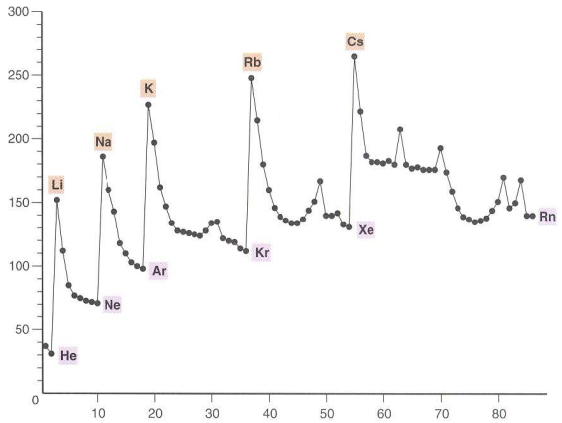
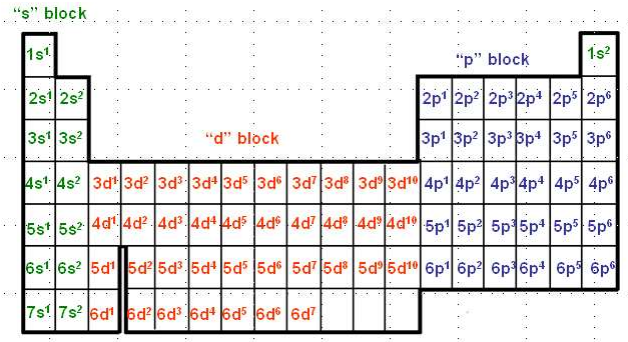
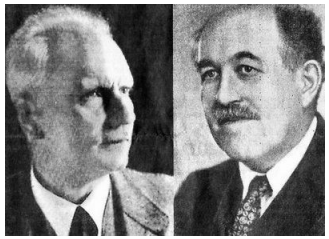
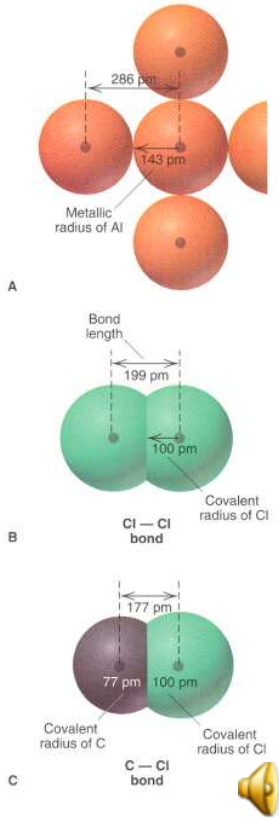




