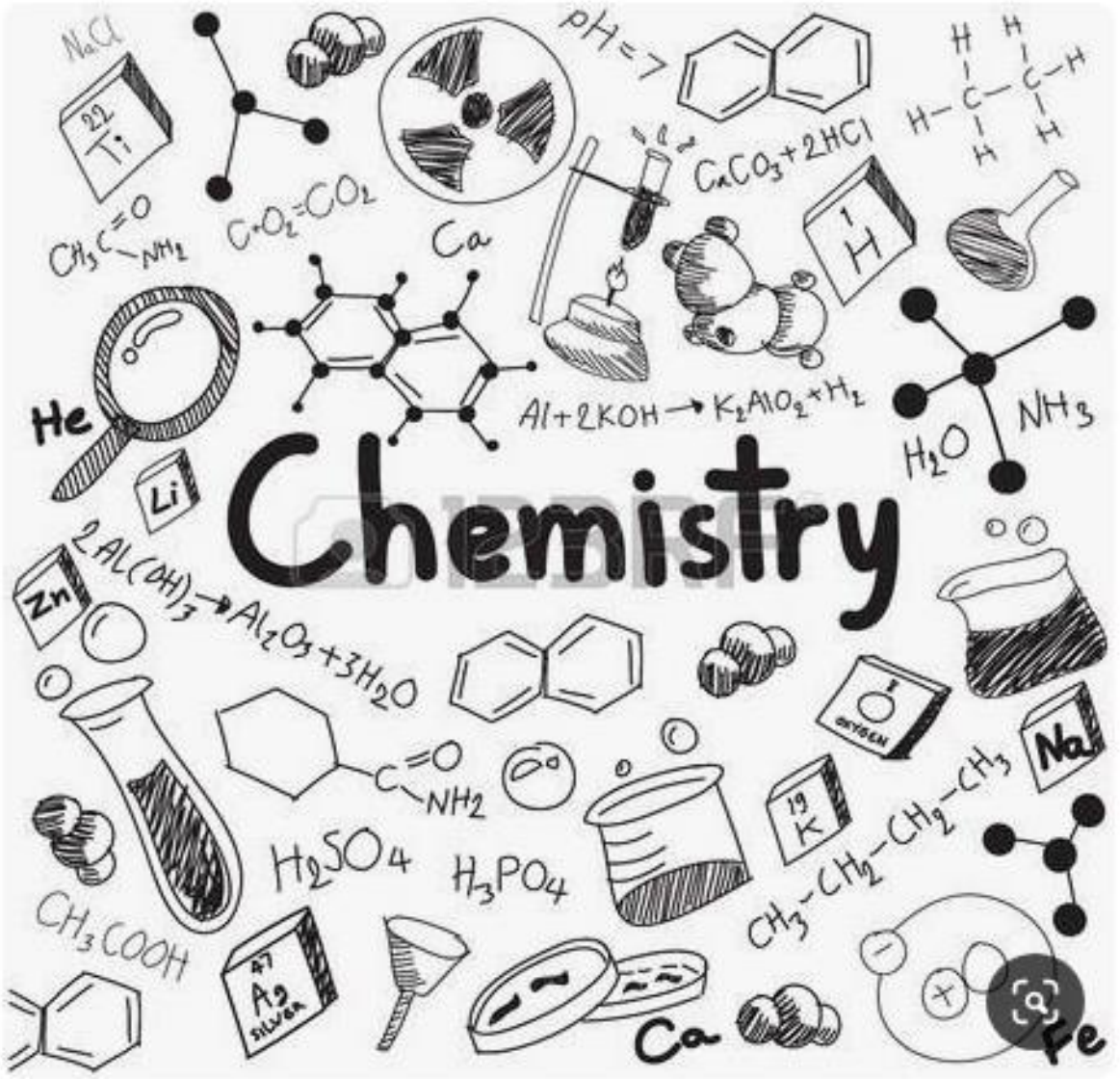
The National Orthodox School Shmaisani

Lesson #1: (Protons, electrons and the periodic table)

Scholastic Year: 2022-2023

Grade: 7CS



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Objective:

1. To be able to find the atomic number, mass number, #of protons, #of electrons and #of neutrons of the first 20 elements.

Resources:

