



Al-Mustaqbal University College
Department of Radiology Techniques - First Stage
General Chemistry



First Lecture: Introduction to Chemistry

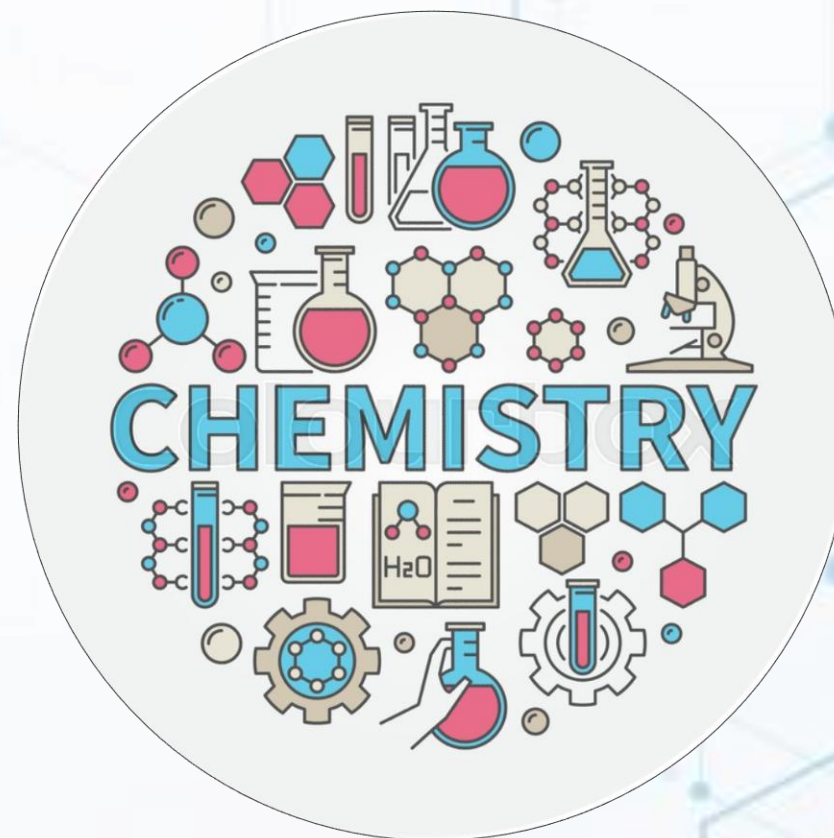


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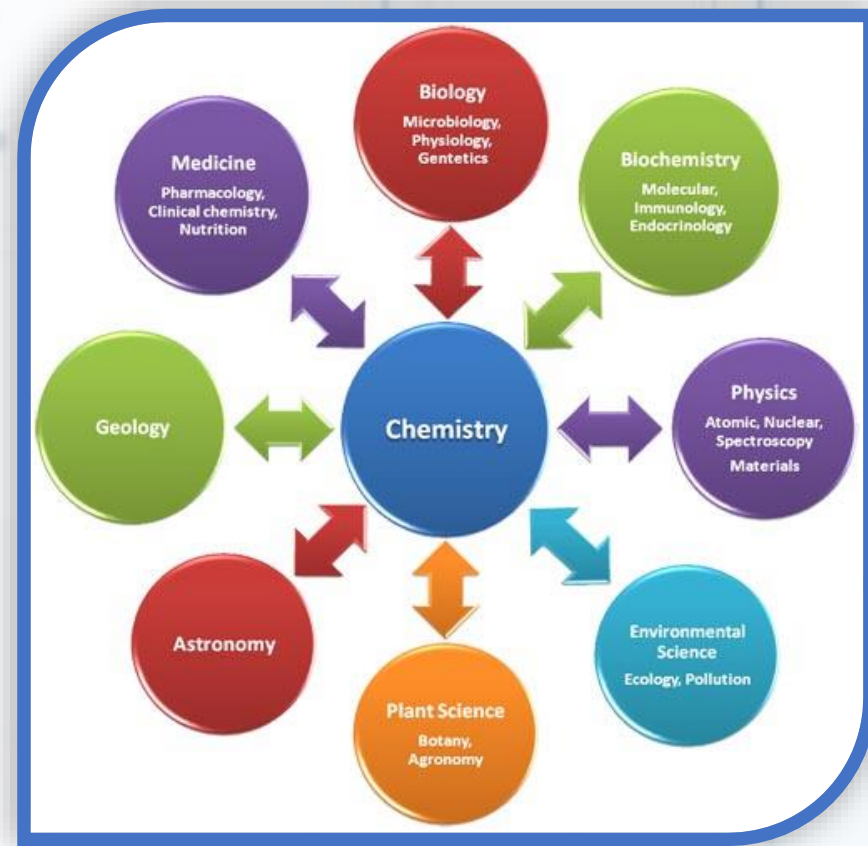
Out line

