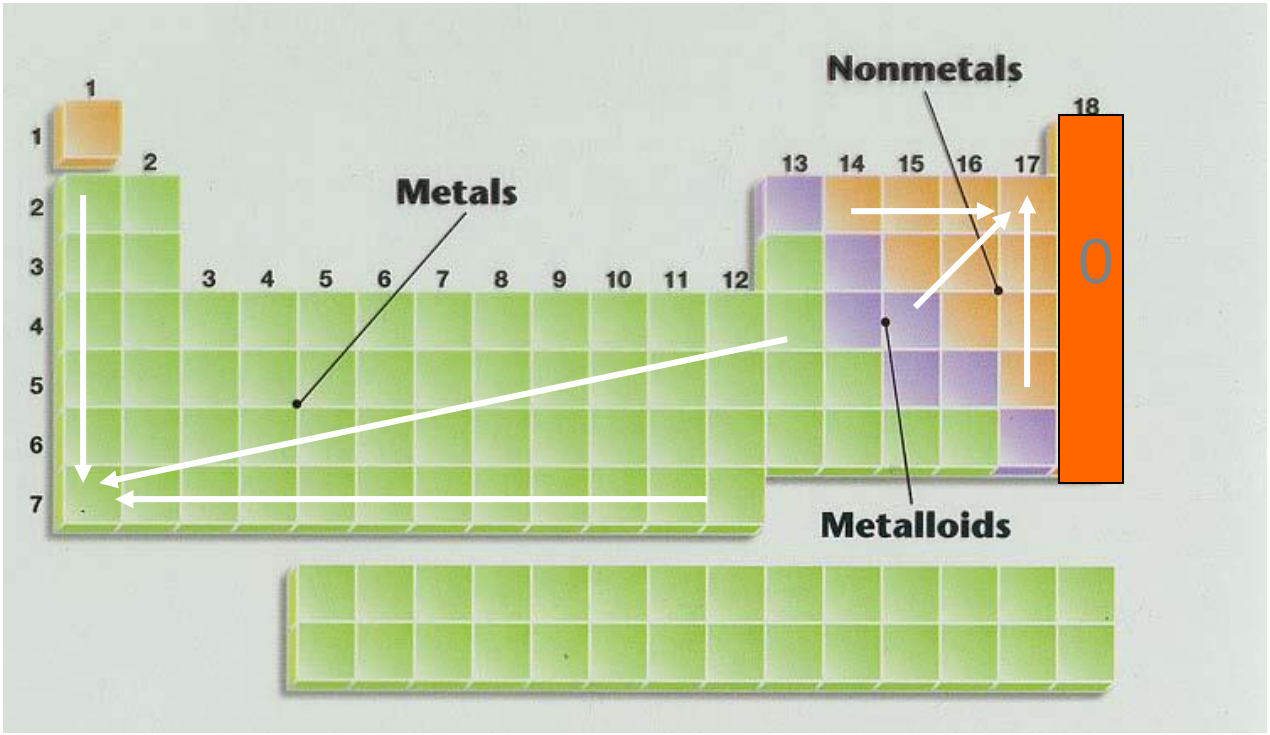


- The most reactive **metals** are the largest since they are the best electron givers.



- The most reactive **nonmetals** are the smallest ones since they are the best electron takers.

Overall Reactivity



Periodic Trends (Summary)

