

# Atomic Structure

## Chapter 3.1

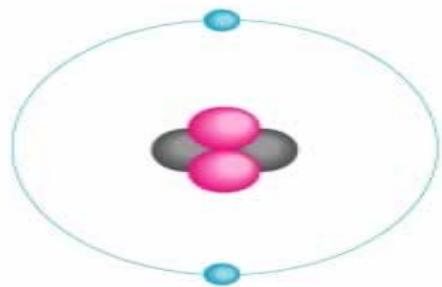
**New Section!**

# Atoms:

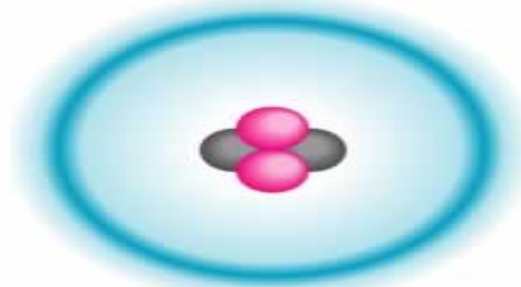
- Every element is made up of tiny, unique particles called atoms that cannot be subdivided.
- Atoms of the same element are exactly alike.
- Atoms of different elements can join to form molecules.

# What are Atoms made of?

- Nucleus: the center of the atom; made up of protons and neutrons



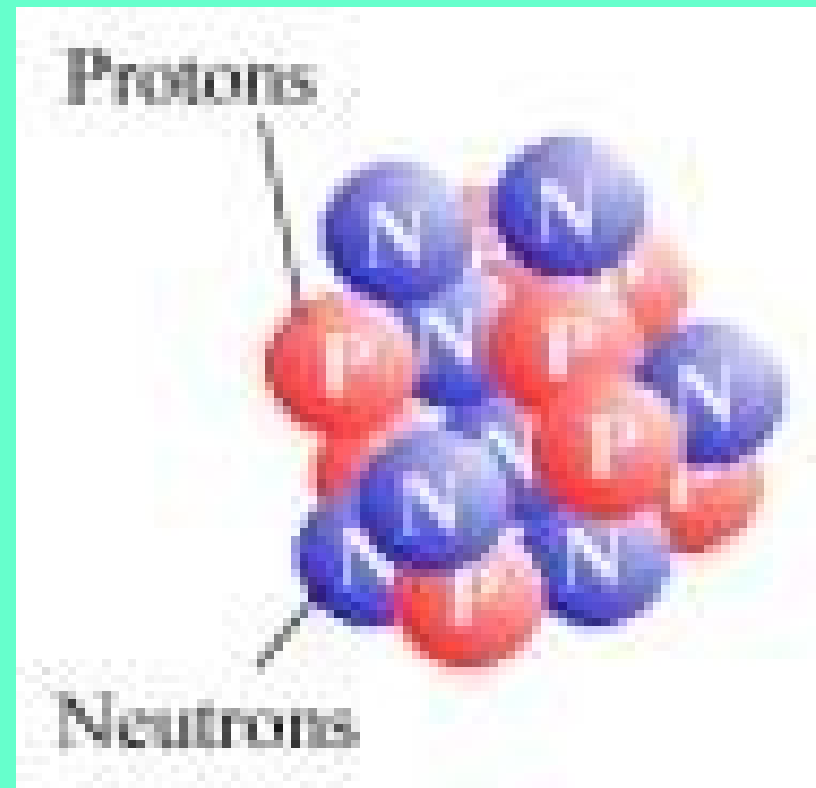
2 ● Protons  
2 ● Neutrons } Nucleus  
2 ● Electrons



6 ● Protons  
6 ● Neutrons } Nucleus  
6 ● Electrons

# In the Nucleus:

- **Neutrons:** a neutral subatomic particle
- **Protons:** a positively charged subatomic particle



# Outside of the Nucleus:

- **Electrons:** tiny negatively charged subatomic particle moving around outside of the nucleus