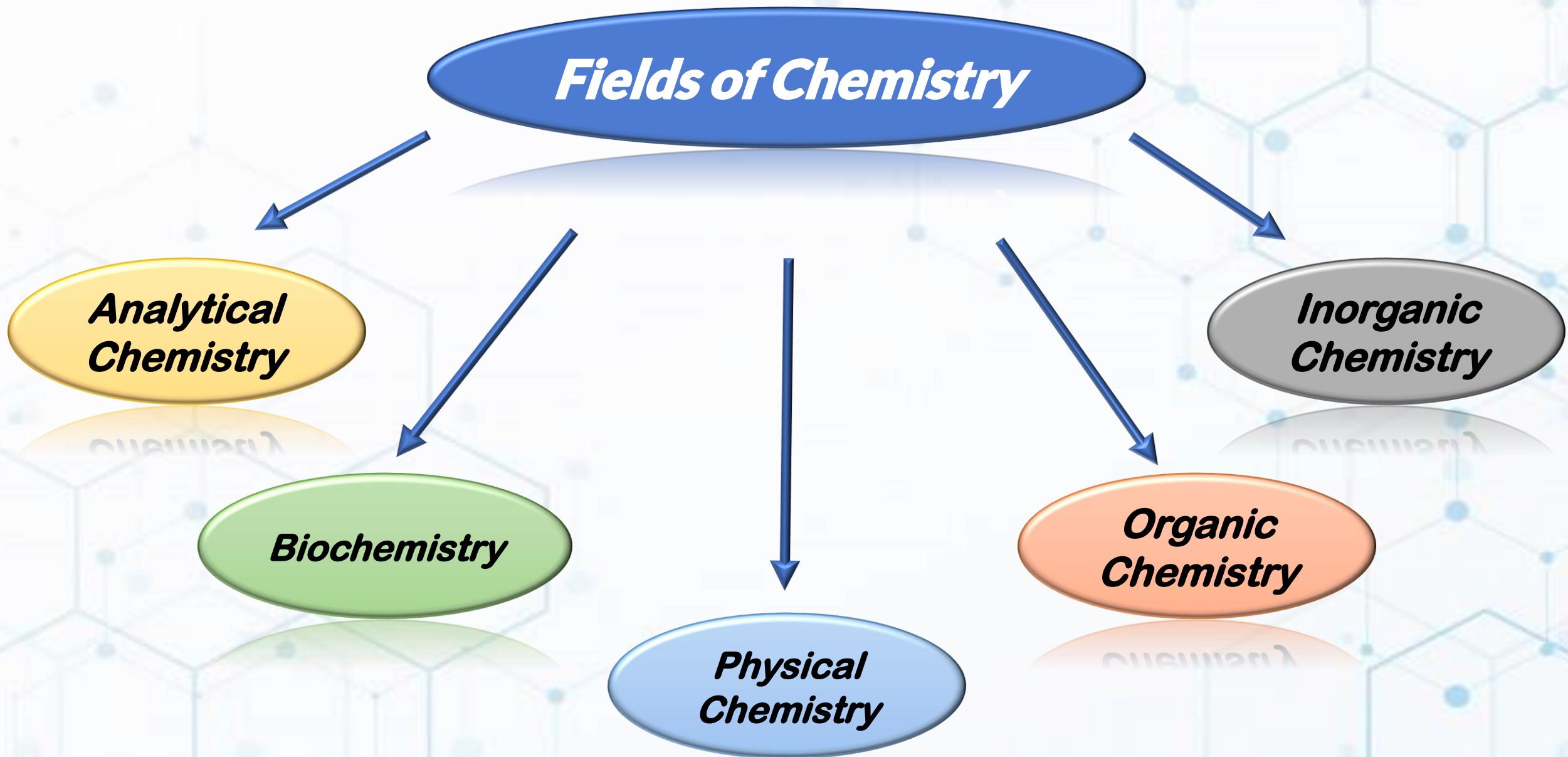
- ✓ **What is chemistry?**
- ✓ **Branches of chemistry.**
- ✓ **Atom.**
- ✓ **Elements.**
- ✓ **Isotopes.**
- ✓ **Matter.**



What is Chemistry?

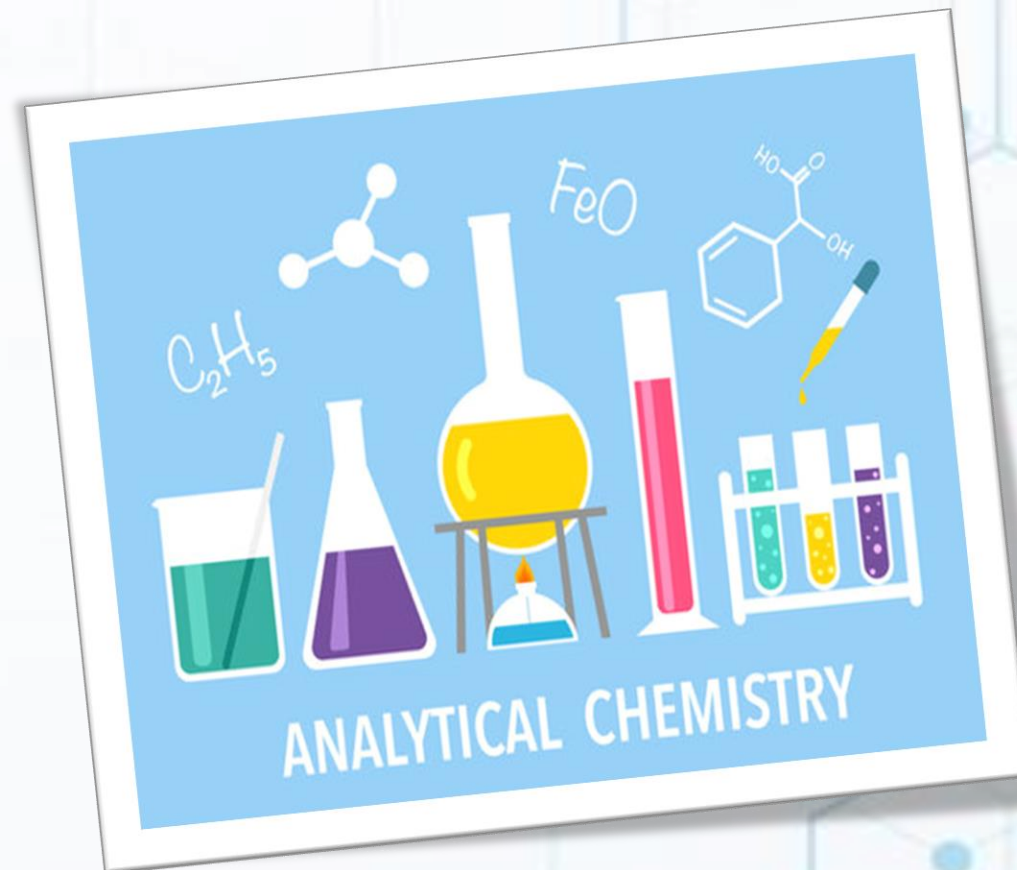
- **Chemistry:** Is a branch of sciences that studies the **composition, structure, properties and reactivity** of matter.
- Why we are study chemistry?
- Because of **chemistry** is a **part of everything** in our lives, and it is the science that help us to **describe and explain** our world. And **chemistry** is central to **understanding** a wide range of scientific disciplines.





