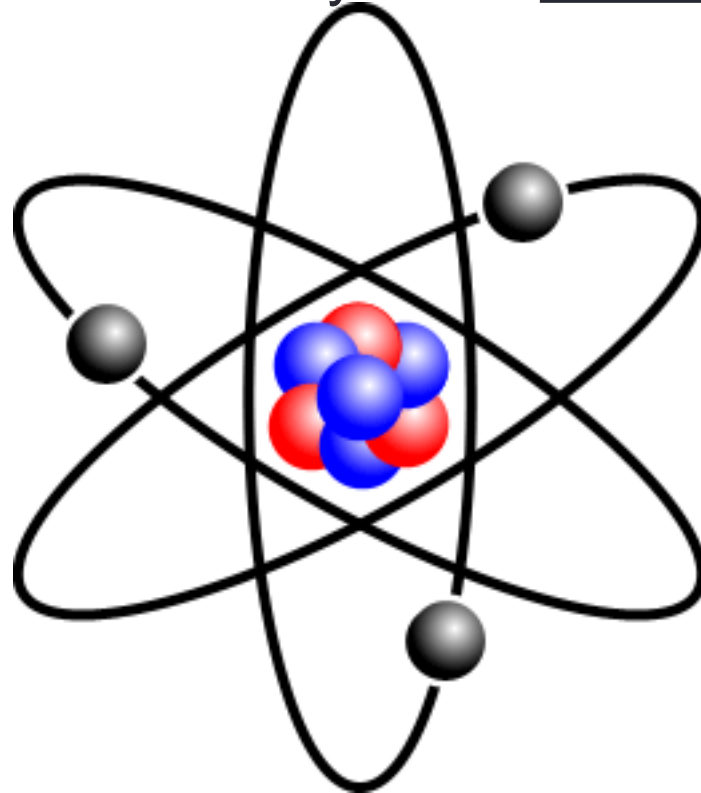


PROGRESSION OF THE ATOMIC MODEL

- By 1808, it was widely accepted that matter was made up of **ELEMENTS**, which consisted of tiny **PARTICLES** called **ATOMS**. After 2000 years - **DEMOCRITUS** was right all along

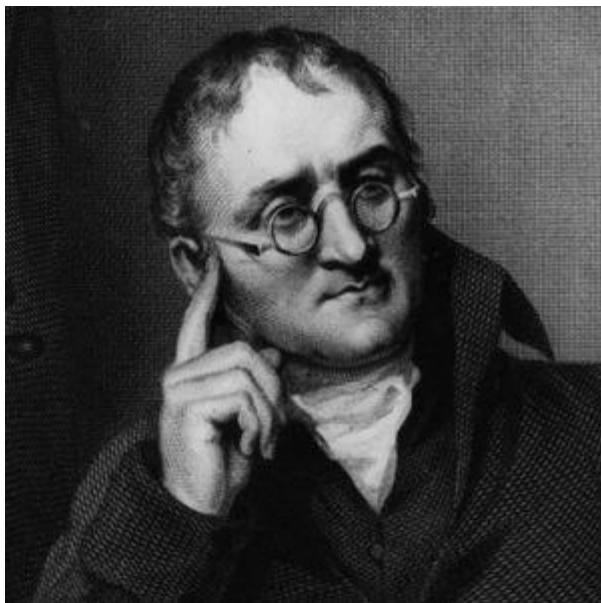


John Dalton

- *Dalton's Atomic Theory:*
- **1. All elements are composed of atoms. Atoms are indivisible and indestructible particles.**
- **2. Atoms of the same element are exactly alike, they all have the same mass, and chemically behave the same way.**
- **3. Each element is characterized by the mass of its atoms, and their properties.**
- **4. The joining of atoms of two or more elements forms compounds.**
- **5. Atoms are neither created nor destroyed in a chemical change.**
-

John Dalton

- Dalton's atomic theory is also known as the "**BILLIARD BALL MODEL**", since he believed that atoms were just tiny **SPHERES**.
- Atoms under Dalton's model would look like this:

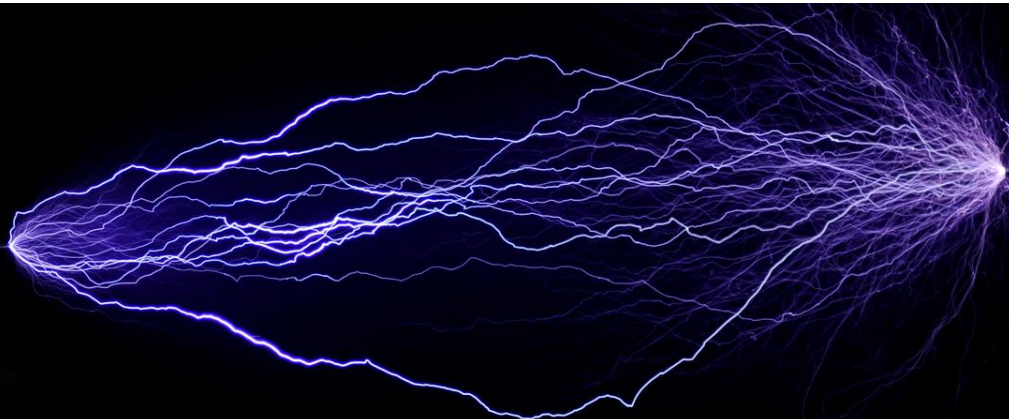


Dalton's Atomic Model

JJ Thompson

Thompson was studying the **PASSAGE** of an electric **CURRENT** through a **GAS**, which led to his discovery of very **LIGHT, NEGATIVE PARTICLES** called **ELECTRONS, DISPROVING** Dalton's theory that the atom is **INDIVISIBLE**.

Later he discovered **HEAVIER, POSITIVE PARTICLES** called **PROTONS**.



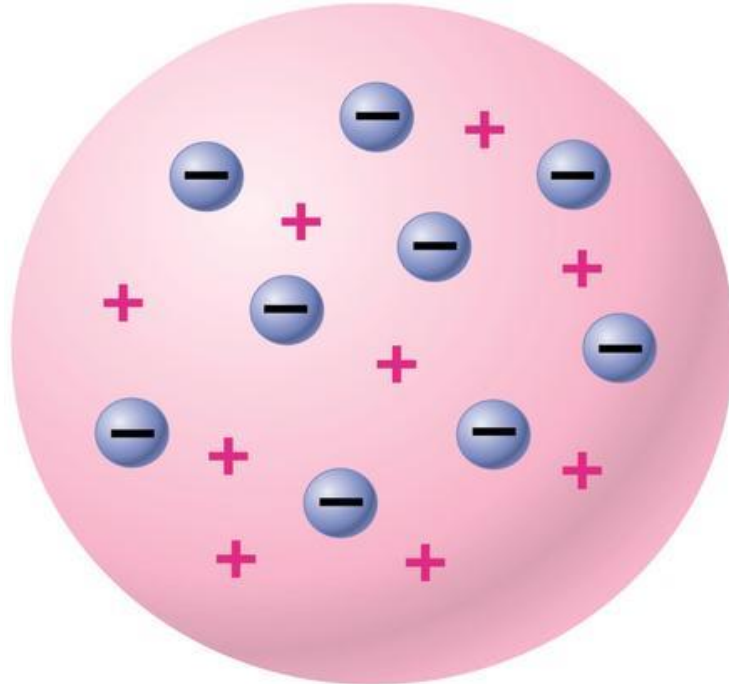
JJ Thompson

- *Thompson proposed that:*
 - **1. Electrons have small mass and a negative charge.**
 - **2. An atom is a sphere of positive electricity.**
 - **3. Electrons are embedded in the positive sphere, so the atom will remain neutral.**
-



JJ Thompson

- Thompson's theory is also called the “**RAISIN BUN**” or “**PLUM PUDDING**” or “**BLUEBERRY MUFFIN**” model:
- It would look like this:



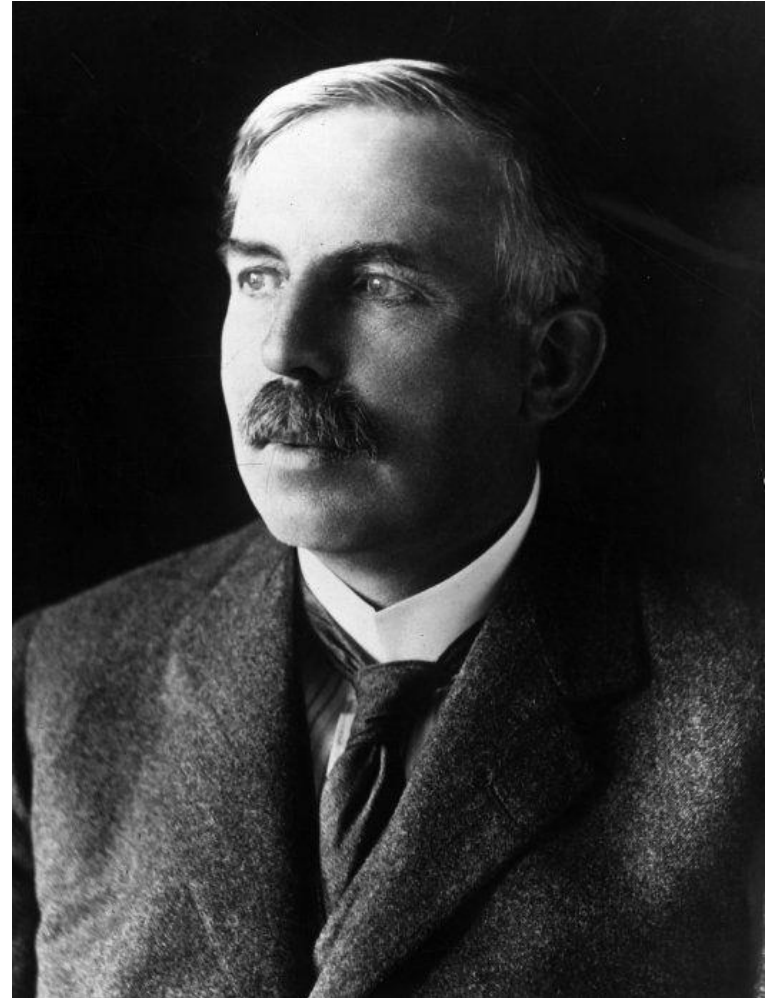
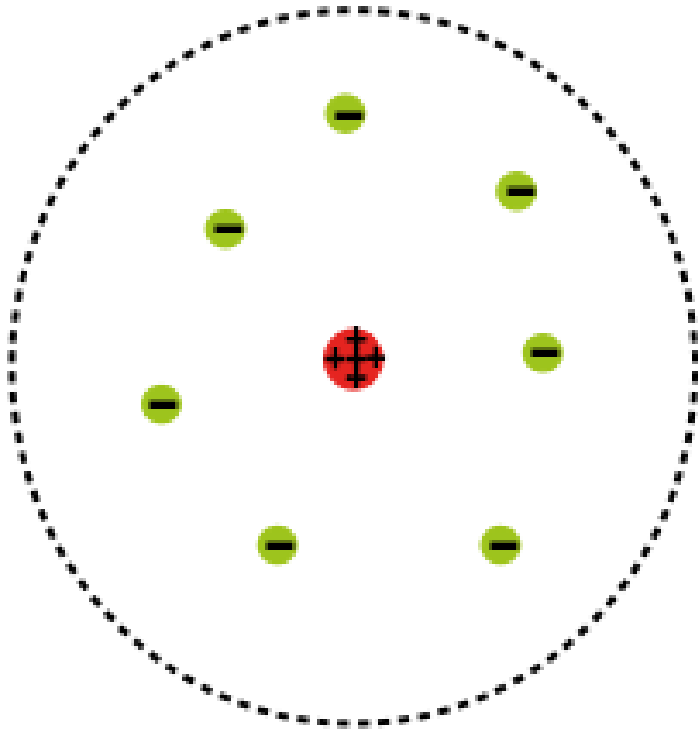
Ernest Rutherford

- Rutherford developed what is known as the **NUCLEAR MODEL**.
- Rutherford did an experiment where “**SHOT**” a beam of **ALPHA PARTICLES** at a sheet of **GOLD FOIL**. He found that **MOST** of the **PARTICLES** went **THROUGH** the foil, as if it were made of **EMPTY SPACE**, while some **BOUNCED** off.
- Through this experiment he discovered a **DENSE POSITIVELY** charged **NUCLEUS**.

Ernest Rutherford

- *He proposed that:*
- **1. The nucleus is a very tiny, dense, positively charged core.**
- **2. All of the protons are contained in the nucleus**
- **3. The nucleus is surrounded by mostly empty space.**
- **4. Rapidly moving, negative electrons are scattered outside the nucleus in an *electron cloud*.**
-

Ernest Rutherford



Neils Bohr

- Bohr thought that if **RUTHERFORD'S** theory were true, the **ELECTRONS** would just **CRASH** into the **NUCLEUS** (since **OPPOSITE** charges **ATTRACT**)
- He improved Rutherford's model by placing the electrons into specific **ORBITS** around the **NUCLEUS**.

