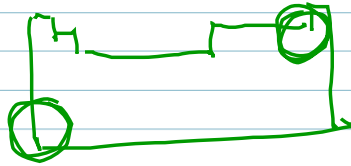


PERIODIC TRENDS

atomic radii  
ionic radii  
IE, EA, EN



\* KEY IDEA → Start w/ answer

TRENDS ≠ EXPLANATION

"r"  $\updownarrow$  ⇒  $\Delta E$  levels ⇒  $\Delta$  distance nucleus  $\leftarrow$   $e^-$   
 away

"Q"  $\leftarrow$  ⇒ effective nuclear charge (shielding)  $Z_{eff}$   
 estimate:  $Z - \left( \begin{matrix} \#e^-s \text{ in} \\ \text{filled lower} \\ \text{orbitals} \end{matrix} \right)$

Al:  $13 - 12 = +1$  (3p)  
 Cl:  $17 - 12 = +5$  (3p) ←

$$F = k \frac{Q_1 Q_2}{r^2}$$

ionic ⇒ lose  $e^-$ 's, get smaller radii  
 $Fe > Fe^{2+} > Fe^{3+}$  } Cations

IE. ⇒ remove an  $e^-$   
 $\downarrow$  (Cs, Fr)  $\uparrow$  (F, Cl)

gain  $e^-$ 's, get larger (anions)  
 $Cl^- > Cl$

"Successive" I.E.

"big jump" → next orbital

→ # valence  $e^-$ 's

Exceptions

1) s → p transition  
 $Be > B$  less E to remove (2p) than 2s

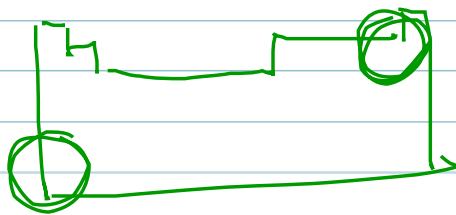
2)  $p^3 \rightarrow p^4$   $O > N$  →  $p^4 \rightarrow 2e^- \rightarrow$  minimizes  $e^-/e^-$

EN  $e^-$ 's in Base

DEN

# PERIODIC TRENDS

atomic radii  
ionic radii  
IE, EA, EN



\* KEY IDEA → Start w/ answer

TRENDS ≠ EXPLANATION

"r"  $\Rightarrow$  DE levels  $\Rightarrow$  distance nucleus  $\leftrightarrow$  e<sup>-</sup> away

"Q"  $\Rightarrow$  effective nuclear charge (shielding)  $Z_{eff}$

estimate:  $Z - (\#e^- \text{ in filled lower orbitals})$

Al:  $13 - 12 = +1$  (3p)

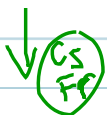
Cl:  $17 - 12 = +5$  (3p) ←

$$F = k \frac{Q_1 Q_2}{r^2}$$

ionic  $\Rightarrow$  lose e<sup>-</sup>'s, get smaller radius  
 Fe > Fe<sup>2+</sup> > Fe<sup>3+</sup> } cations

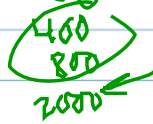
gain e<sup>-</sup>'s, get larger (anions)  
 Cl<sup>-</sup> > Cl

IE  $\Rightarrow$  remove an e<sup>-</sup>

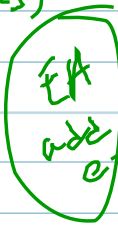


"Successive" I.E.

"big jump"  $\rightarrow$  next orbital



$\rightarrow$  # valence e<sup>-</sup>'s



## Exceptions

1) s  $\rightarrow$  p transition  
 Be > B less E to remove (2p) than 2s

2) p<sup>3</sup>  $\rightarrow$  p<sup>4</sup> (O)  $\rightarrow$  N  $\rightarrow$  p<sup>4</sup>  $\rightarrow$  2e<sup>-</sup>  $\rightarrow$  minimizes e<sup>-</sup>/e<sup>-</sup> DEN

