

ELEMENTS & COMPOUNDS

Quantum Theory

- **Allows us to predict with high probability where each electron is within the “cloud”**
- **Use quantum numbers to designate the atom’s atomic address, just like we have a house address to designate where we live**
- **Quantum numbers:**
 - **n = tells us what energy level the electron is in**
 - **l = tells us the shape of the orbital (region) the electron is in**
 - **m = how many sub-orbitals**
 - **s = which direction the electron is spinning**

Max Plank:

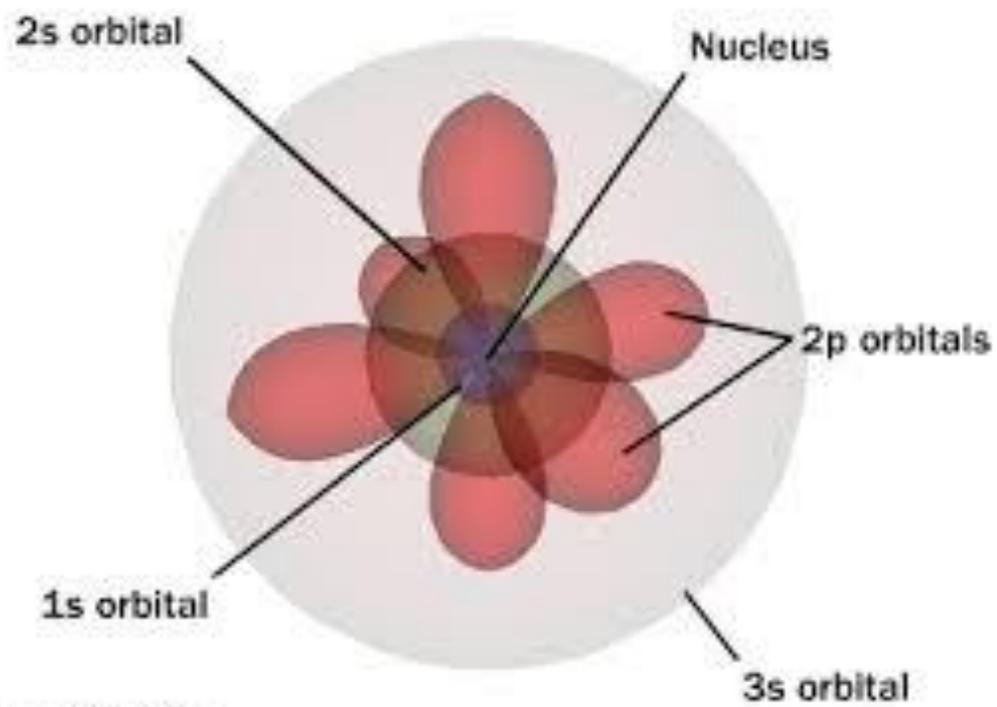
studied energy levels and how energy is emitted or absorbed as electrons jump up energy levels or fall back down

also proposed the idea that energy is emitted in small discrete packages called quanta

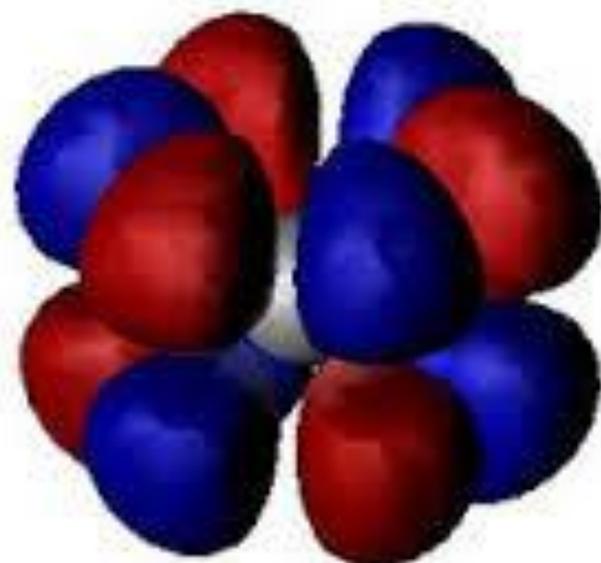
Louis De Broglie

proposed that electrons have wave properties





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5 Main Points of Atomic Theory:

- 1. All matter is composed of very small particles called atoms**
 - 2. Atoms of a given element are the same**
 - 3. Atoms of one element are different from atoms of another element**
 - 4. Atoms combine to create compounds, and they always combine in fixed ways**
 - 5. Atoms cannot be created, destroyed, or subdivided**
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Compound: a distinct substance that contains two or more elements chemically combined in definite proportions

2 types: Molecular & Ionic

Molecular Compound – substance that is composed of molecules that are all alike

Molecule – smallest uncharged individual unit of a compound made up of two or more atoms that are chemically bonded



Ionic Compound: substance that is made up of cations and anions held together by attractive forces

Chemical Formula: abbreviations for compounds that show the ratio of atoms and elements in a compound

- **Which elements it is composed of and how many atoms of each**





1 Dozen = 12 objects
1 Ream = 500 objects
1 Gross = 144 objects



Atoms :

- **Incredibly Tiny**
 - **Mass is too small to measure on a balance in the lab**
 - **Chemists count atoms by weighing them**
 - **Know the average masses of atoms and count them by defining a unit to represent a larger number of atoms!**
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Mole

Chemists have chosen the mole as the unit for counting atoms!



❖ **Just like**

1 Dozen = 12 objects

In chemistry:

1 mole = 6.022×10^{23} objects

*** Call this Avogadro's Number !!**

Mole (mol) : quantity of a given substance that contains as many molecules as the number of atoms in exactly 12 g of Carbon -12

**• A mole of a substance contains
 6.02×10^{23} Molecules of a substance**

**Ex. 1 mole of oxygen atoms contains
 6.02×10^{23} Oxygen atoms**

Molar Mass: (MM) the mass of 1 mole of a substance

The sum of the atomic masses of all the atoms in a molecule of the substance

***The atomic mass expressed in grams**

***We change the units of atomic mass (amu) to grams to express it as molar mass**

***Because the atomic mass of any element contains one mole of atoms!**