1. Analytical Chemistry

It concerned mainly with the various **techniques** and **laboratory methods** to **determine the composition** of matter.



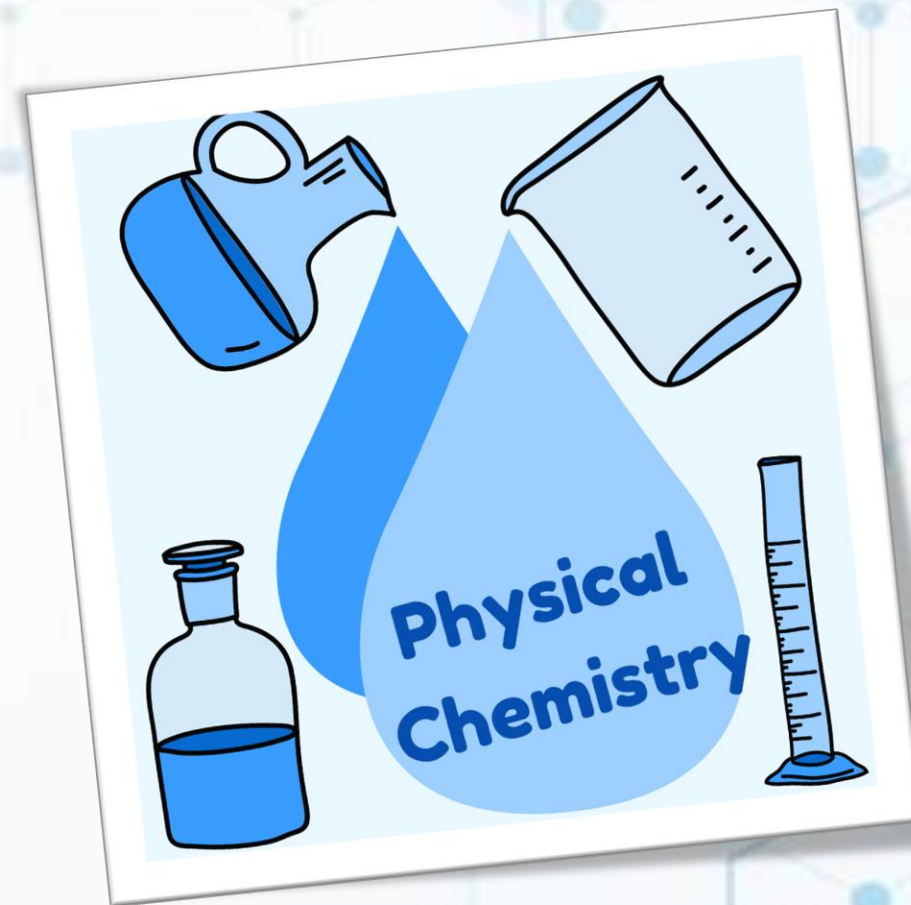
2. Biochemistry

It concerned mainly with
the **chemistry of life**
processes and living
organisms.



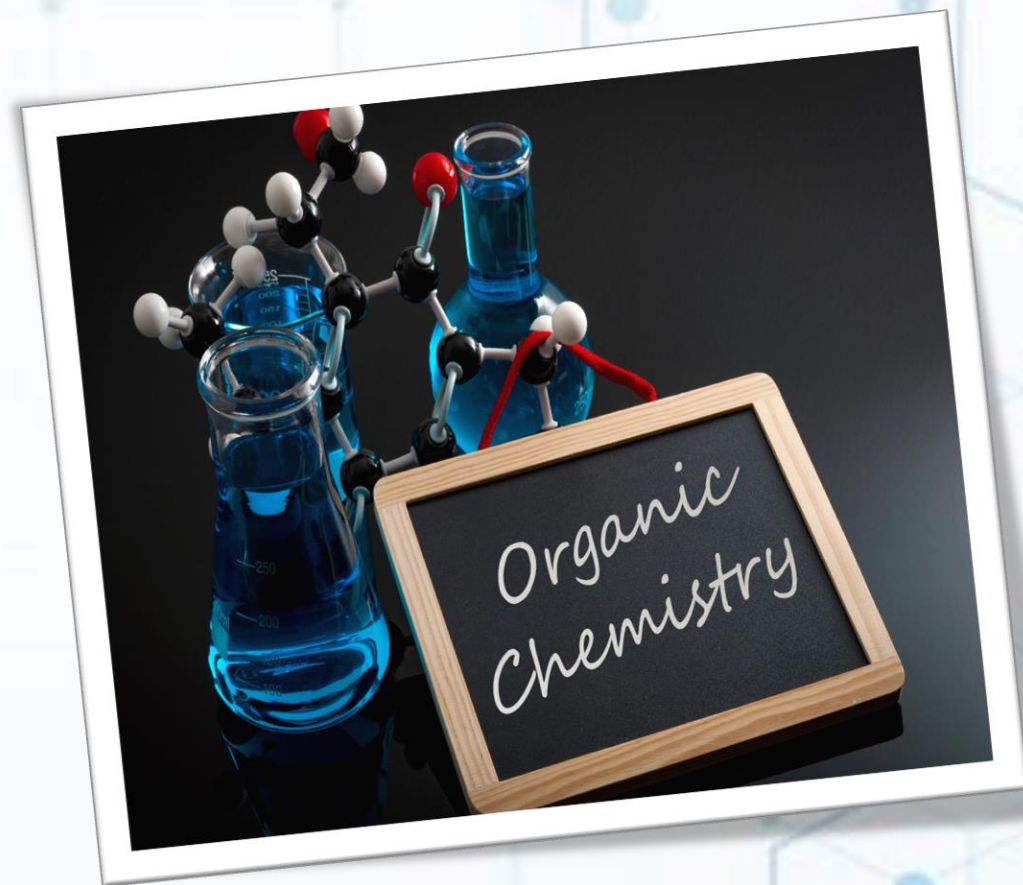
3. Physical Chemistry

It deals with the **application**
of **physical laws** to
chemical change and
chemical systems.



