wave particle like behavior

$\lambda = \frac{h}{mv}$

Heisenberg formulated the uncertainty principle.

Theory stated: $\Delta x \Delta p \geq h / 4\pi < \Delta E \Delta t$

We can know one or the other not both position or momentum.

Δ = change in = $y_2 - y_1$

Quantum Mechanics:

Schrodinger developed a theoretical approach which incorporated these 2 concepts,

-do not travel in circles around nucleus

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Quantum Numbers:

-describe the organization of electrons within an atom and their energies

Sublevels (1):

order of levels

Sober - 0
physicists - 1
don't - 2
find
giraffe's
riding
in
kitchens

1. each neutral atom has # of electrons = to Z
2. each atom start filling @ n=1
3. start filling @ s sublevel

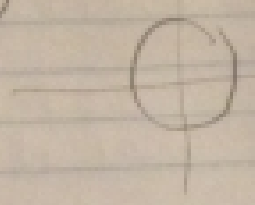
Shell	l	Sublevel	total shell
1	0	s	2
2	0,1	s,p	8
3	0,1,2	s,p,d	18
4	0,1,2,3,4	s,p,d,f	32

Sub-sub level:

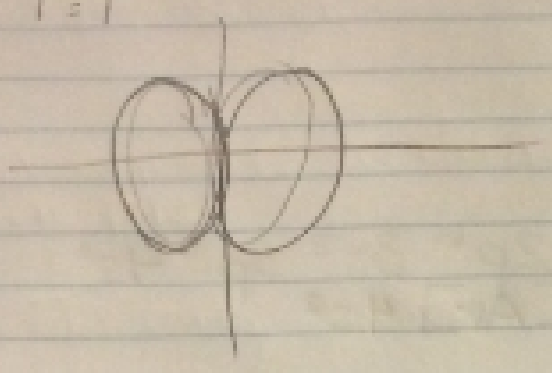
each sublevel has associated with it one or more ~~sub-ter~~ sub levels called Orbitals

-each orbital can contain a maximum of 2 electrons

s l=0



p l=1



Writing Electronic Structure:

Hydrogen = $1s^1$

Shell number (n) → 1 s ← sublevel

1 ← # of electrons in sublevel

He z=2 $1s^2$

Be Z=4 $1s^2 2s^2$

Na Z=11 $1s^2 2s^2 2p^6 3s^1$

Z=9 $F: 1s^2 2s^2 2p^5$ $F^- = [1s^2 2s^2 2p^6]$

Aufbau principle:

For transition elements

[redacted]

$Ca = 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$

$Ca^{2+} = [1s^2 2s^2 2p^6 3s^2 3p^6]^{2+}$

* Memorize table *

1s			
2s	2p		
3s	3p	3d	
4s	4p	4d	4f
5s	5p	5d	5f
6s	6p	6d	6f

Ca (Z=20) = $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$

electronic shorthand $Ca = [Ar] 4s^2$

$Sr = [Kr] 5s^2$

$Si = [Ne] 3s^2 3p^2$

Pauli Exclusion Principle:

- States that no 2 electrons in an atom can have exactly the same quantum numbers.

n=1; l=0 $m_l = 0$ for both electrons so...

quantum number called spin (m_s) solves dilemma. has 2 values

+1/2 or -1/2

electrons in any filled orbital will have opposite spins

s → 2