Complete Chemistry for Cambridge Secondary 1/ Page 146-147& 154

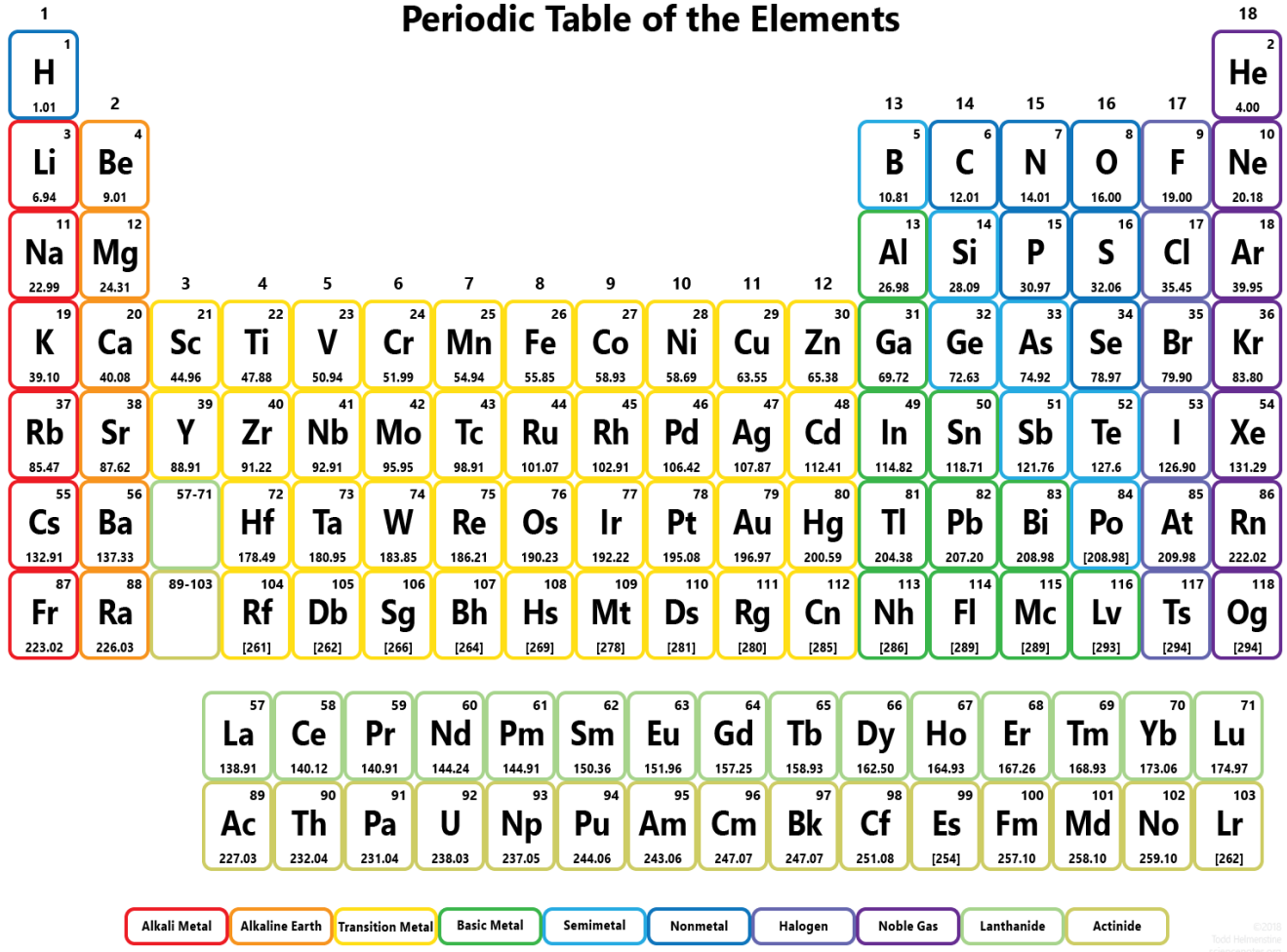
Ionic structure class activity

The periodic table

Elements are arranged in the periodic table.

In each block of the periodic table you will find:

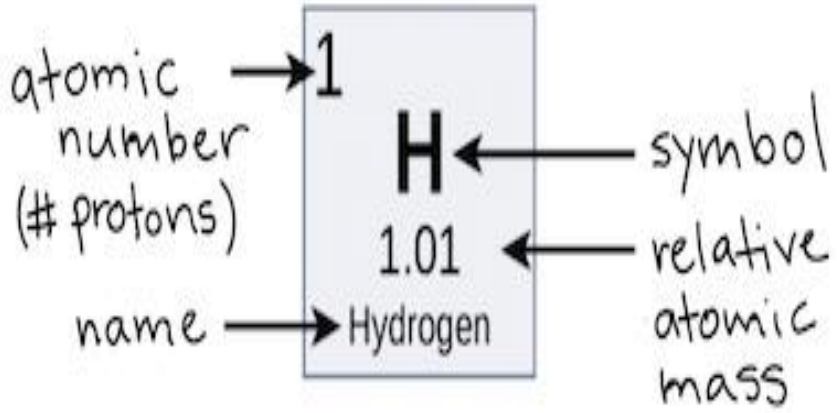
1. **Element's name.**
2. **Element's symbol.**
3. **Atomic number.**
4. **Mass number.**



Atomic number

The atomic number is the number of protons in an atom of an element.