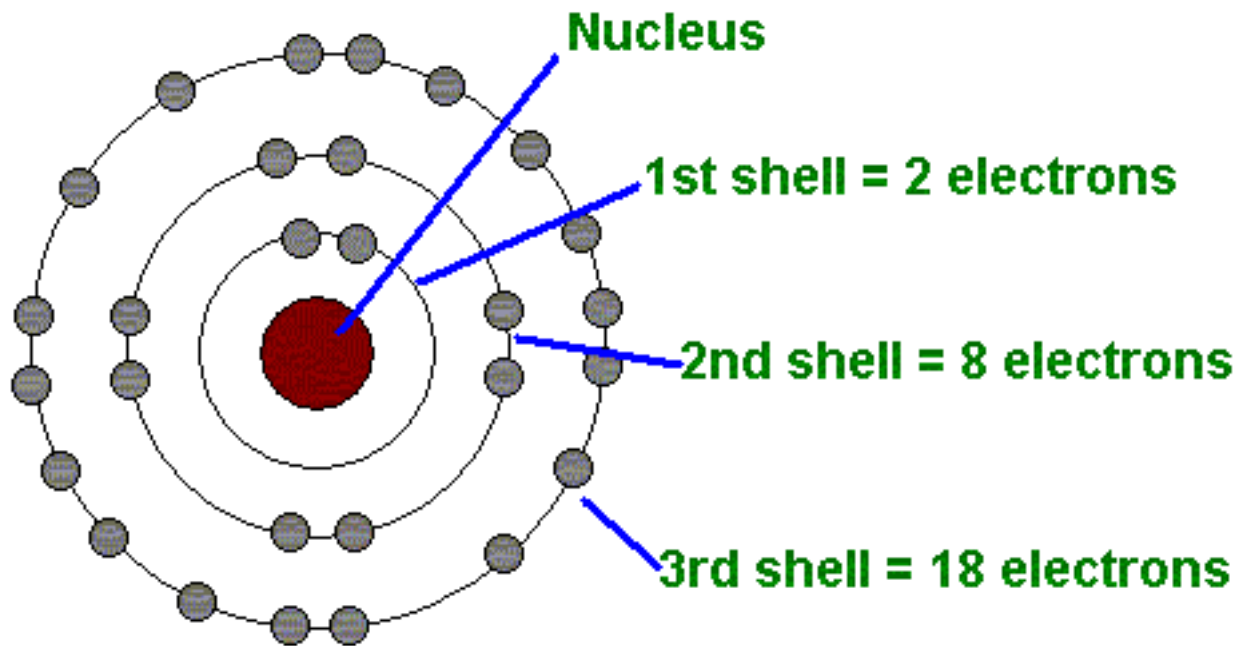


Neils Bohr

- *He proposed that:*
- **Electrons move around the nucleus in specific paths called orbits (like planets around the sun).**
- **Each electron in an orbit has a definite amount of energy.**
- **The further away from the nucleus, the more energy an electron has.**
- **Electrons cannot exist between orbits, but can move between them if they gain or lose energy.**
- **Each orbit or energy level is a certain distance from the nucleus.**
- **Electrons are more stable at lower energy levels.**
- **The order of filling the 1st three orbits is: 2, 8, 8.**
-