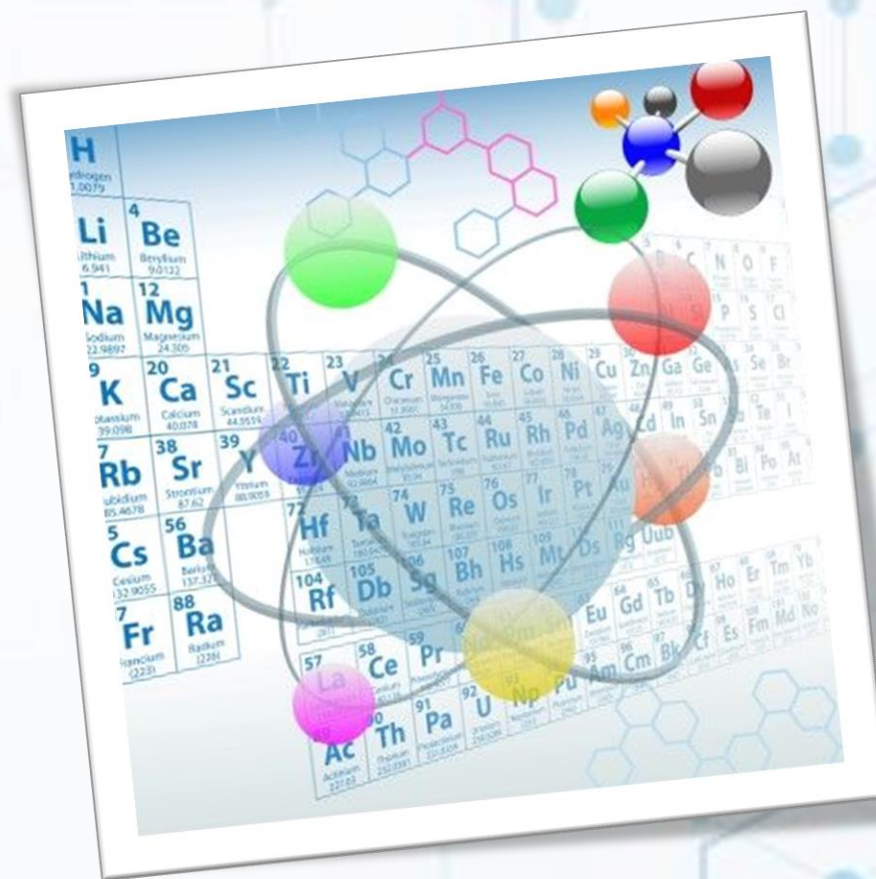
4. Organic Chemistry

It is concerned with the **study** of most **carbon** based **compounds**.



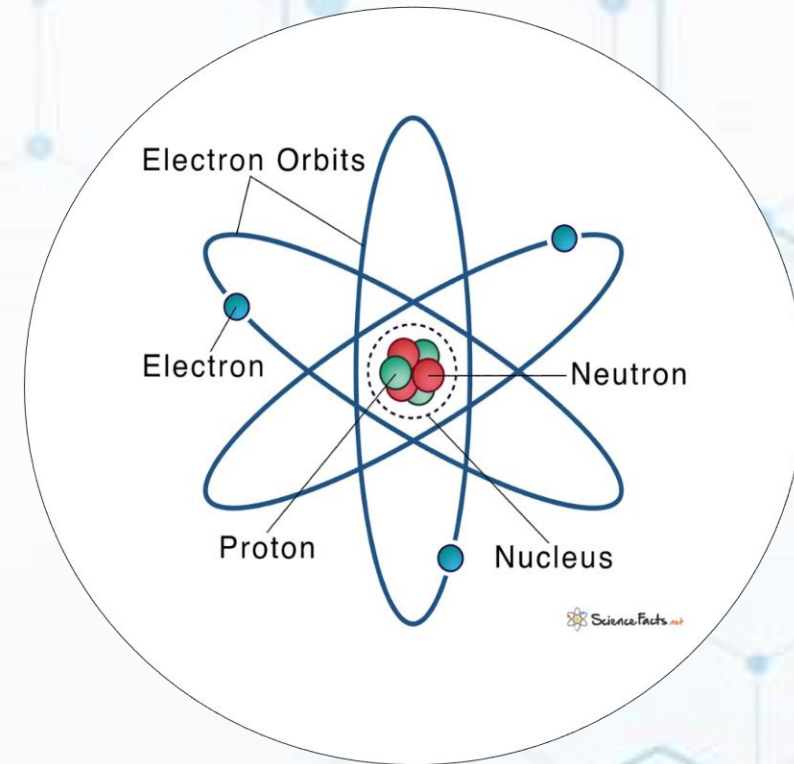
5. Inorganic Chemistry

It deals with the **substances** which are **not considered to organic** which may contain any of over **100 elements** (including **carbon**) .



