APS110H1f2024 November 11, 2024

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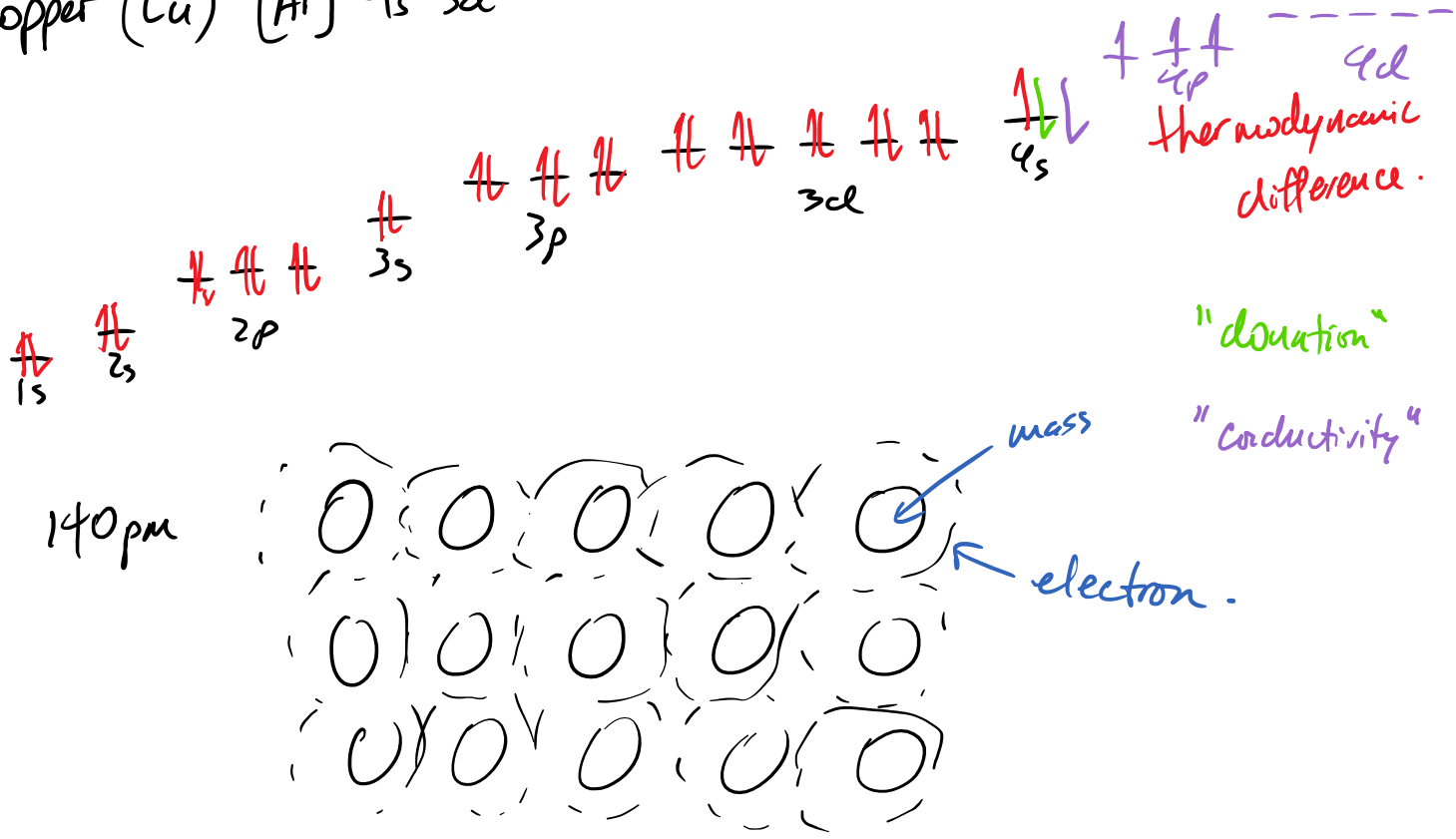
Copper (Cu) [Ar] $4s^1 3d^{10}$



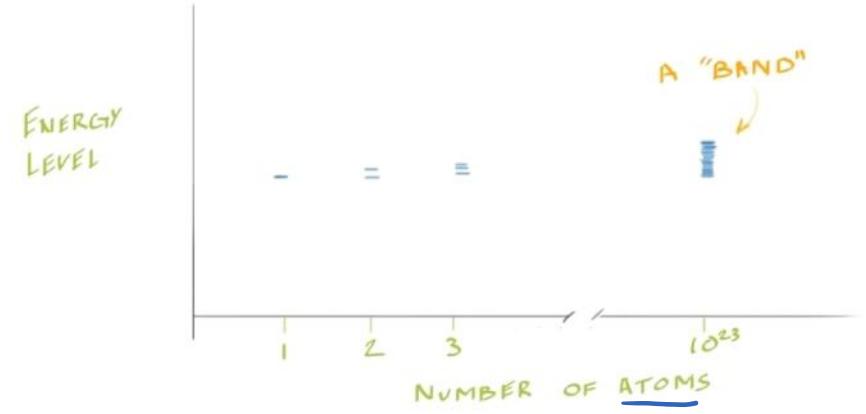


Figure 11. A schematic depiction of a particular energy level in an isolated atom, two atoms, three atoms, and so on up to a massive collection of atoms, as in a solid. The number of energy levels in a solid, for a corresponding single energy level in an isolated atom, is equal to the number of atoms, so that when we have a solid there are so many closely spaced energy levels as to be essentially continuous. We call this a band.

