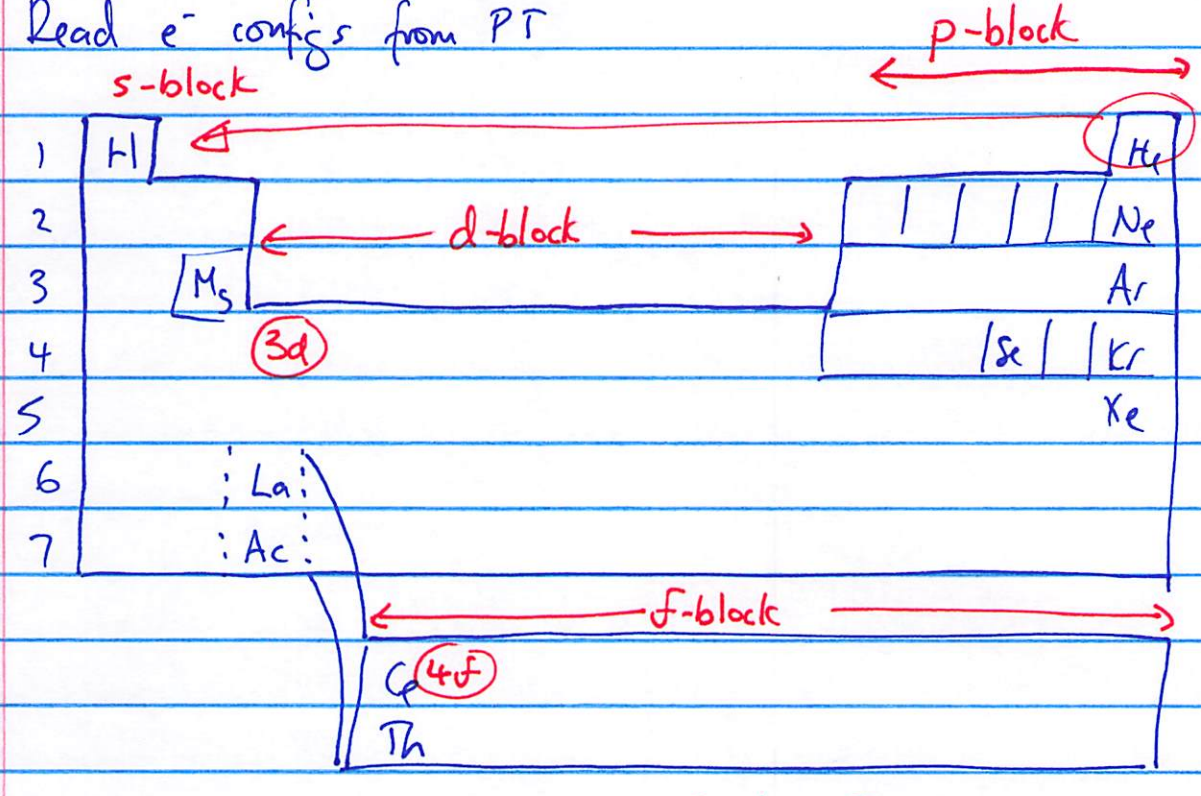
11/16/2018

Read e^- configs from PT



ex $_{12}Mg$ $1s^2 2s^2 2p^6 3s^2$ (2 valence e^-s) OR $[Ne]\,3s^2$

$_{34}Se$ $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^4$ OR $[Ar]\,4s^2 3d^{10} 4p^4$