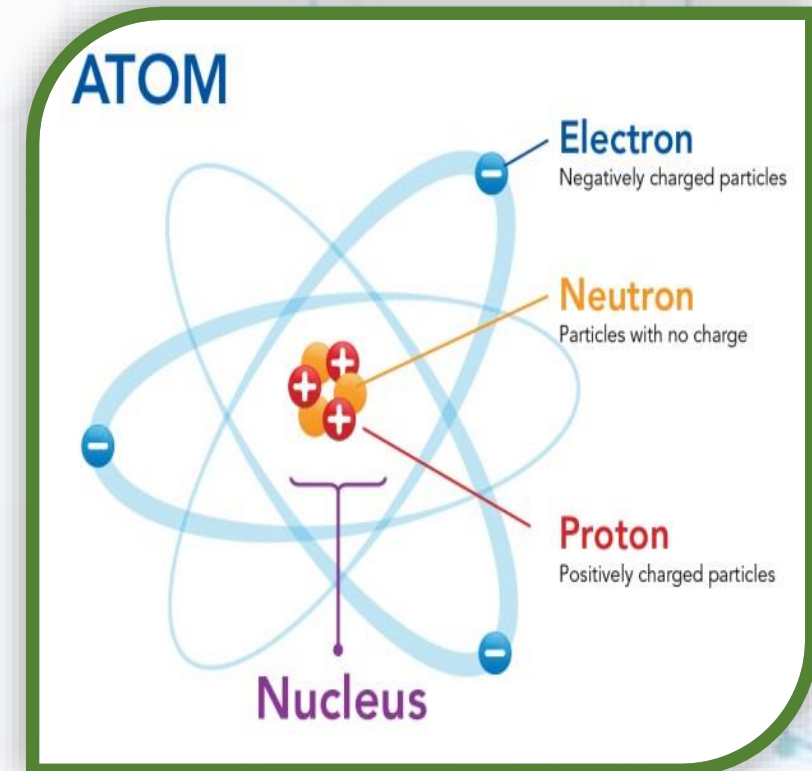
Atom

- **Atoms:** are the basic units of matter and the defining structure of elements.
- **Atoms are made of three basic subatomic particles:**
 - ✓ The **protons** have a **positive** electric charge.
 - ✓ The **electrons** have a **negative** electric charge.
 - ✓ The **neutrons** have **no** electric charge.



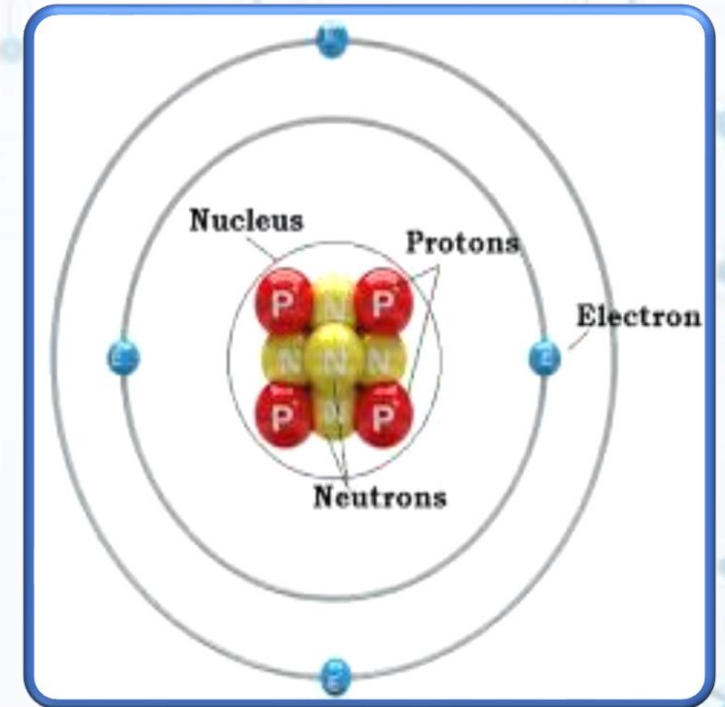
Atom

- **Protons and neutrons** are heavier than **electrons** and found in the **center of the atoms**, which is called **nucleus**.
- **Nucleus:** small, dense center of atom and contains almost all the mass of the atom and contains protons and neutrons.
- **Electrons** are very lightweight and exist in a cloud orbiting the nucleus.



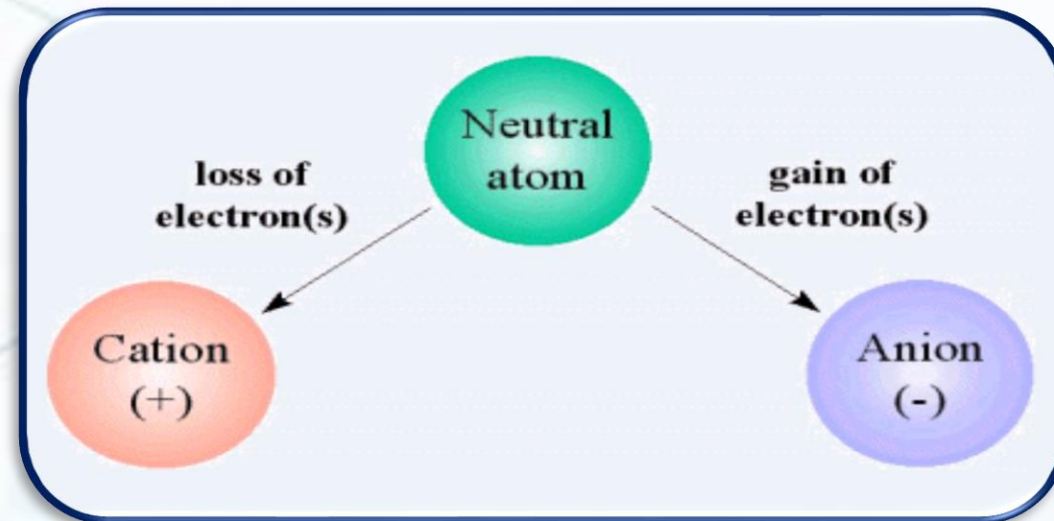
Atom

- **Protons and neutrons** have approximately the same mass and different with **electrons** where one **proton** weighs more than **electron** by **1800** times.
- **Atoms** always have an **equal number of protons and electrons**, and the **number of protons and neutrons** is usually the **same in the nucleus** as well.