Chapter 8

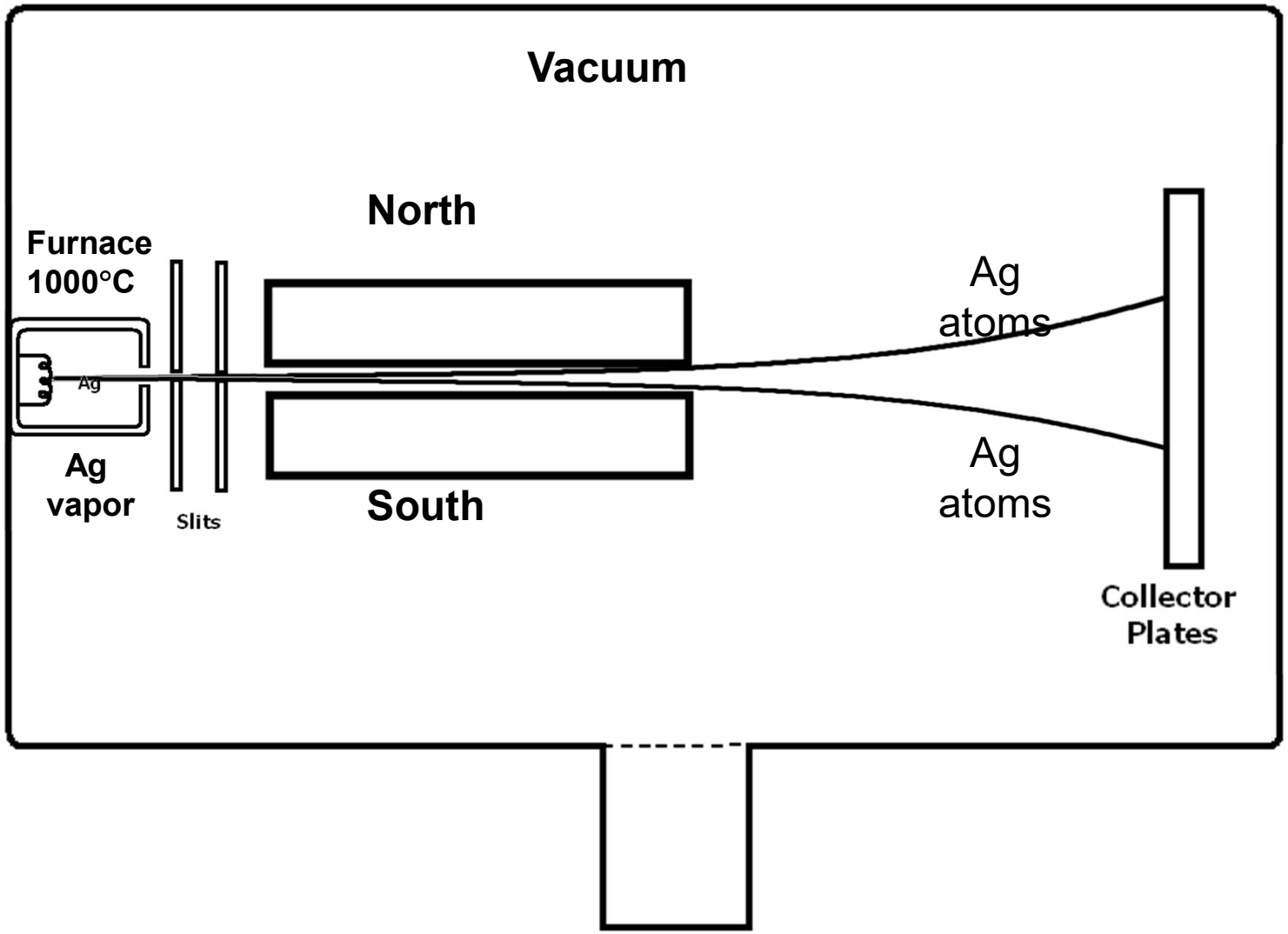


Electron Configuration and Chemical Periodicity



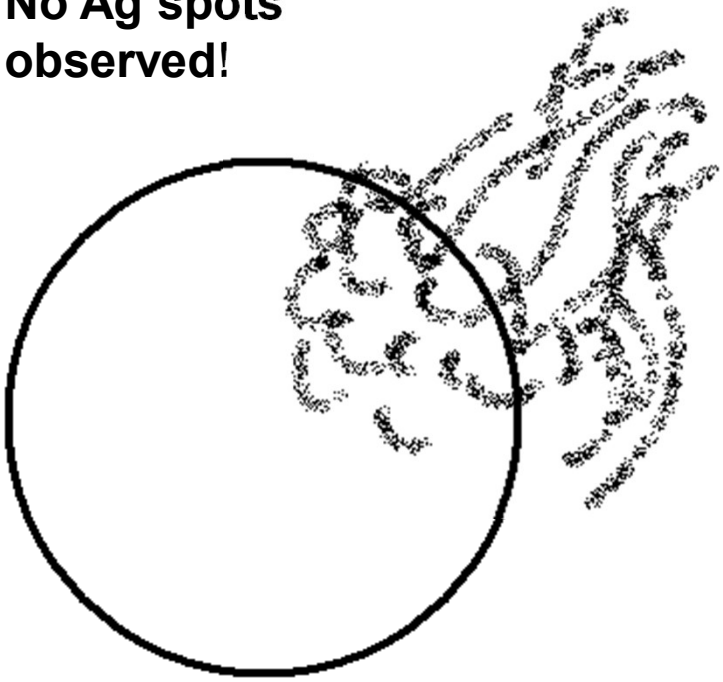
5	6	7	8	9	10
B	**C**	**N**	**O**	**F**	**Ne**
10.811	**12.011**	**14.007**	**16.000**	**18.998**	**20.18**

Stern-Gerlach Experiment

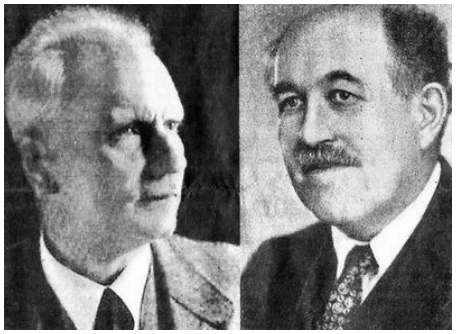


Stern-Gerlach Experiment

No Ag spots observed!



Collector Plate



Walther Gerlach **Otto Stern**

...as the story goes

...Stern smoked bad cigars

...Breathed on the collector plate (breath contained sulfur!)

...Trace Ag converted to Ag_2S

...Making the spots visible!