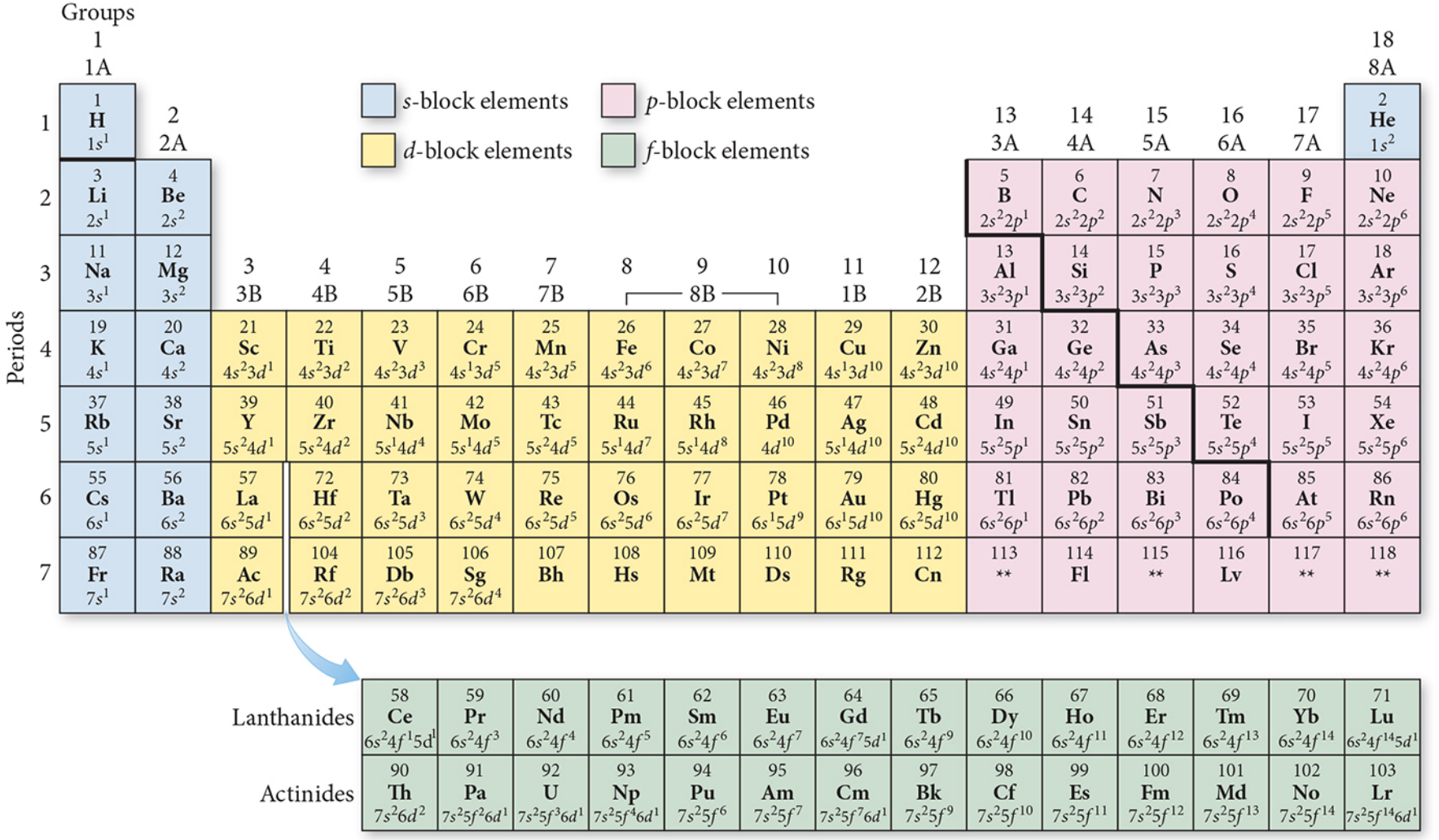
(6 valence e^-s)