Atom

- If the **number of protons and electrons are equal**, that atom is electrically **neutral**.
- If the atom has **more protons than electrons**, it will have a **positive charge**.
- While if the **electrons number more than protons** the atom has a **negative charge**.
- The atom in this case is called an **ion**.
- **Atoms can attach to another one or more by chemical bonds to form chemical compounds.**



Elements

- Composed of **one type of atom**.
- **Element**: is a pure substance that cannot be changed into a simpler form of matter by any chemical reaction.
- Each element is assigned by **one or two letter chemical symbol** for example: **H, Na, Zn** etc.

PERIODIC TABLE OF THE ELEMENTS

<http://www.kgf-split.hr/periodni/en/>

The periodic table is organized into groups (I to VIII) and periods (1 to 7). It includes the Lanthanide and Actinide series at the bottom. The legend indicates the following categories:

- Metal** (Blue background)
- Semimetal** (Orange background)
- Nonmetal** (Green background)
- Alkali metal** (Group 1)
- Alkaline earth metal** (Group 2)
- Transition metals** (Groups 3-10)
- Lanthanide** (Lanthanide series)
- Actinide** (Actinide series)
- Chalcogens element** (Group 16)
- Halogens element** (Group 17)
- Noble gas** (Group 18)

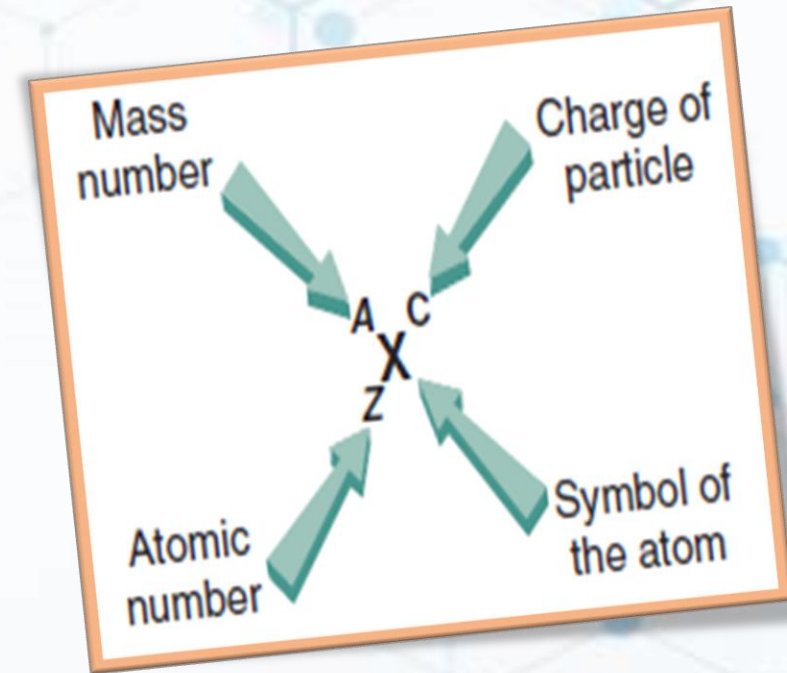
Standard state (25 °C, 101 kPa):
 Ne - gas, Fe - solid, Ga - liquid, Ts - synthetic

(1) Pure Appl. Chem., 73, No. 4, 667-683 (2001)
 Relative atomic mass is shown with five significant figures. For elements from no stable nuclides, the value enclosed in brackets indicates the mass number of the longest-lived nuclide of the element.
 *Nomenclature of these elements (Fr, Ra, and U) is based on their chemical composition, and for these an atomic weight is not defined.

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Elements

- Each element is identified by two numbers: **Atomic number** and **Atomic weight (mass number)**.
- **Atomic number (Z):** is the number of protons in the nucleus of the atom.
- The number of protons (atomic number) determine the **identity of an element**.
- **Note:** Adding a **proton** to an **atom** makes a **new atom**.

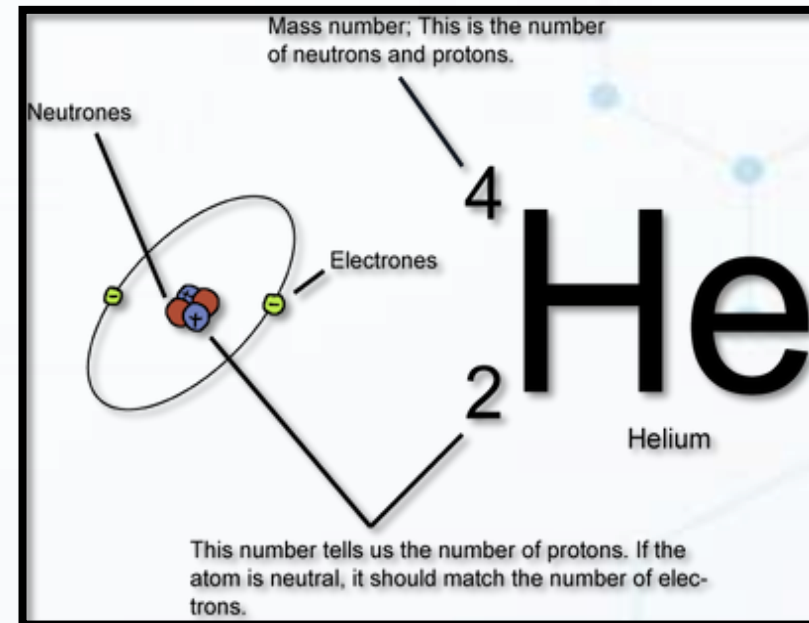
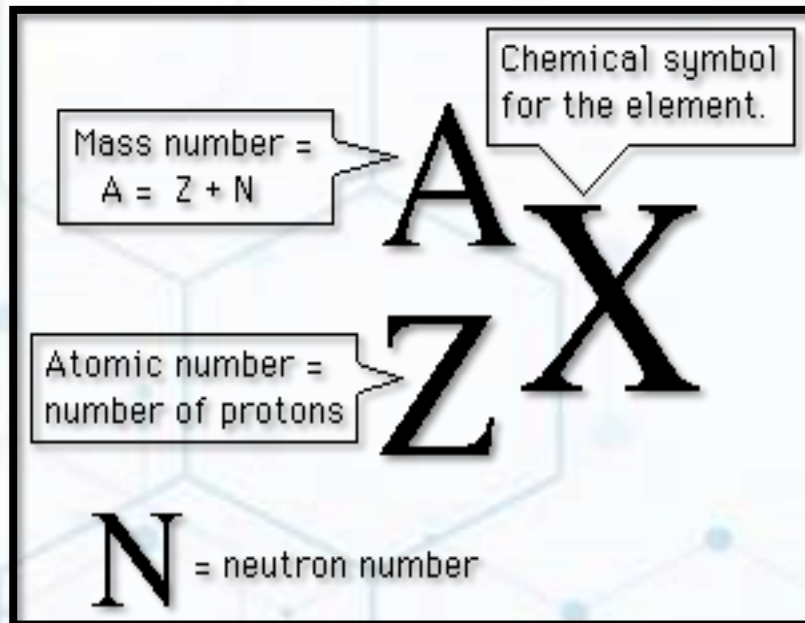