...Conclusion: Two types of electrons!

Stern-Gerach Experiment

Electrons come in two different types
are identified by the electron spin quantum number

$$\mathbf{m_s}$$

$m_s = +½$ (“Spin up”)

$m_s = -½$ (“Spin down”)

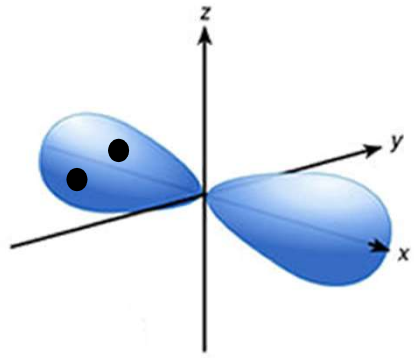
Pauli Exclusion Principle

No two electrons can have the same set of four quantum numbers

(n ℓ m_ℓ m_s)

in the same atom.

$2p_x$



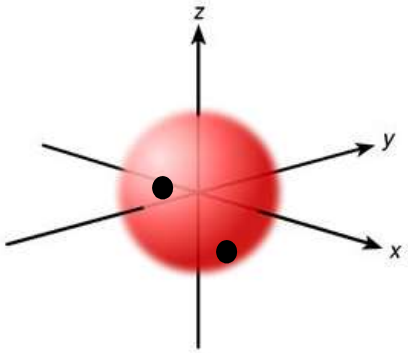
n = 2 ℓ = 1 m_ℓ = -1 m_s = +½

n = 2 ℓ = 1 m_ℓ = -1 m_s = +½

Maximum Capacity for $2p_x$ is 2 electrons!

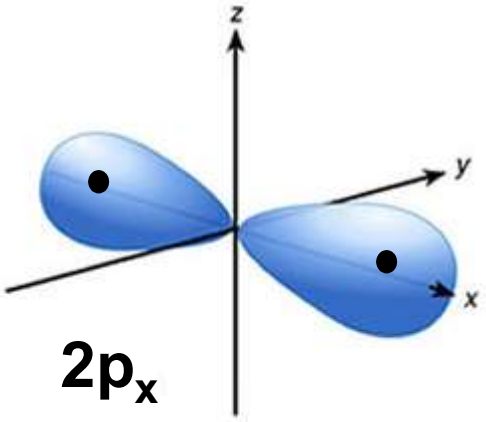
Electron Count

2s

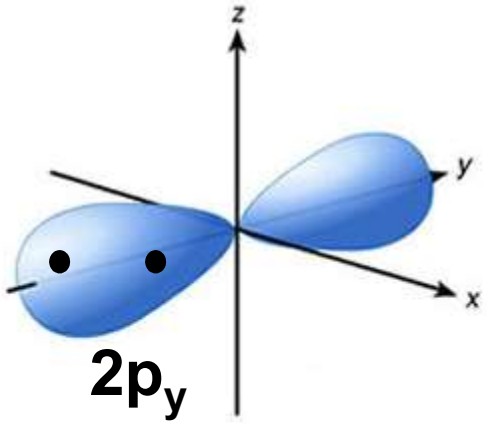


n = 2 ℓ = 0 m_ℓ = 0 m_s = +½

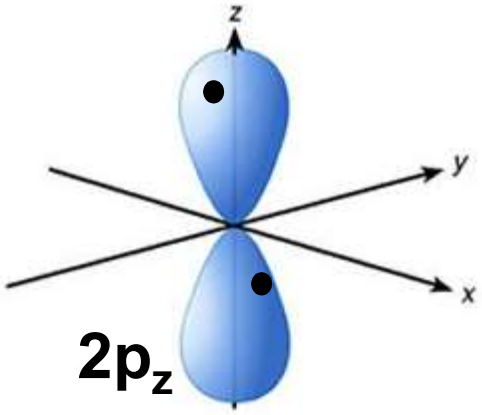
n = 2 ℓ = 0 m_ℓ = 0 m_s = -½



$2p_x$



$2p_y$



$2p_z$

n = 2 ℓ = 1 m_ℓ = -1 m_s = +½

n = 2 ℓ = 1 m_ℓ = -1 m_s = -½

n = 2 ℓ = 1 m_ℓ = 0 m_s = +½

n = 2 ℓ = 1 m_ℓ = 0 m_s = -½

n = 2 ℓ = 1 m_ℓ = 1 m_s = +½

n = 2 ℓ = 1 m_ℓ = 1 m_s = -½

n= 2: 2 electrons from 2s + 6 electrons from 2p = 8 electrons total

Total electrons = $2 \times n^2$ = 2×2^2 = 8 electrons total!