

Notes 01/07

Monday, January 07, 2008
9:58 AM



Notes 0108

Audio recording started: 10:00 AM Monday, January 07, 2008

Discussion: 50pts

Midterm: 100pts

Final: 200pts

Total: 350pts

C- to C+ is approx at 45% to 60%

B- to B+ is approx 61% to 80%

A- to A+ is approx 81% to 100%

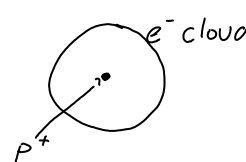
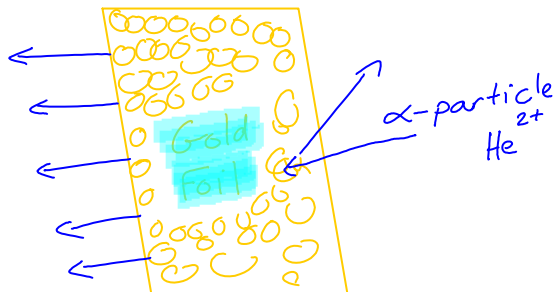
Lecture Notes:

Shape of Atoms:

	Symbol	Mass (amu)	Charge
Electron	e^-	$5.486 \times 10^{-4}u$	-1
Proton	p	1.0073u	+1
Neutron	n	1.0087u	0

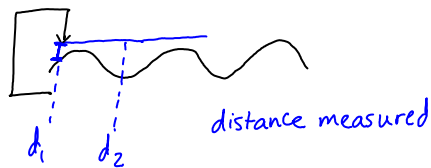
$$u : 1.6605 \times 10^{-27} \text{ kg}$$

- X element
 - X^- anion
 - X^+ cation
- Alpha-Particle
$${}^4_2\text{He}$$
- Beta-Particle
$${}^0_{-1}e^{-1}$$
- Gamma Particle
$${}^0_0\gamma$$
- Rutherford Experiment



- Fewer are deflected because the region occupied by nucleus is small. Atom size is mostly represented by electron cloud because most particles pass through.

- STM Scanning Tunneling Microscopy



Rough STM of Benzene



- STM gave further evidence that atoms are cylindrical.

- Electron Location

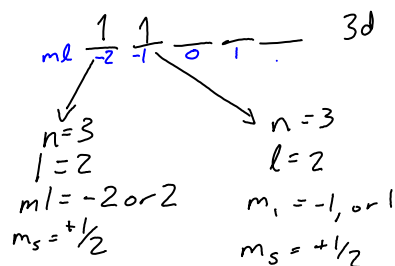
- Impossible to determine electron location without affecting location
- Probabilistic through Schrodinger equation
- 4 Quantum numbers

Quantum #	Name	Possible Vales	Significance
n	Principle quantum number	1,2,3,....	Distance from nucleus (size of orbital)
l	Orbital angular momentum	0,1,2,3,4,5,... n-1 s,p,d,f,g,h	Shapes of orbitals
m _l	Magnetic quantum number	-l,...,0,...,+l	Describes orientation e ⁻ density (orbitals)
m _s	Spin quantum #	+1/2 or -1/2	Direction of spin

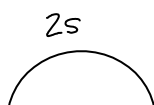
- Possible values of some quantum numbers:

n	l	ML	# of orbitals
1	0 s	0	1
2, (1)	0,1 s, p	-1,0,1	3
3, (1,2)	0,1,2	-2,-1,0,1,2	5
4, (1,2,3)	0,1,2,3	-3,-2,-1,0,1,2,3	7

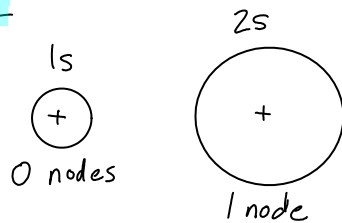
- What are set of quantum numbers that describe location of this electron?



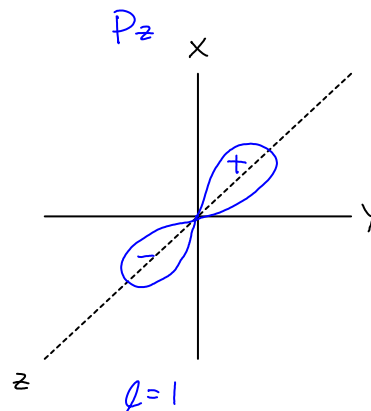
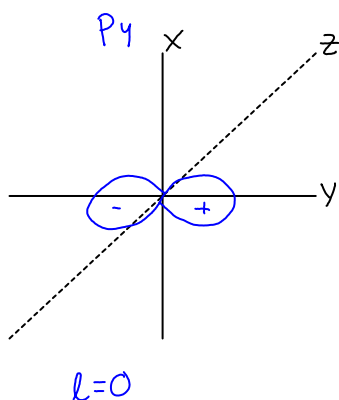
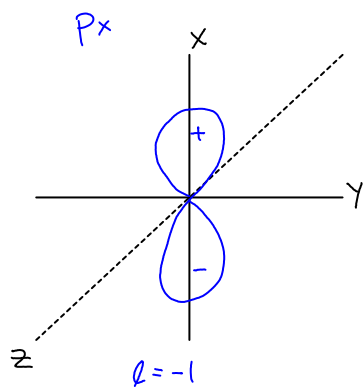
- Shapes of Orbitals



S

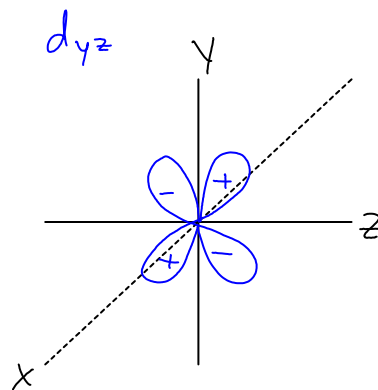
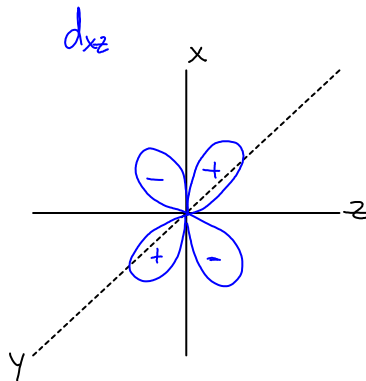
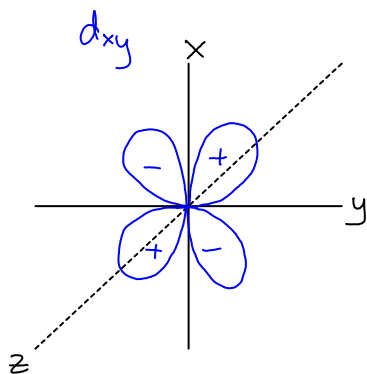


P

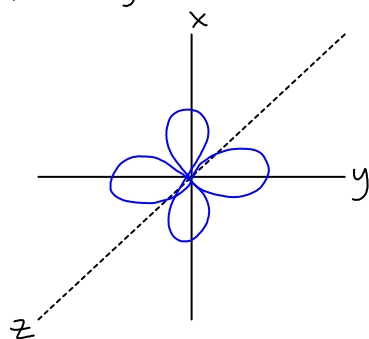


d

5 orbitals



$d_{x^2-y^2}$
 same as d_{xy} but rotated 45°



d_{z^2}