atomic number = # protons = # electrons ***(for pure elements)***



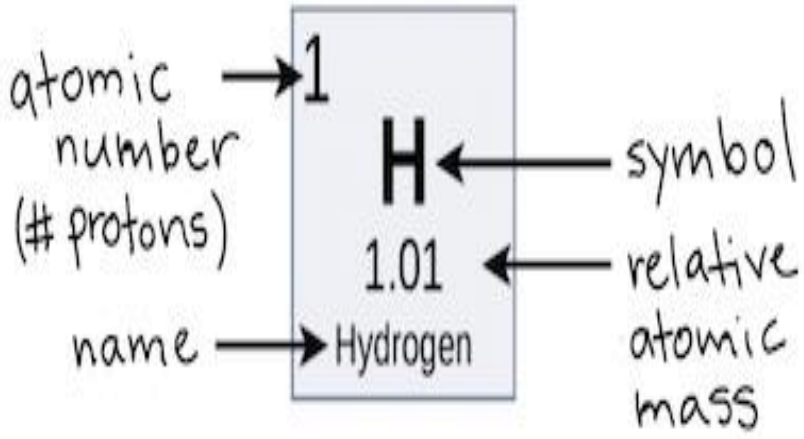
An atom contains equal numbers of protons and electrons.

Since protons and electrons have equal and opposite charges, this means that **atoms are have no overall electrical charge.**

Mass number

Mass umber is the number of protons and neutrons inside the nucleus.

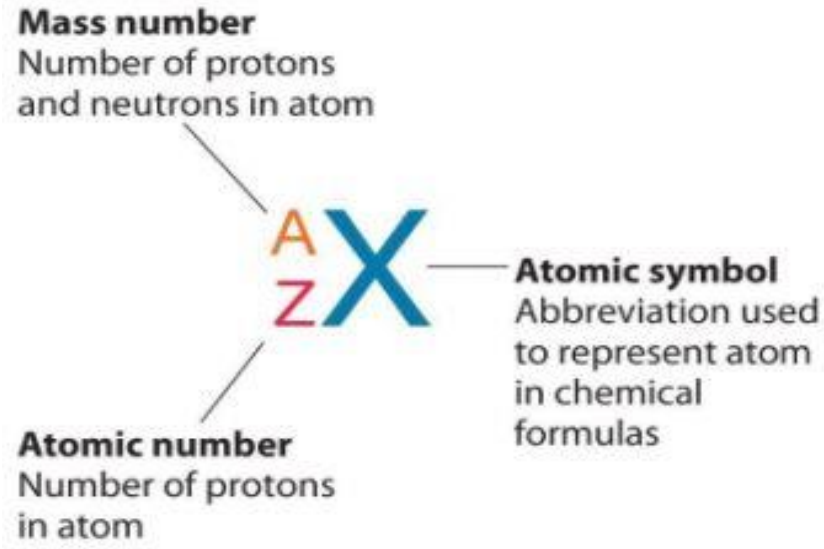
mass number = protons + neutrons.

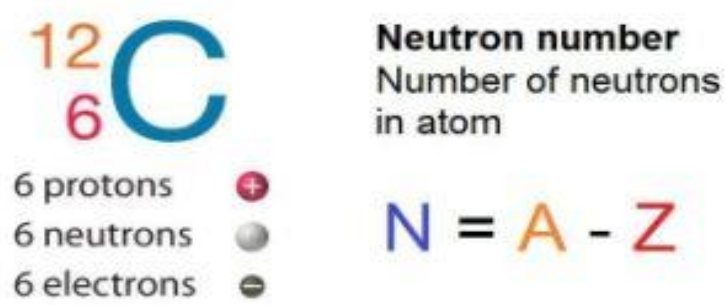


Note:

If you want to calculate how many neutrons an atom has, you can simply subtract the atomic number, from the mass number.

 # neutrons= mass number- atomic number





For example

Element	Symbol	Atomic number	Mass number	Number of electrons	Number of protons	Number of neutrons
Aluminum	*Al*	*13*	*27*	*13*	*13*	*(27-13) =14*
Lithium	*Li*	*3*	*7*	*3*	*3*	*(7-3) =4*

