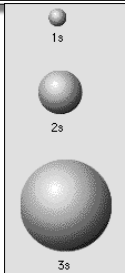


Quantum Mechanical Model

Quantum Numbers (n, l, m_l, m_s)

- $n =$ _____ Quantum Number
- It has whole number values (1, 2, 3, ...)
- As n increases, the orbital becomes larger
- n tells you what _____ you are in
- n designates the _____

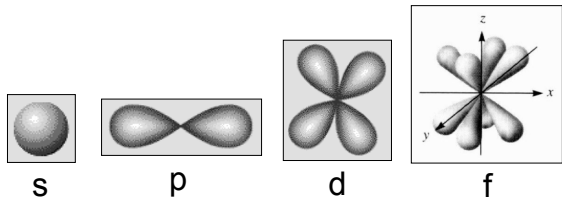
Size



Quantum Numbers (n, l, m_l, m_s)

- $L =$ _____ Quantum Number
- Also known as the _____ Quantum Number
- Can have values from 0 to $(n-1)$ for each value of n
- Defines the _____ of the orbital
- $L = 0 \rightarrow s$
- $L = 1 \rightarrow p$
- $L = 2 \rightarrow d$
- $L = 3 \rightarrow f$
- Tells you what _____ you are in

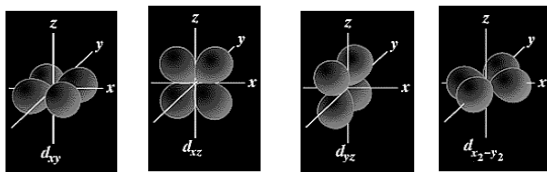
Shapes



Quantum Numbers (n, l, m_l, m_s)

- $m_l =$ _____ Quantum Number
- Can have whole number values from $-L$ to $+L$ (including zero)
- This describes the orbital's _____ in space (which axis it is on)
- Tells you what _____ you are in

Orientation



Quantum Numbers (n, l, m_l, m_s)

- $m_s =$ magnetic _____ quantum number
- Spin quantum number denotes the direction of spin of an electron within a magnetic field.
- Possibilities for m_s $+1/2$ or $-1/2$

Possible Values for n , l , m_l , m_s

- n (shell) = 1, 2, 3, 4, ... (whole numbers)
- l (sub shell) values from 0 \rightarrow ($n - 1$)
- m_l (orbital) values from $-l$ to $+l$ (including zero)
- $m_s = +1/2$ or $-1/2$

Examples

- What are the possible values for l if $n = 2$?

Examples

- What are the possible values of n , l , and m in the 2s sub shell?

Examples

- What are the possible values for n , l , & m in the 3d sub shell?

Example

- What is the designation for the sub shell where $n = 2$ and $L = 1$?

Example

- What is the designation for the sub shell where $n = 4$ and $L = 3$?

Possible Number of Values (how many answers are there?)

- A shell with Principal Quantum Number (n) has exactly n number of sub shells
- # L's = n

Example

- If $n = 2$ how many possible number of values are there for L ?

- What would those values be?

Possible Number of Values
(how many answers are there?)

- For a given value of L there are $2L + 1$ possible values for m

Example

- How many values of m are there if $L = 0$?

Example

- How many possible values are there for m if $L = 2$?

Example

- What are the values for m if $L = 2$?

Possible Number of Values (how many answers are there?)

- The number of possible values of $m = n^2$
- Example:
- If $n = 2$, how many values are there for m ?

Possible Number of Values (how many answers are there?)

- Since each orbital can hold at most 2 electrons, the number of electrons in a shell is $2n^2$
- How many electrons are in the $n = 3$ shell?

Summary

Possible Values

- $L (0 \rightarrow n-1)$
- $m (-L \rightarrow +L)$

of Possible Values

- Orbitals (m)
 - $\#m = 2L + 1$
 - $\#m = n^2$
- Sub shells (L)
 - $\#L = n$
- Electrons
 - $\# \text{ electrons} = 2n^2$

More examples

- How many sub shells are in $n = 4$?

More examples

- What designation would $n = 5$ and $L = 1$ have?

More examples

- In the 4d sub shell, what are the possible values for n , l , & m ?

More examples

- In the 3p sub shell, what are the possible values for n , l , & m ?