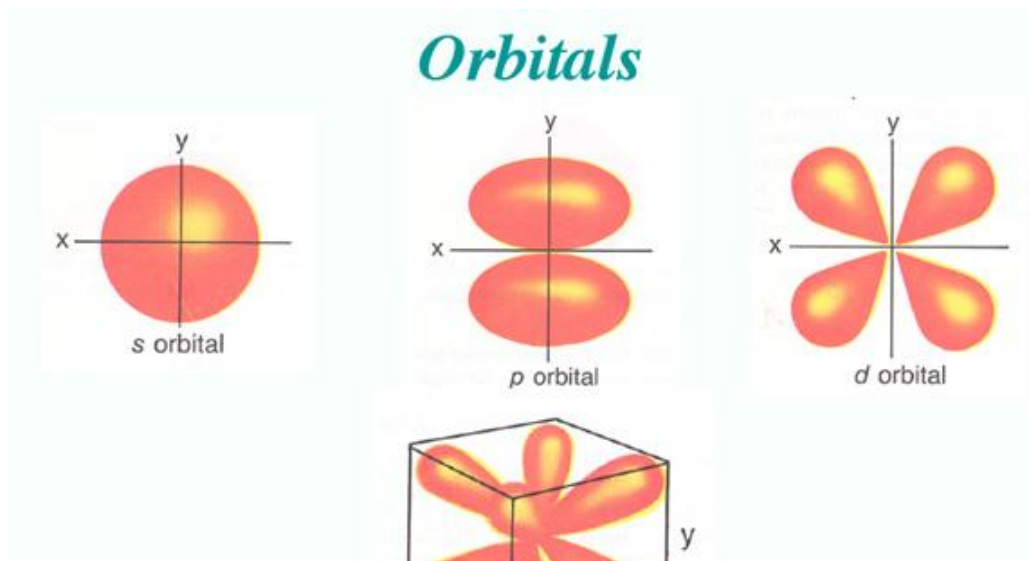
Neils Bohr

- His theory is also called the “**PLANETARY MODEL**”.
- It would look like this:



Quantum Model

- Bohr's theory works well for **SIMPLE ATOMS** (eg, H), but does not explain more complicated ones.
- It was found that particles sometimes exhibit wave properties (**wave-particle duality**), which lead to the current model of the atom



Quantum Model

- *The Quantum model proposes:*
- **Electrons do not move in a definite path like planets.**
- **It is impossible to determine the exact location of an electron.**
- **The probable location of an electron is based on its energy.**
- **Energy levels are divided into four sublevels called orbitals, which contain several pairs of electrons.**
- **The orbitals are like electron clouds, and the electrons move around randomly in them.**

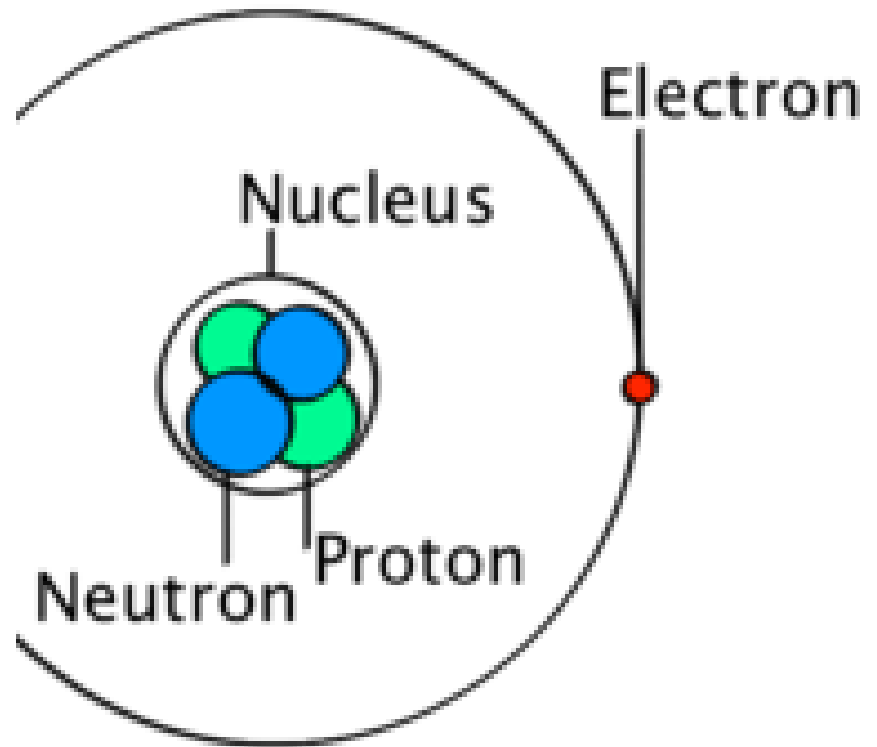
Size of an Atom



- Atom = toronto skydome
- Nucleus = baseball
- Proton = marble
- Electron = mosquito

Contents of an Atom

- **Contents of an Atom:**
- An atom is made up of three **SUBATOMIC** particles:
- **proton (+ve)**
- **electron (-ve)**
- **neutron (neutral)**
-



Contents of an Atom

Subatomic Particle	Symbol & Charge	Mass	Location
Proton	p ⁺	1 amu	Nucleus
Neutron	n(0)	1 amu	Nucleus
Electron	e ⁻	1/1837 amu	Electron shell

Contents of an Atom

- amu = atomic mass unit = 1.66×10^{-27} kg
- **The ELECTRON has a mass almost 2000X LESS than PROTON & NEUTRON.