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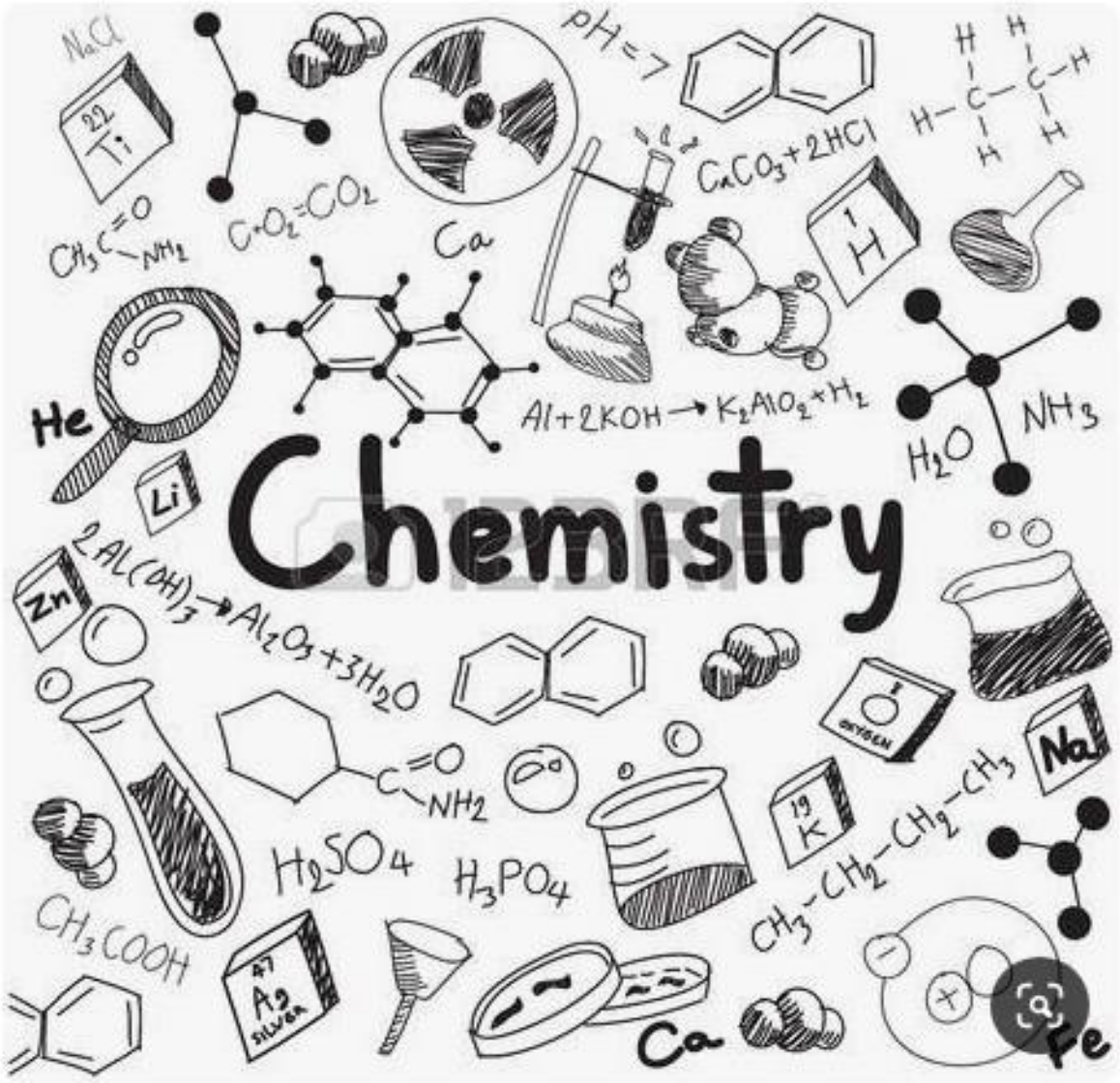
Lesson #2: (The nuclear atom model)

Scholastic Year: 2022-2023

Grade: 7CS



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Objective:

1. To be able to describe the atomic structure.
2. To describe the method of discovering the nucleus.

Resources:

Students book 149-151

video

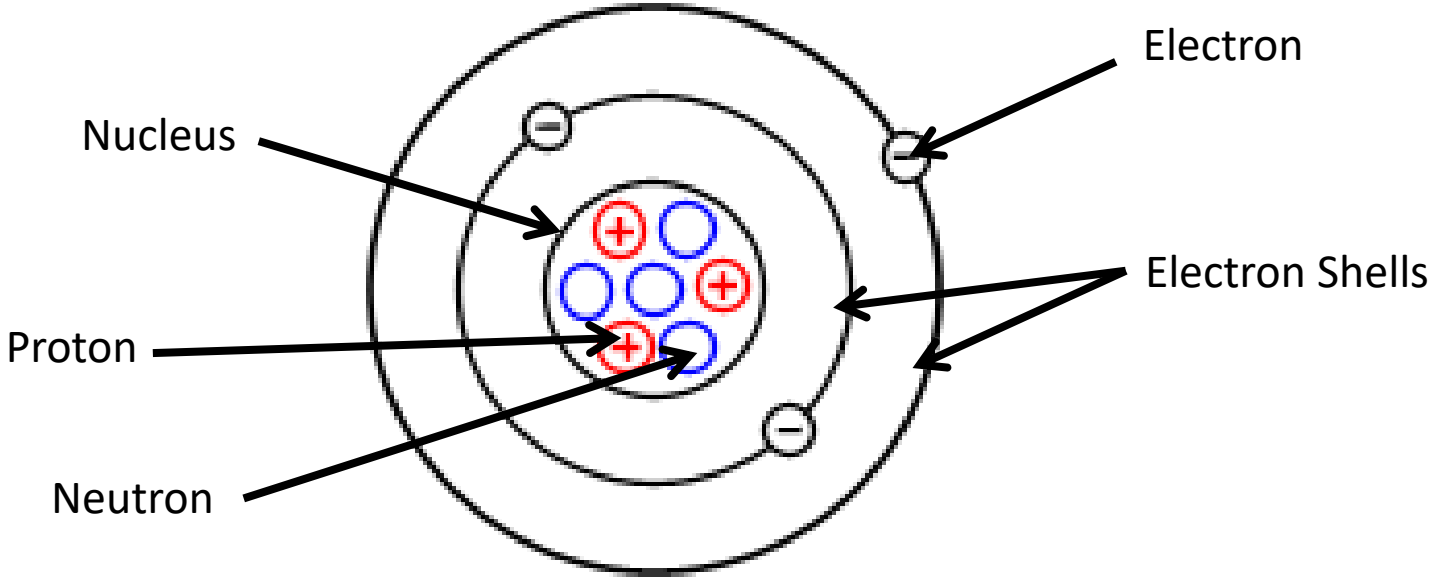
What is an atom made of?

