

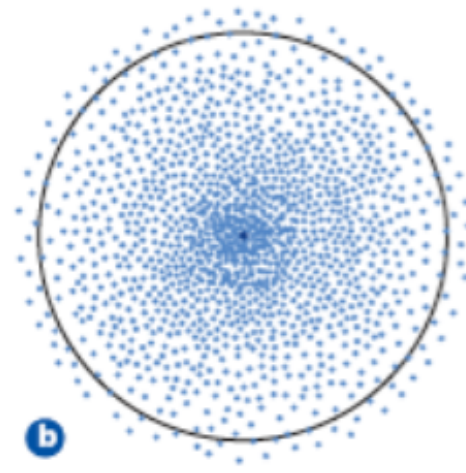
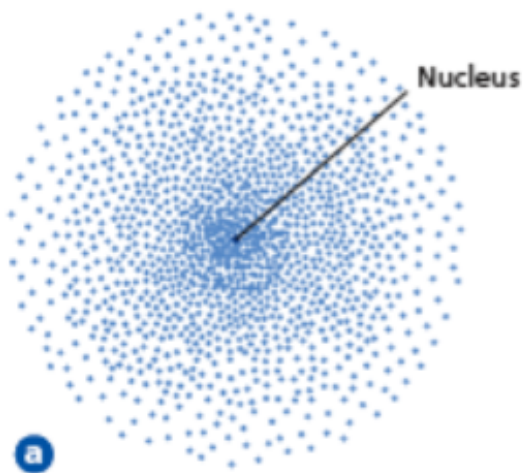
The Quantum Mechanical Model

Heisenberg Uncertainty Principle

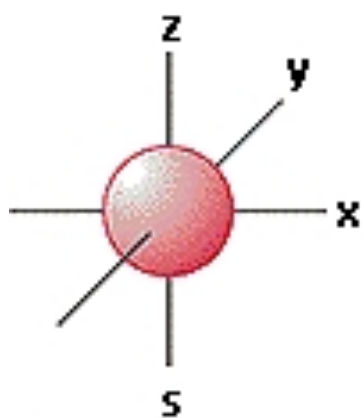
- 1920s: The exact position of an electron can never be known.
- Determining both the position and path of an electron is impossible.
- Can only determine an electron's most probable location using a mathematical model.

Quantum Mechanics

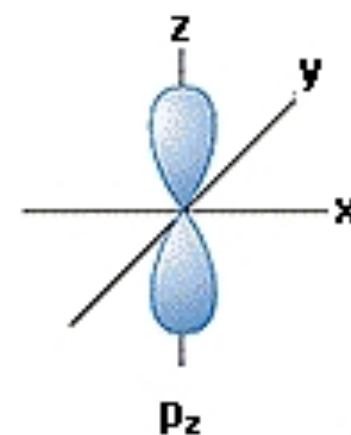
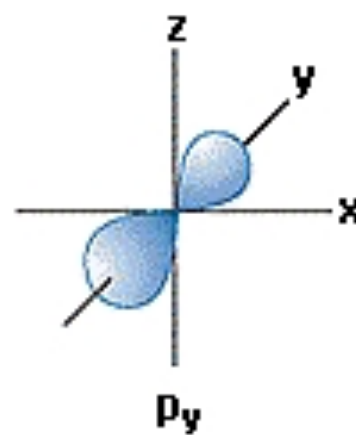
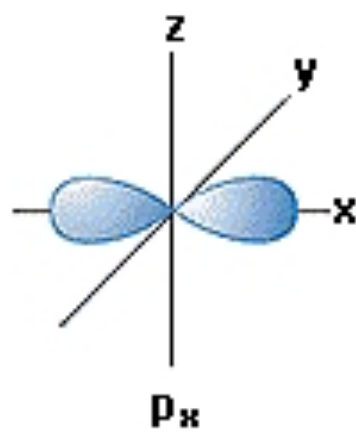
- Each energy level has sublevels where an electron can exist.
- Sublevels contain “*orbitals*” that describe the *most probable location of an electron*.
- The shape of orbitals is determined by a *90% probability of finding an electron*.



Draw this diagram!



s orbital



p orbitals

Electron Filling Rules

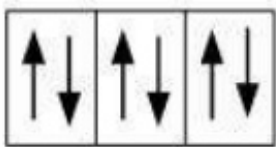
1. Aufbau Principle: Electrons are normally in the lowest energy orbital available.
2. Pauli Exclusion Principle: Maximum two electrons in any one orbital (with opposite spins).
3. Hund's Rule: All orbitals in a sublevel must have one electron before the second electron is added.



1s



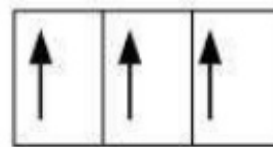
2s



2p



3s

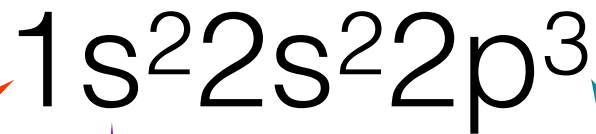


3p

Steps for determining electron configurations

1. Determine # of e^- in element/ion
2. Fill orbitals according to e^- filling rules
3. Verify your answer by checking and counting superscripts

Electron Configuration of Nitrogen



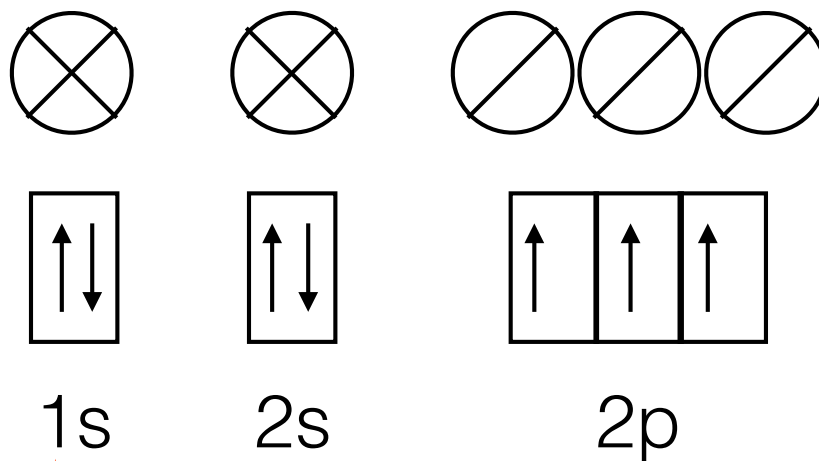
**energy
level**

**# of e⁻ in
sublevel**

**sublevel
(orbital type)**

Orbital Diagram of Nitrogen

(circles and lines OR boxes and arrows)



of e⁻ in sublevel

energy level

sublevel (orbital type)

Practice 1

Write the electron configuration for magnesium (Mg).

**To be completed in class!
(leave 2-3 lines)**

How many unpaired electrons?

Practice 2

Write the electron configuration and indicate the number of unpaired electrons for fluorine (F).

To be completed in class!
(leave 2-3 lines)

Practice 3

Write the electron configuration and indicate the number of unpaired electrons for nickel (Ni).

To be completed in class!
(leave 2-3 lines)