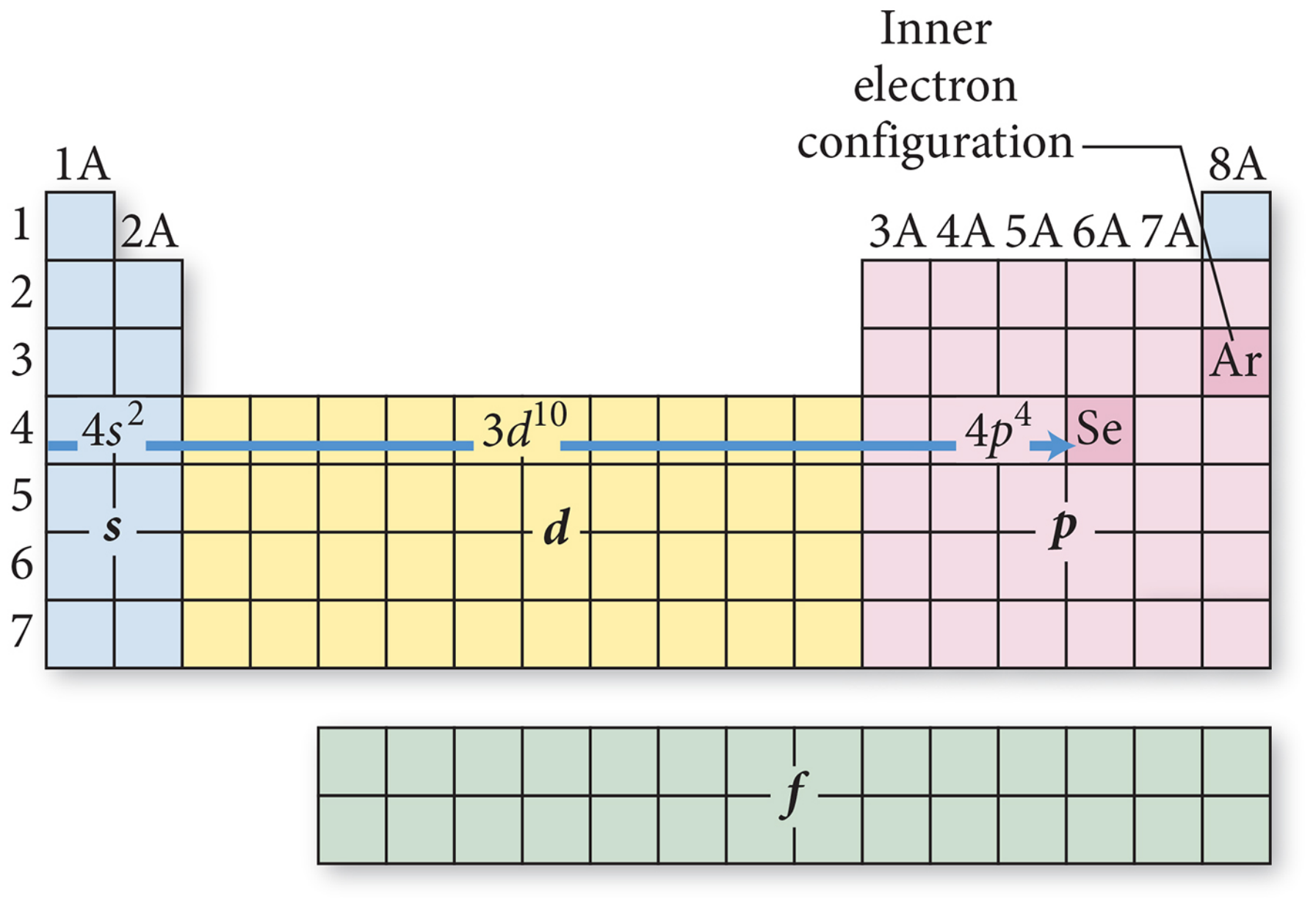
$_{48}Cd$ $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10}$ OR $[Kr]\,5s^2 4d^{10}$

(2 valence e^-)

Valence e^-s: in outermost shell

Orbital Blocks of the Periodic Table





some exceptions:

often: $ns^2 (n-1)d^4 \longrightarrow ns^1 (n-1)d^5$

ex: $_{24}Cr$ ~~[Ar] $4s^2 3d^4$~~ [Ar] $4s^1 3d^5$

50% filled.