At the centre of an atom is a positive nucleus.

The nucleus is made up of positive protons, and neutral neutrons.

The nucleus is surrounded by negative electrons.

These electrons are arranged in layers, or shells, sometimes these shells are called energy levels.



The Atomic Structure

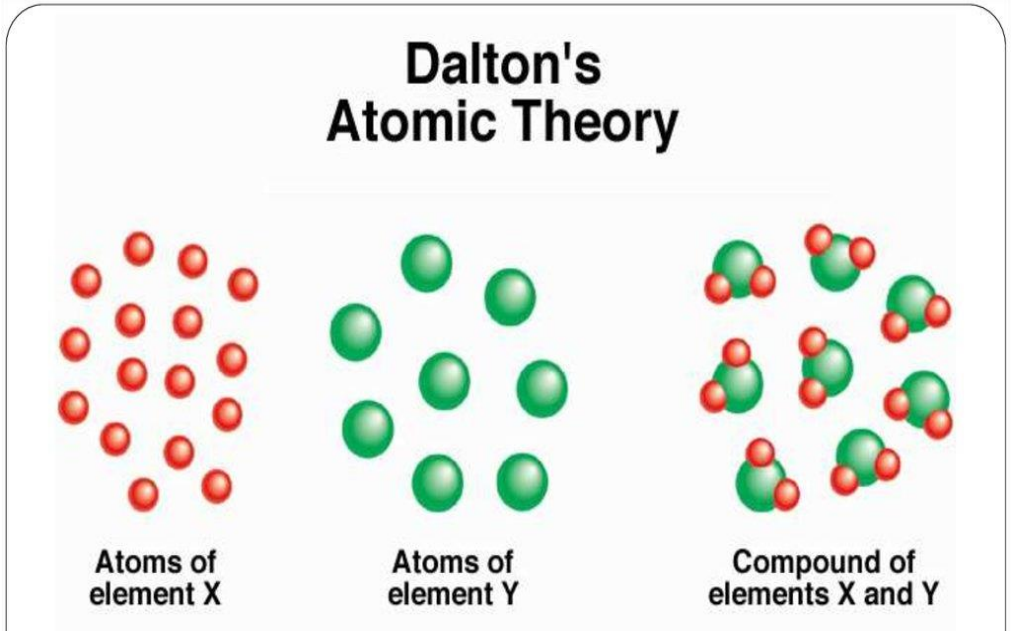
✓ **Dalton's Atomic Theory**

1) All matter is made of atoms. Atoms are indivisible.

2) All atoms of a given element are identical in mass and properties.

3) Atoms of different elements show different properties, and they have different masses and different chemical properties.