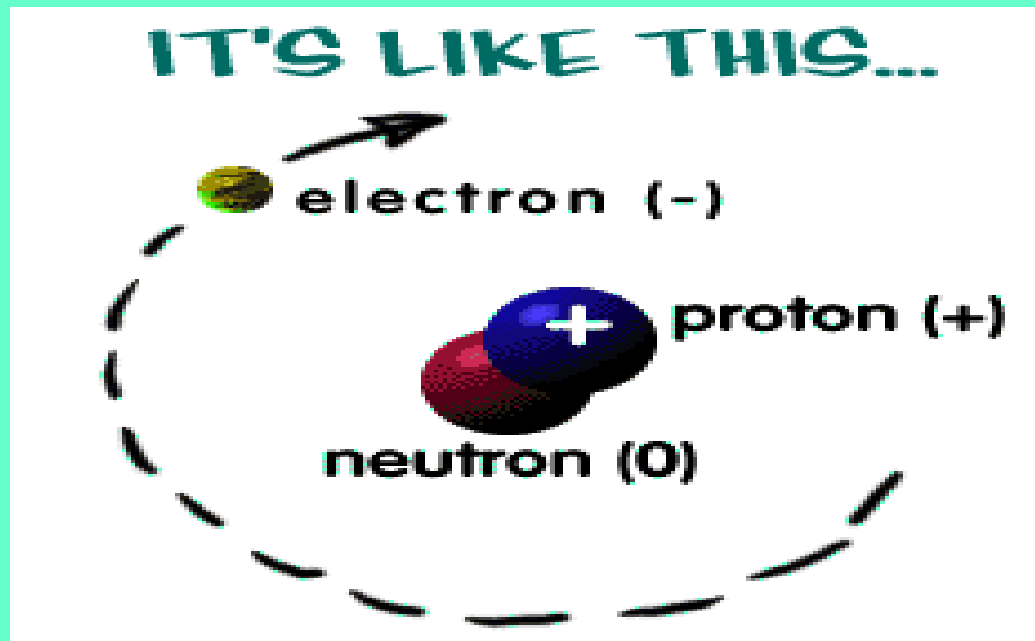


# Difference between Elements

- Each element is unique in the amount of protons and electrons its atoms contain.
  - Example:
    - Helium atoms have one more electron and proton than a Hydrogen atom.

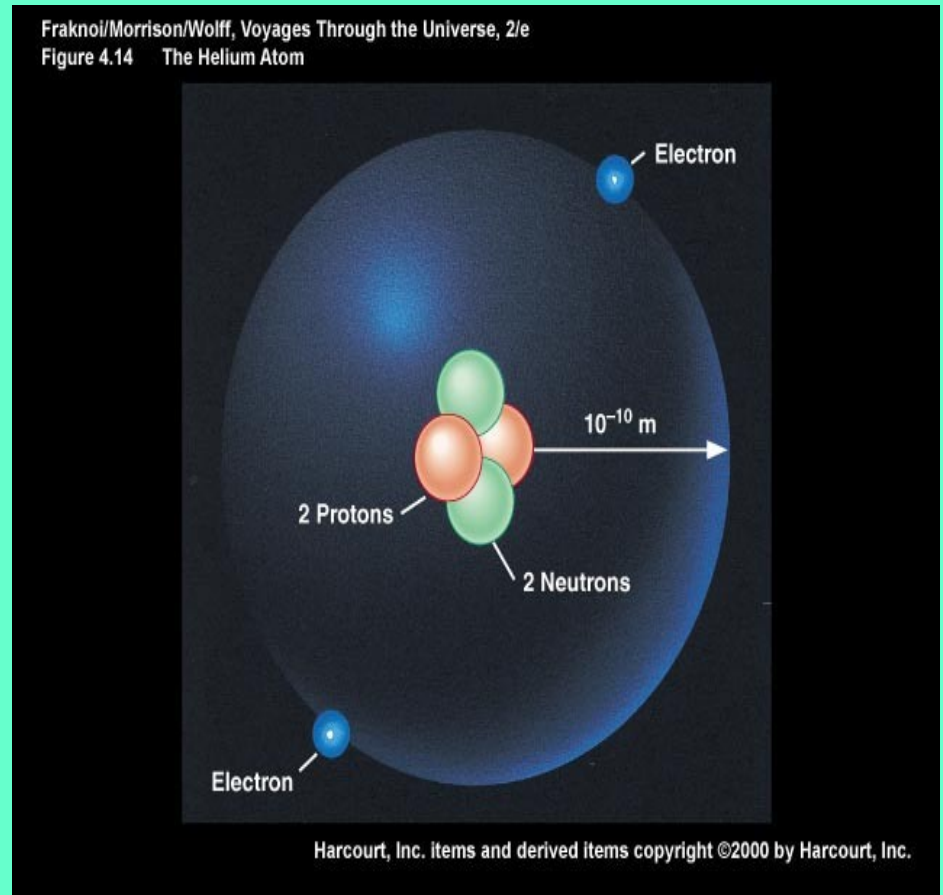
# Neutral Atomic Charges:

- Atoms with **Neutral Charge** = equal # of protons and electrons



# Electron Clouds

- Impossible to determine **exactly** where an electron is located or how fast it is orbiting.
- Can determine a **region** in which an electron is. This is an Electron Cloud.
  - Ex: Moving Fan





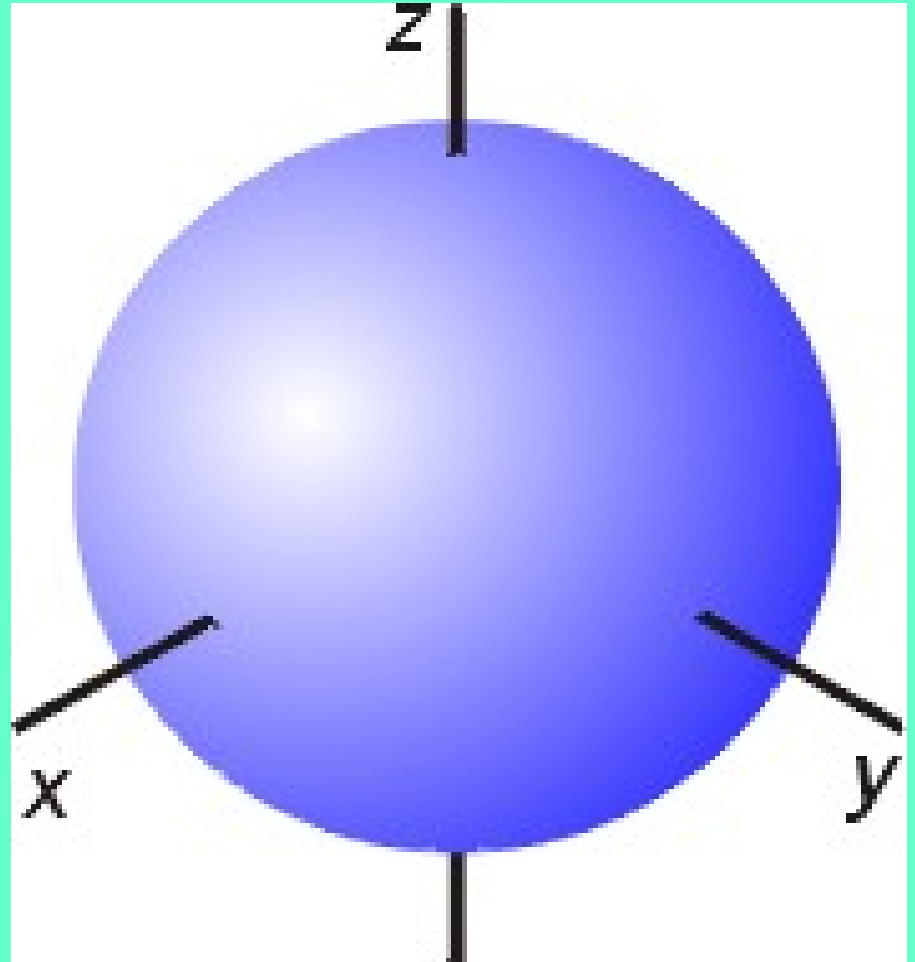
# Orbital

- The region in an atom where there is a high probability of finding electrons
- There are four possible orbital shapes:

