




12/2/15
Quantum Scientists

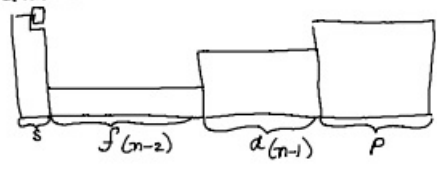
Scientist	Theory/Experiment	How to remember
Planck	"Quanta" amount of energy $E = h\nu$	$e^- E^- E^- \int \delta$ max quantity
Einstein	Photons - packets of light that are particles travelling in waveform. Photoelectric effect.	 little Einstein Einstein slept on a photon
Bohr	Energy levels (n) Atomic line spectrum	Bohr-ring Niels $\rightarrow n$ Bohr's rainbow
Compton	 Collision proved that photons are particles.	NOT straight outta Compton Compton Collision Dual Broglie
De Broglie	Dual Nature - all matter has mass (particle) + waveform, the larger an object is the harder it is to see its vibration	
Heisenberg	Uncertainty Principle: you cannot measure location and momentum (speed) simultaneously. - you must choose one or the other to study.	Uncertain how to spell Heisenberg Uncertain where an iceberg will go High speed Heisenberg
Pauli	Pauli Principle: the two e^- in an orbital must have opposite spins. $+1/2 -1/2$ or $\uparrow \downarrow$	Paulley D. always arguing w/ opposite opinion DJ Paulley spinning opposite directions
Hund	 e^- must be placed w/ topspin \uparrow in each available orbital before adding $\downarrow e^-$	Opposite spins Pauli Principle * Nosey Neighbor up down Hund over/Hunder


Quantum Numbers + Electron Configuration


4 Quantum Numbers give "address" of each e^- in an element:

1st Quantum Number: Energy level (n) e^- cloud 1-7

2nd Quantum Number: Sublevel (azimuthal) s, p, d, f



s = 1 orbital ($2e^-$) =  0

p = 3 orbitals ($6e^-$) =  $\begin{matrix} \times & -1 \\ & 0 \\ \delta & 1 \end{matrix}$

d = 5 orbitals ($10e^-$) $\begin{matrix} \mathcal{P} & z & 1 \\ & -2, -1, 0, 1, 2 \end{matrix}$

3rd Quantum number: magnetic - (m)
gives direction in space

f = 7 orbitals ($14e^-$) -3, -2, -1, 0, 1, 2, 3

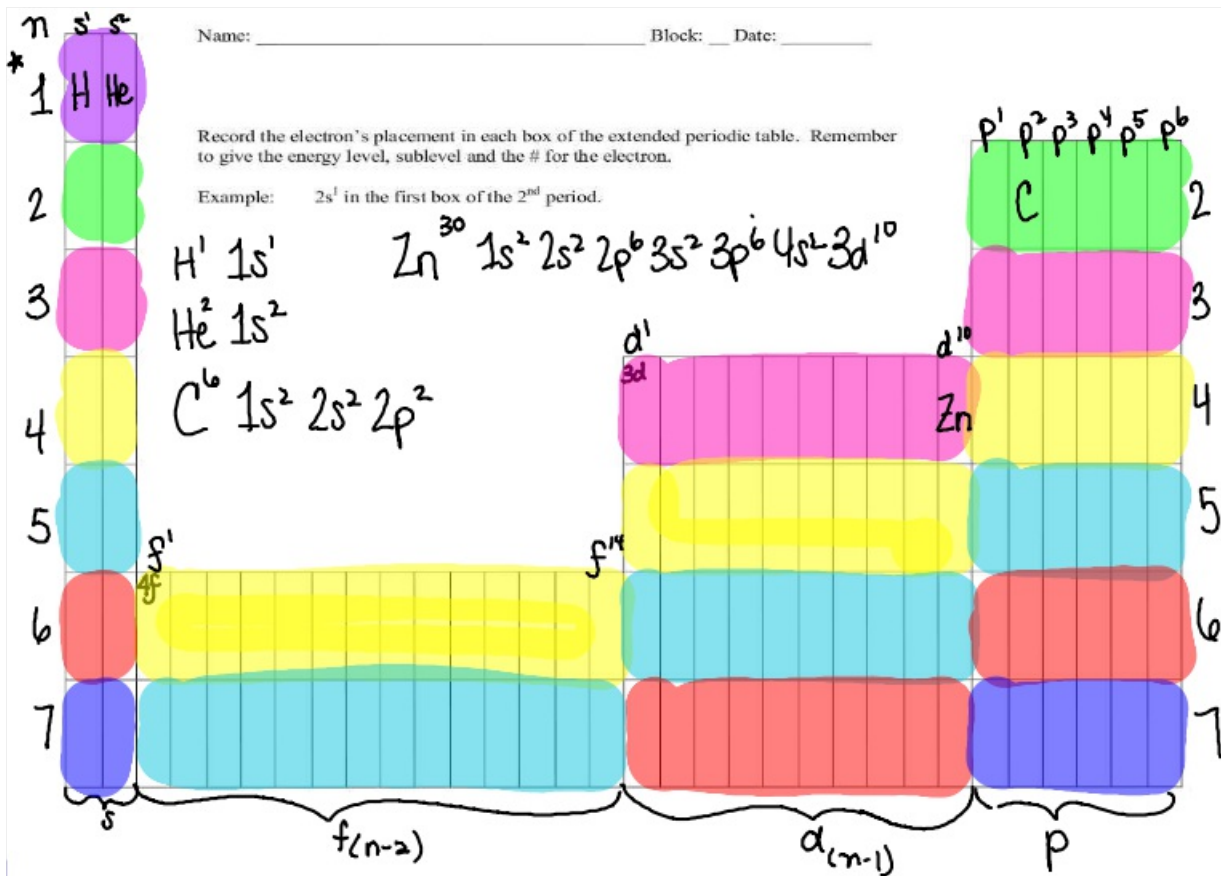
s = 0 p = -1, 0, 1

d = -2, -1, 0, 1, 2 f = -3, -2, -1, 0, 1, 2, 3

4th Quantum number: spin (s)

each orbital holds $2e^-$, each with an opposite spin

$+\frac{1}{2}, -\frac{1}{2}$ or $\uparrow \downarrow$



Quantum Number Summary Chart

n (energy levels)	l (sublevel)	m (magnetic)	# orbitals	max # of e ⁻
1	s	0	1	2e ⁻
2	s	0	s=1	S=2e ⁻
	p	-1 0 1	p=3	P=6e ⁻ 8e ⁻
3	s	0	s=1	S=2e ⁻
	p	-1 0 1	p=3	P=6e ⁻ 18e ⁻
	d	-2 -1 0 1 2	d=5	d=10e ⁻
4 (5,6,7)	s	0	s=1	S=2e ⁻
	p	-1,0,1	p=3	P=6e ⁻
	d	-2,-1,0,1,2	d=5	d=10e ⁻
	f	-3,-2,-1,0,1,2,3	f=7	f=14e ⁻ 32e ⁻