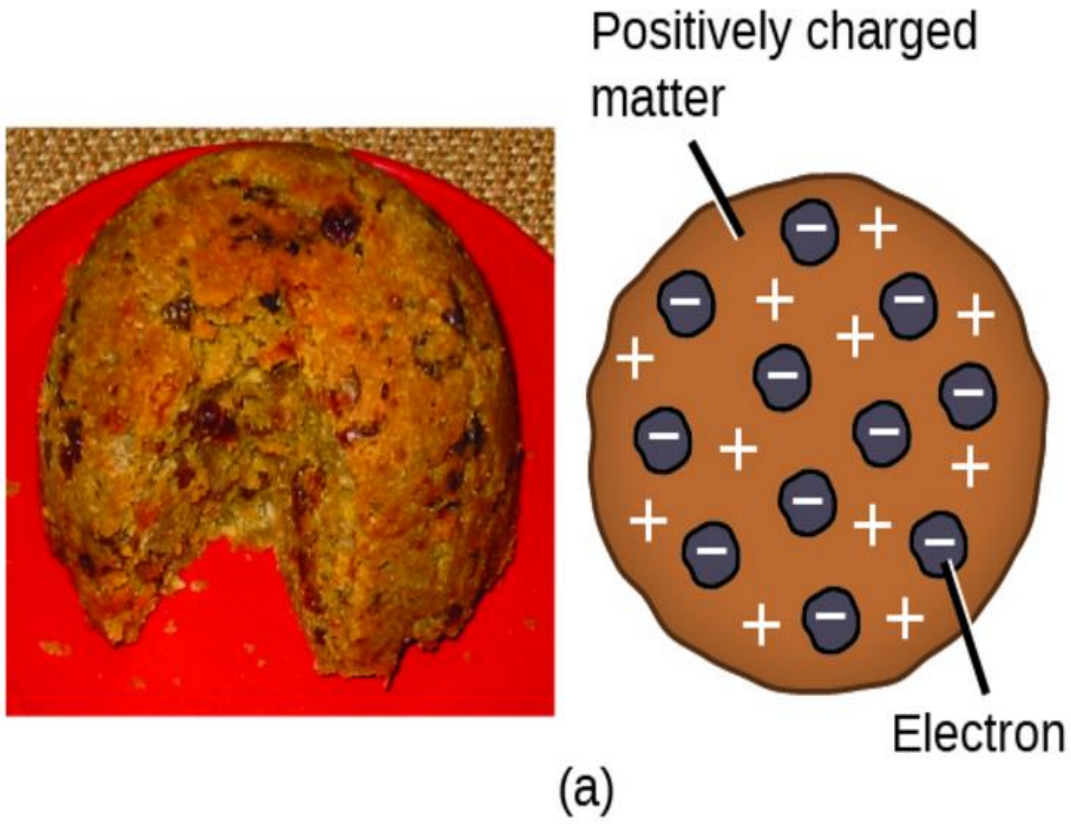
4) Compounds are formed by a combination of two or more different kinds of atoms.



✓ **Thomson's Atomic Theory**

Thomson proposed a model of the atom that consisted of more than one fundamental unit.

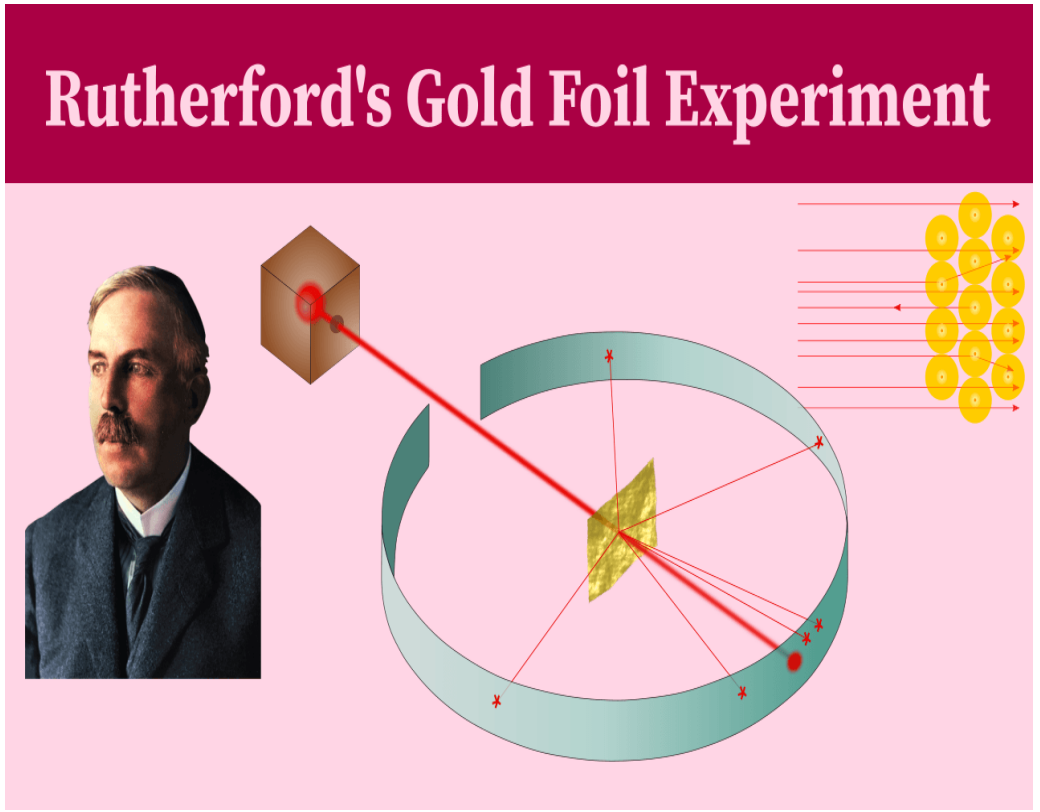
Based on its appearance, which consisted of a “sea of uniform positive charge” with electrons distributed throughout, Thomson’s model came to be nicknamed the “**Plum Pudding Model**”.