$$Z = \text{no. } P = \text{no. } E$$

Elements

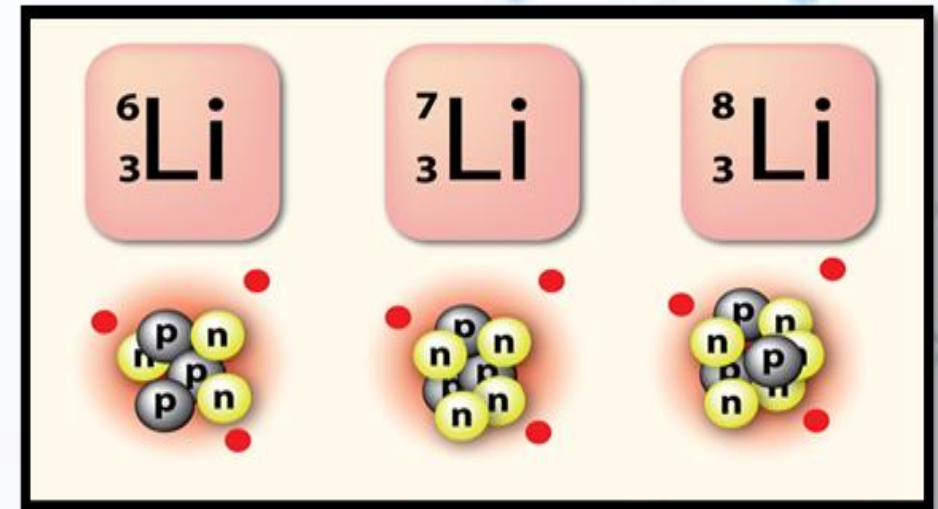
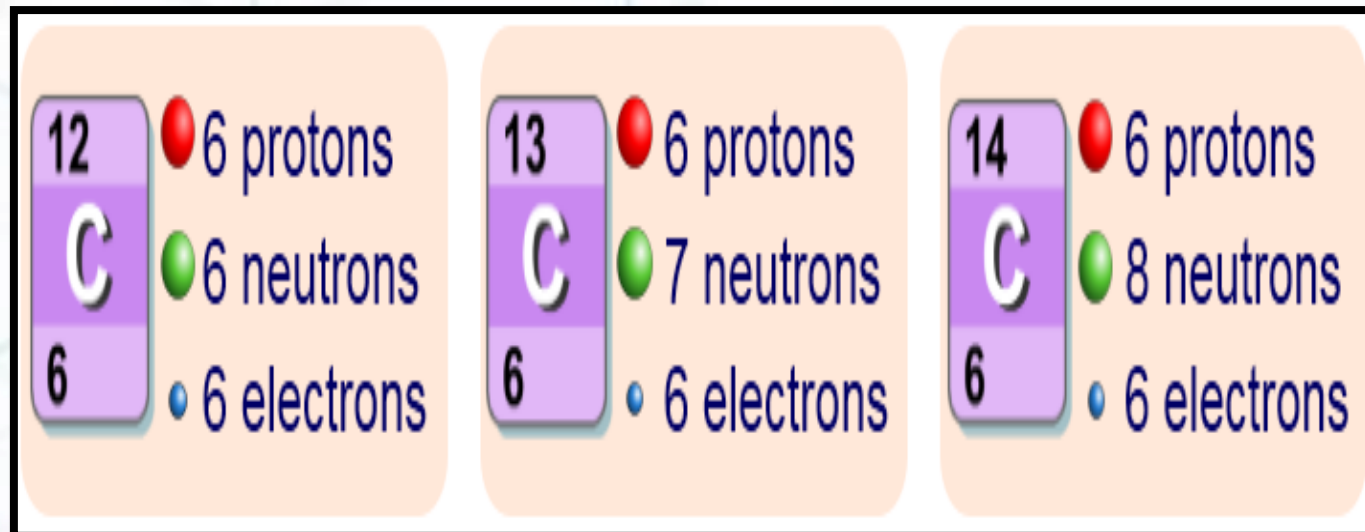
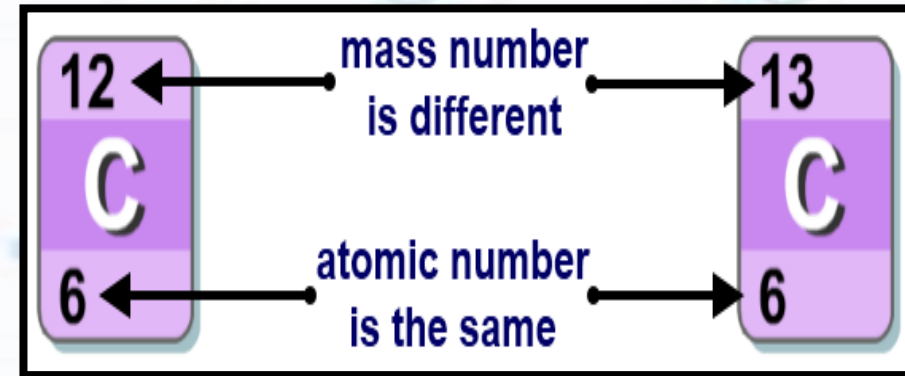
- **Mass number:** is the sum of protons and neutrons in the nucleus.