Atomic Radius ***decreases***

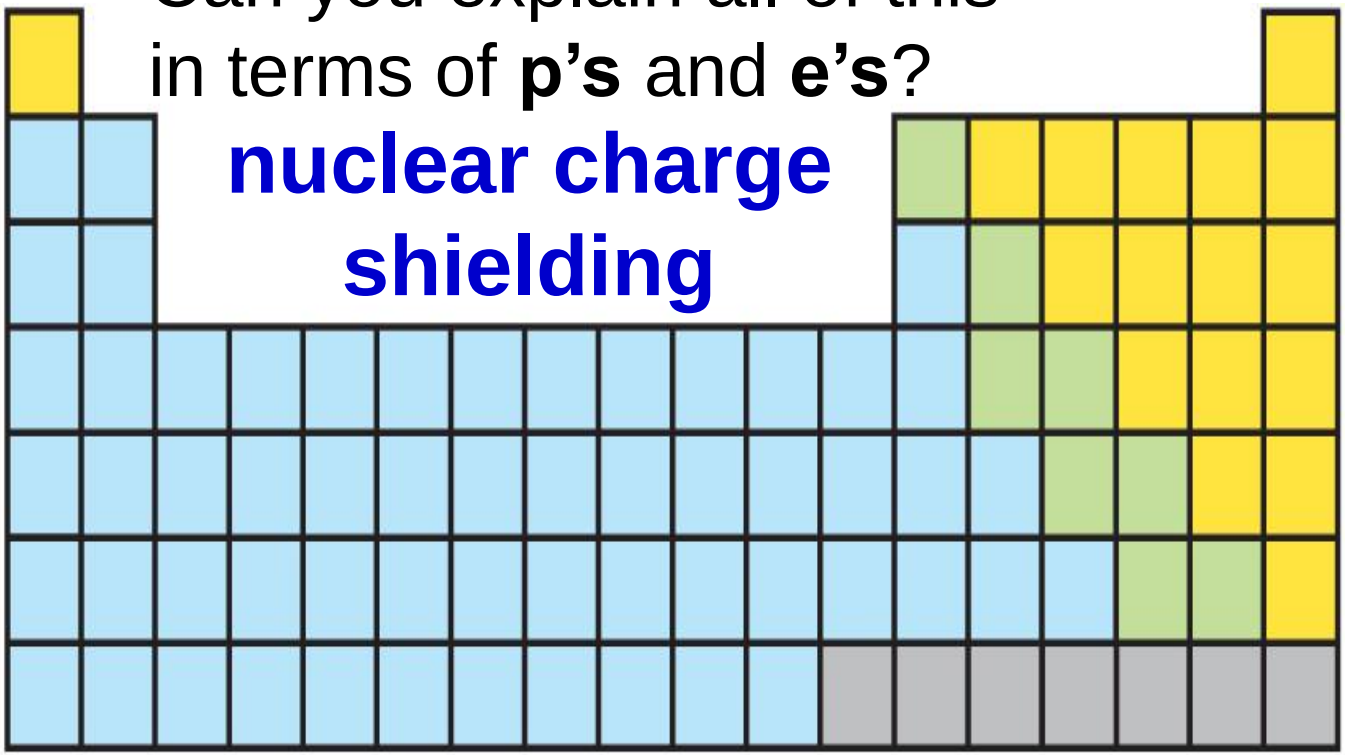
Ionization Energy ***increases***

Electronegativity ***increases***

Can you explain all of this in terms of **p's** and **e's**?

nuclear charge

shielding



Electronegativity ***decreases***

Ionization Energy ***decreases***

Atomic Radius ***increases***

Periodic Trends (Summary)

Atomic Radius ***decreases***

Ionization Energy ***increases***

Electronegativity ***increases***

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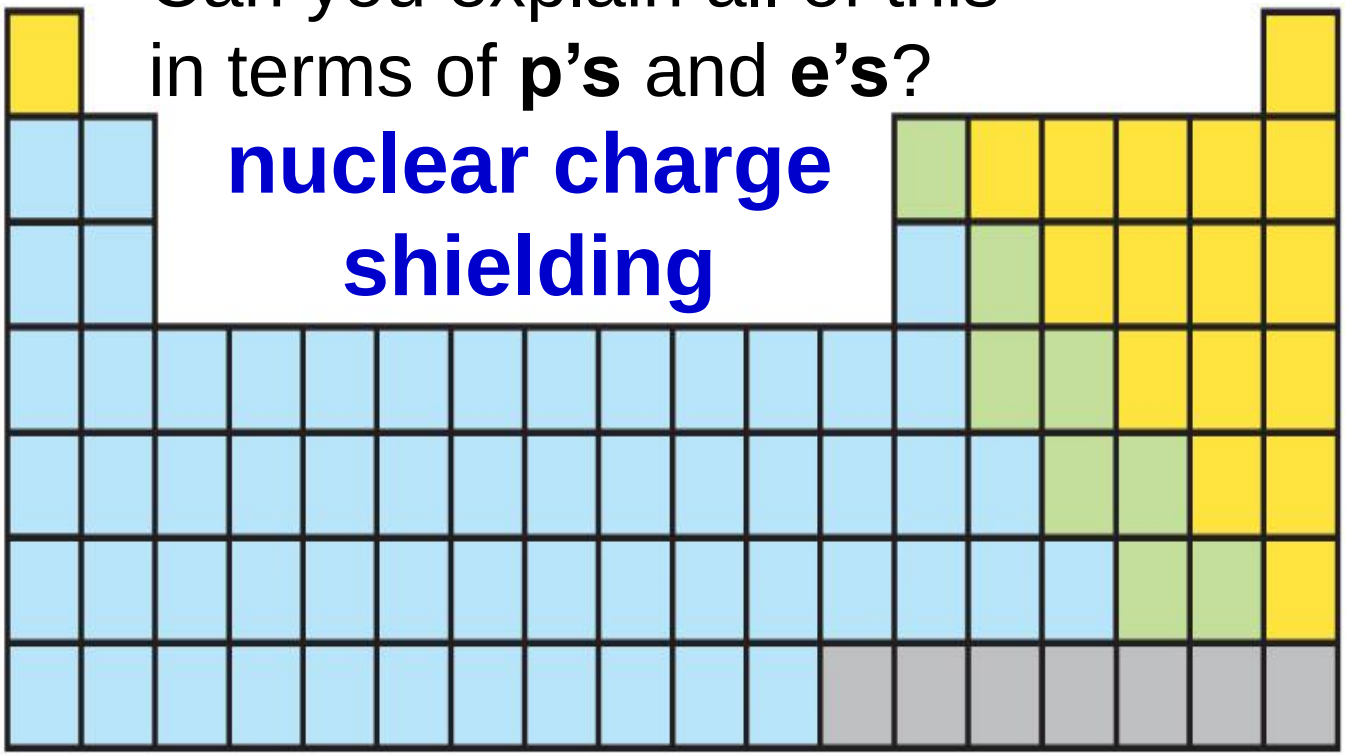

Electronegativity ***decreases***

Ionization Energy ***decreases***

Atomic Radius ***increases***