https://www.youtube.com/results?search_query=discovery+of+the+nucleus

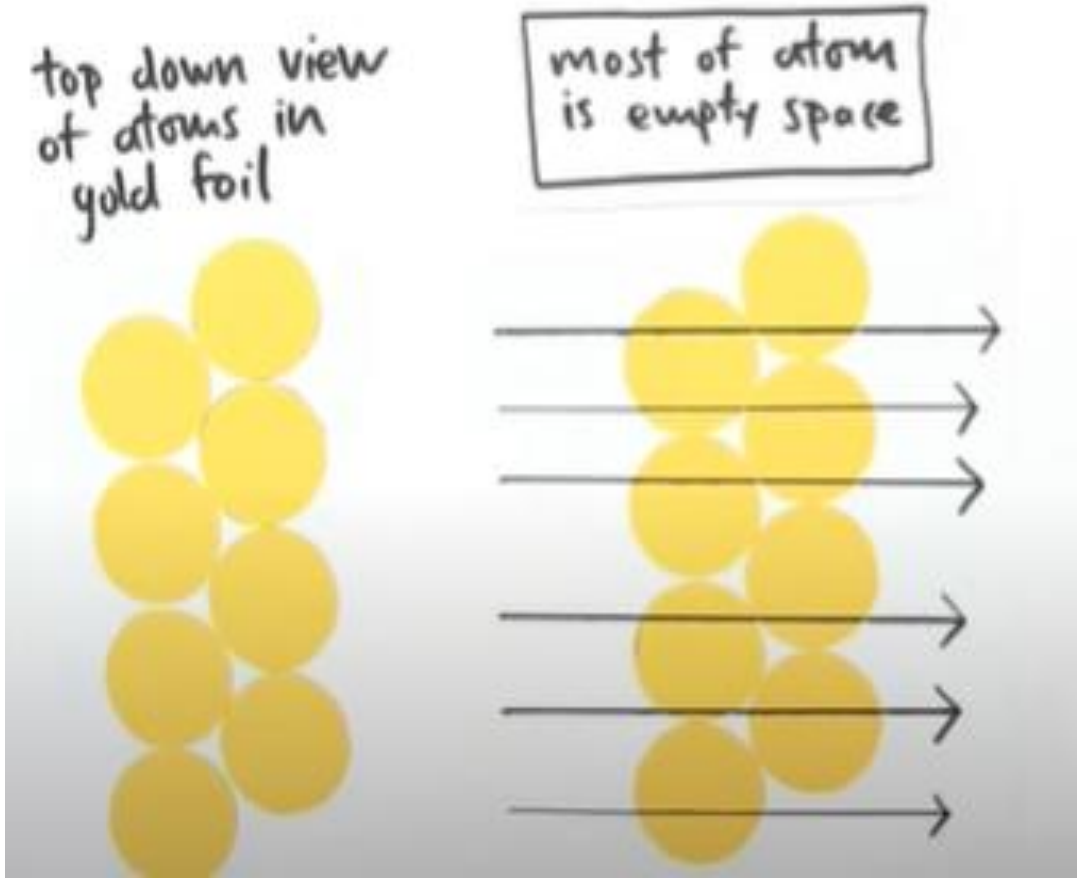
The experimental setup for Rutherford's gold foil experiment:

Alpha particles were directed toward a thin sheet of gold foil that was surrounded by a screen (belt) which would allow detection of the deflected particles.



Prediction

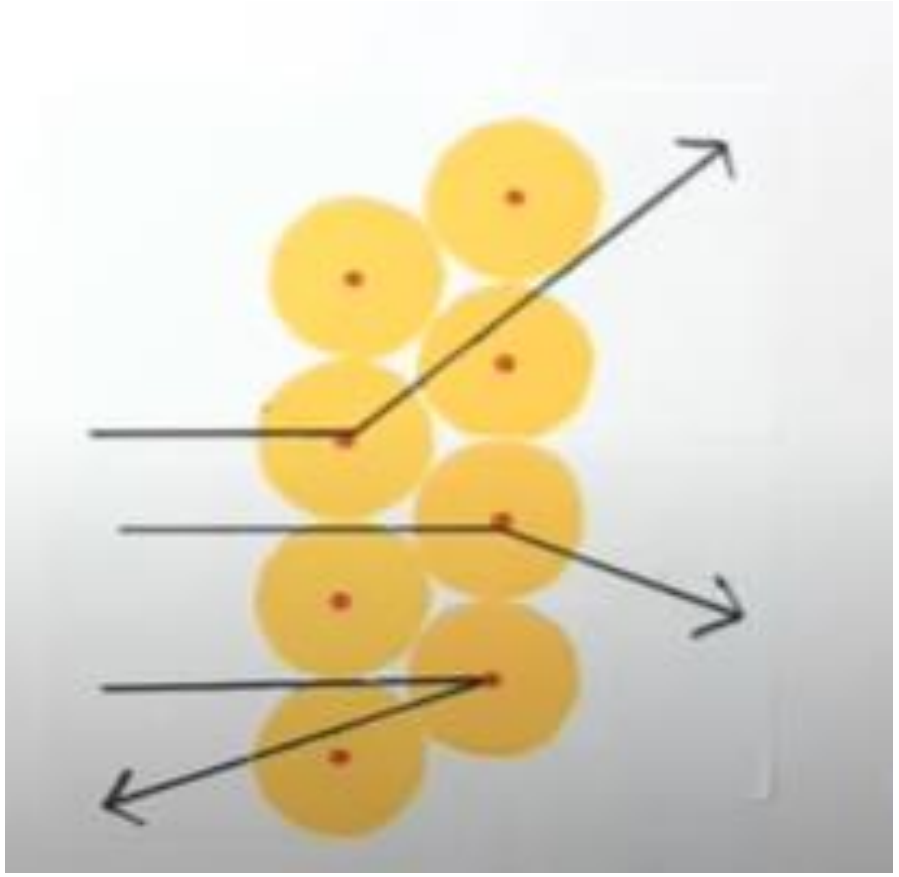
The scientists expected that <u>most of the alpha particles would pass through the gold foil.</u>