*s, p, d, f*

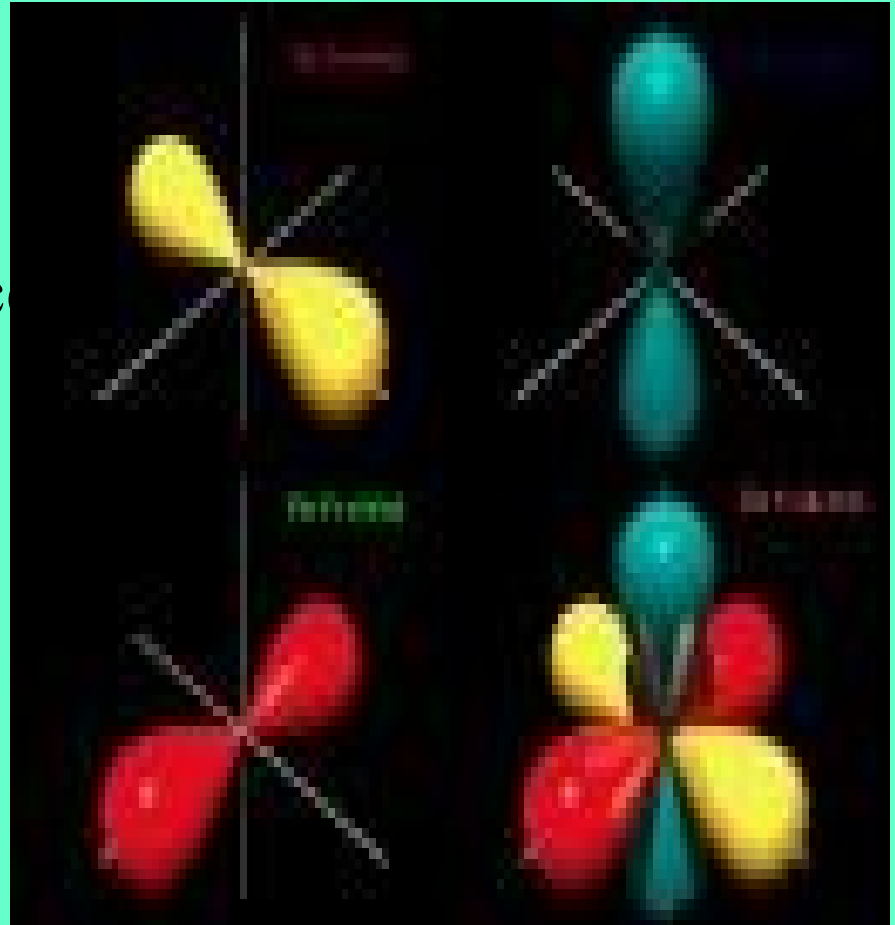
# S orbital

- Spherical shaped, surrounding the nucleus
- Can hold a max of 2 electrons



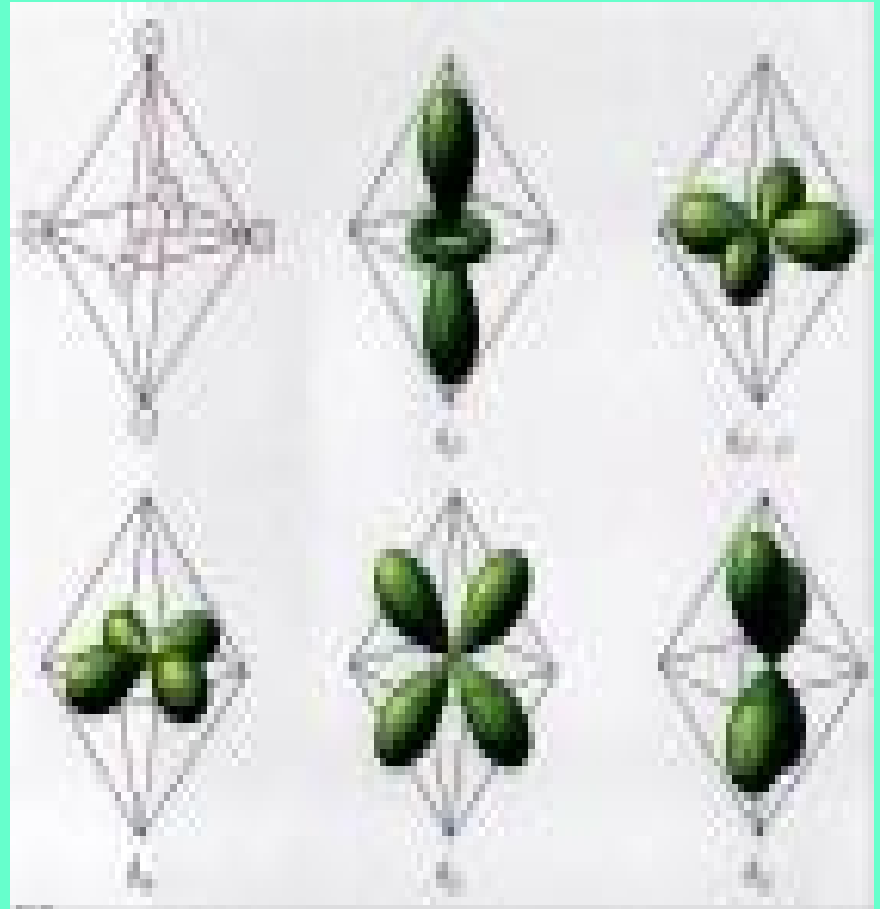
# *P* Orbital

- Dumbbell shaped
- Can be oriented three different ways in space
- Can hold 2 electrons in each orientation; a total maximum of 6 electrons