WHY? ↑↓ → ↑ ↑↑↑↑↑

4s 3d → 4s 3d

$ns^2 (n-1)d^9 \longrightarrow ns^1 (n-1)d^{10}$

ex: $_{47}Ag$: ~~[Kr] $5s^2 4d^9$~~ → [Kr] $5s^1 4d^{10}$

100% filled

[Kr] ↑↓ ↑↓↑↓↑↓↑ → [Kr] ↑ ↑↓↑↓↑↓↑↓↑↓

5s $4d^9$ → 5s 4d

Valence e's + groups

Notice: gpIA

H		$1s^1$
Li	$1s^2$	$2s^1$
Na	$1s^2 2s^2 2p^6$	$3s^1$

1 valence e⁻

- all can lose 1 valence e^- + form inert gas core

ex: gp 7A F $1s^2 2s^2 2p^5$

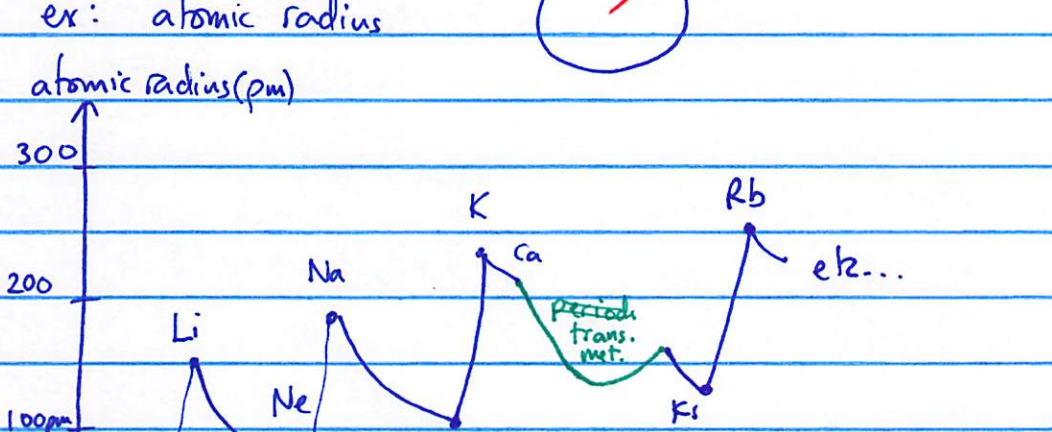
Cl $1s^2 2s^2 2p^6 3s^2 3p^5$ 7 valence e⁻s

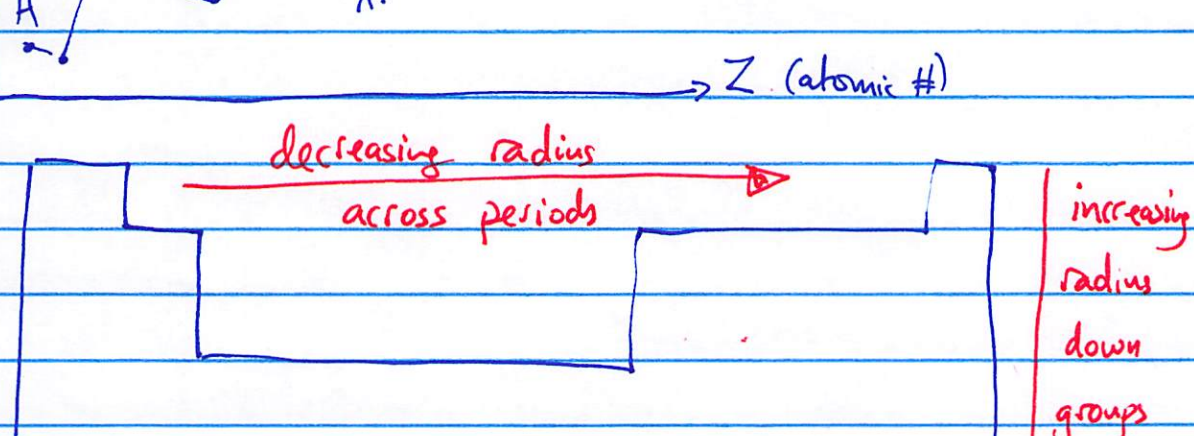
- all can gain 1e⁻ + form inert gas core!