Observation

A very small percentage (about 1 in 10000 particles) bounced off the gold foil at very large angles. Some were redirected back toward the source.

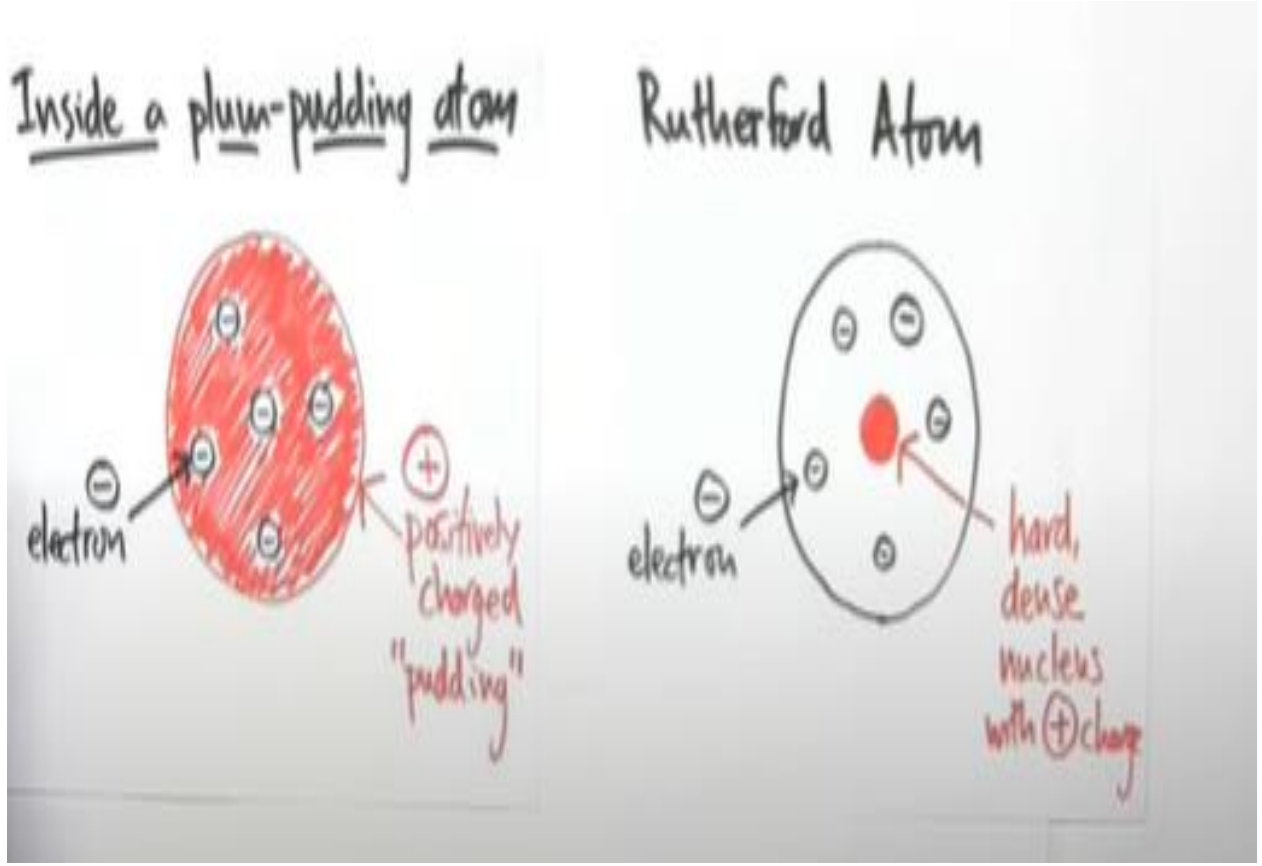
No prior knowledge had prepared them for this discovery.



Explanation

Because the majority of the alpha particles had passed through the gold, he reasoned that most of the atom was an empty space.

In contrast, the particles that were highly deflected must have experienced a force within the atom. He concluded that all of the positive charge and the majority of the mass of the atom must be concentrated in a very small space in the atom's interior, which he called the nucleus.



Timeline of the nuclear atom model

The nuclear model of the atom consists of a small and dense positively charged structure surrounded by a cloud of electrons.