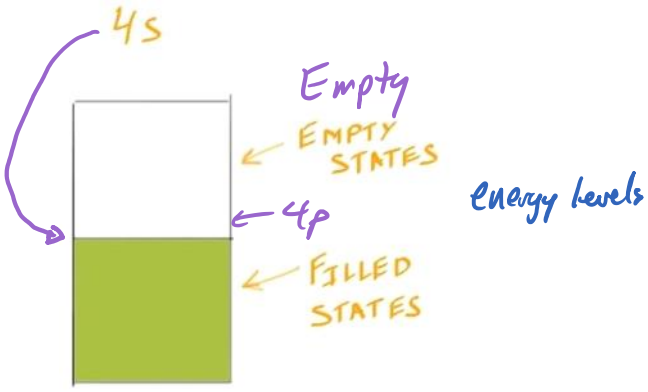


Figure 12. The band structure for copper.

Magnesium, Aluminum

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Magnesium (Mg) [Ne] $3s^2$ = $1s^2 2s^2 2p^6 3s^2 = Mg^0$

1s 2s 2p 3s 3p

electric conductivity
- weak / not good
- semi-conductor

Aluminum (Al) [Ne] $3s^2 3p^1 = Al^0$

1s 2s 2p 3s 3p

electric conductivity (back in the day)
- "ok" conductivity

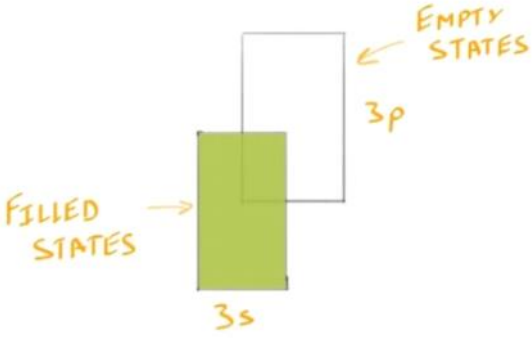

Figure 13. The band structure for magnesium.

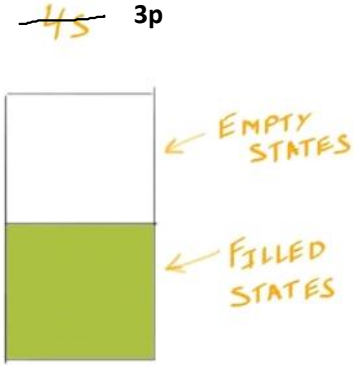

Figure 12. The band structure for ~~copper~~ aluminum

Metal, Salts... Octet rule

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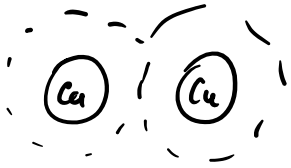
Octet rule "$ns^2\ np^6$" – "stable"/more stable

= 8



copper

$4s^1\ 3d^{10}$

$3p^6\ 4s^1$ ~~ $3p^6\ 4s^2$

donation

4 – –

~~ 3s 3p

3+3 = 6

↑

donated

chlorine (Cl) $[Ne]\ 3s^2 3p^5 \xrightarrow{Cl^-} [Ne]\ 3s^2 3p^6$

fluorine (F) $[He]\ 2s^2 2p^5 \xrightarrow{F^-} [He]\ 3s^2 3p^6$

bromine (Br) $[Ar]\ 4s^2 3d^{10} 4p^5 \xrightarrow{Br^-} [Ar]\ 4s^2 3d^{10} 4p^6$

iodine (I) $[Kr]\ 5s^2 4d^{10} 5p^5 \xrightarrow{I^-} [Kr]\ 5s^2 4d^{10} 5p^6$

potassium (K) $[Ar]\ 4s^1$

$= 1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 \xrightarrow{K^+} 1s^2 2s^2 2p^6 3s^2 3p^6$

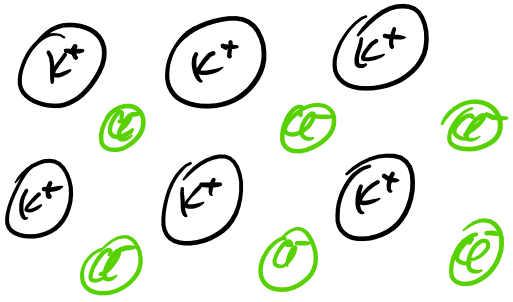
calcium (Ca) $= [Ar]\ 4s^2$

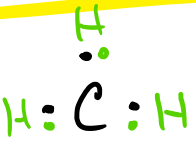
$= 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 \xrightarrow{Ca^{2+}} 1s^2 2s^2 2p^6 3s^2$

175 pm

KCl

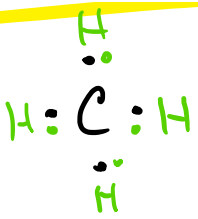
275 pm





C $1s^2 2s^2 2p^2 \xrightarrow{4} 1s^2 2s^2 2p^6$

H



$C \quad 1s^2\ 2s^2\ 2p^2 \xrightarrow[H]{4} 1s^2\ 2s^2\ 2p^6$

Periodic Table - Electron Configuration

November 8, 2024 2:00 PM