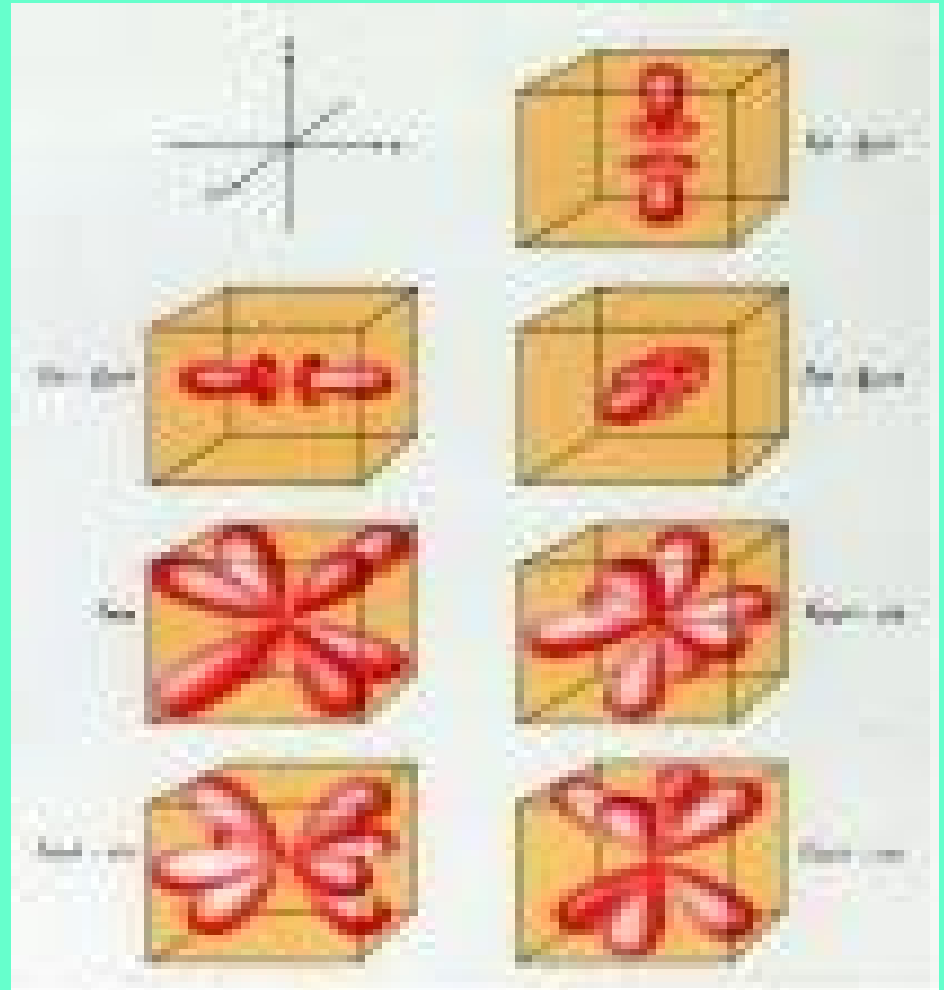
# *D* Orbital

- More complex shape
- Five different orientations, each containing 2 electrons
- Total Maximum of 10 electrons



# *F* Orbital

- Very complex shape
- Seven different orientations, each containing 2 electrons
- Total Maximum of 14 electrons



# Valence Electrons

- An electron in the **outermost energy level** of an atom