F^-, Cl^-

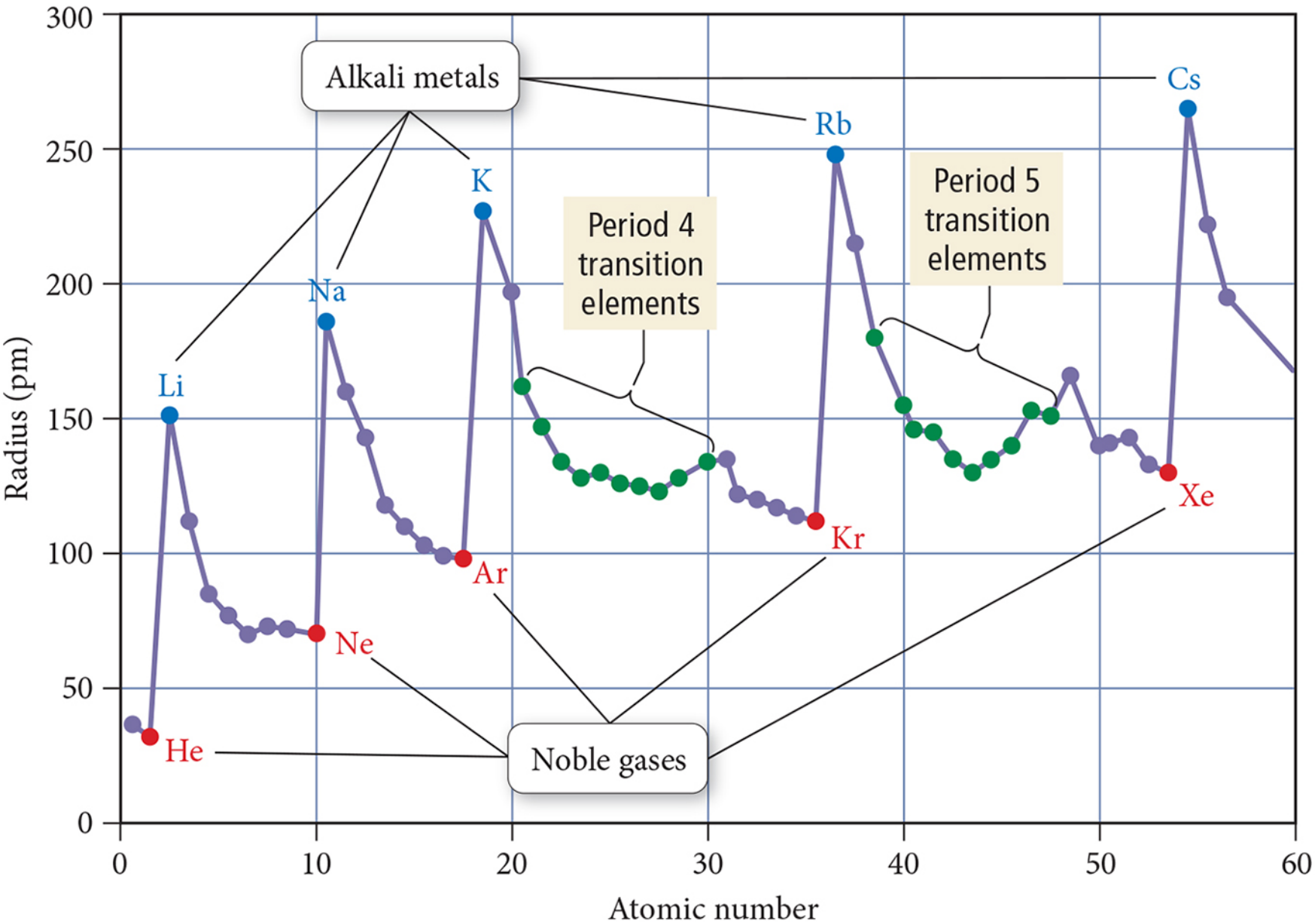
Periodic trends

ex: atomic radius





Atomic Radii



WHY?

Coulomb's law: $f \propto \frac{q_+ \times q_-}{r^2}$

$q_+ \longleftrightarrow q_-$ (r)

- the larger the +ve charge, the greater the attraction to the -ve charge! (e^-)

The size of atom is determined by outer (valence) e⁻s.

ex: $_{11}Na$ $11p^+$ $1s^2 2s^2 2p^6 3s^1$ ↑ valence e⁻

$_{13}Al$ $13p^+$ $1s^2 2s^2 2p^6 3s^2 3p^1$ ↑ valence e⁻

Outer e⁻s DO NOT feel full nuclear charge, Z!
... they feel an effective nuclear charge, Z_{eff}

where: $Z_{eff} = Z - S$

S: screening constant ↑ inner shell e⁻s "block" or "screen" some of the nucleus's charge.