$$A = \text{no. } P + \text{no. } N$$



Isotopes

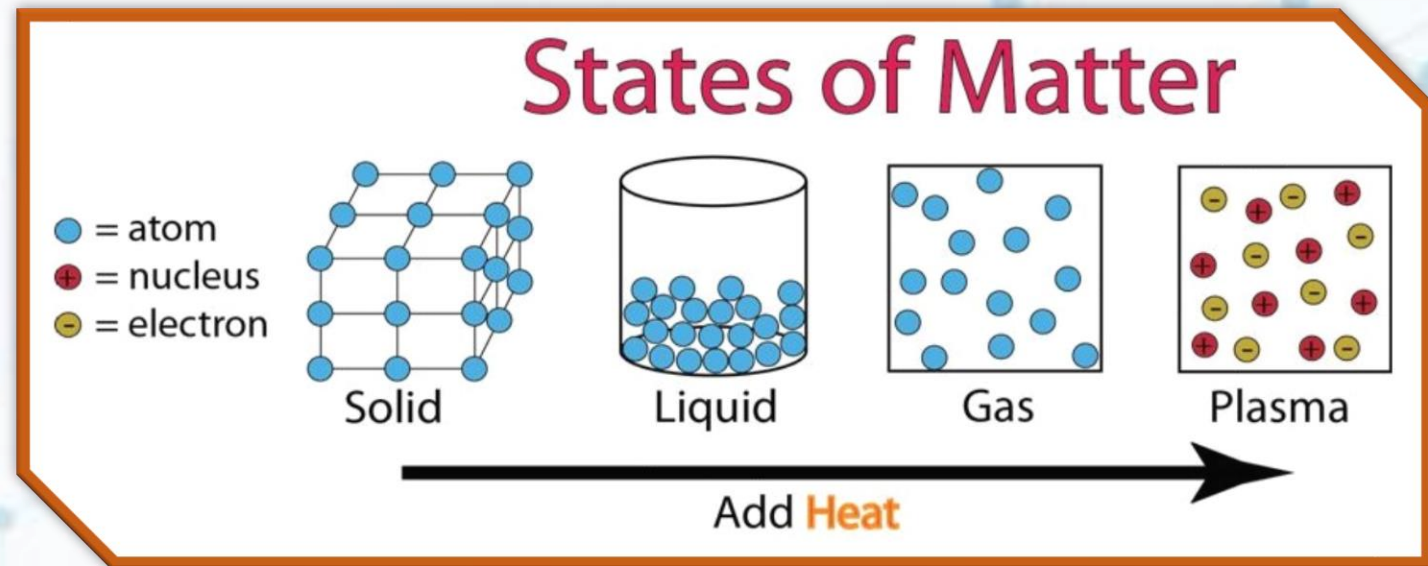
- **Isotopes:** Atoms that have the **same number of protons** and **different number of neutrons**, (atoms with **same atomic number** and **different atomic weight**).



Matter

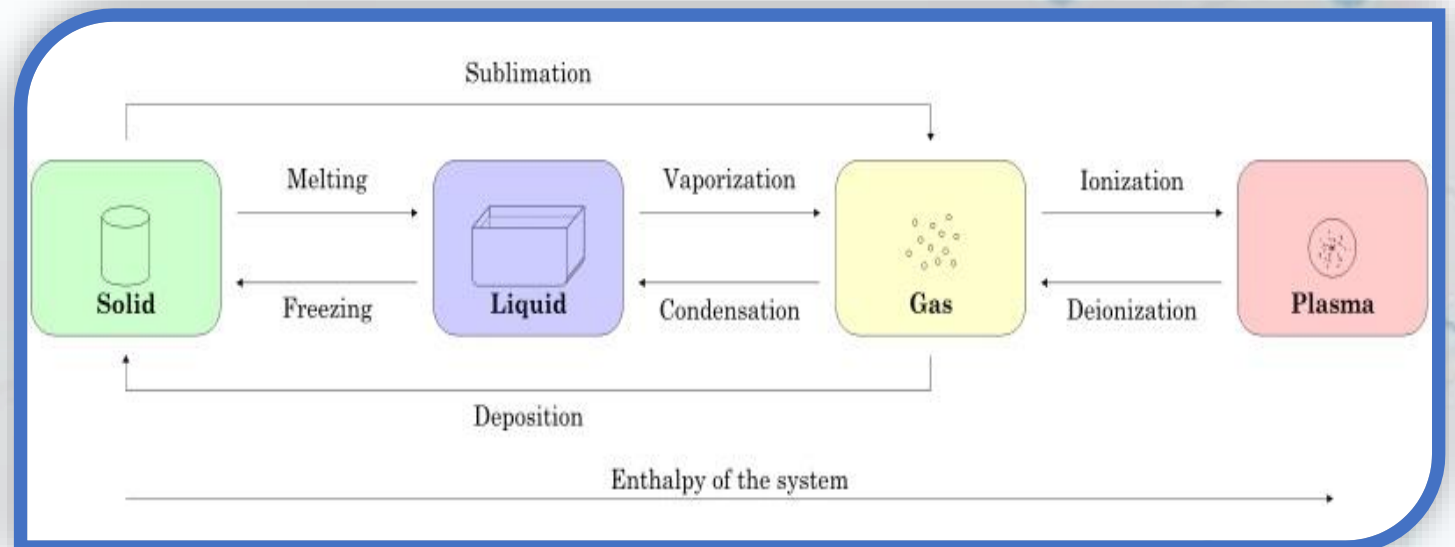
- **Matter:** Is anything that it can take place, or it is anything that has mass and volume.
- There are **four states of matter:**

- ✓ **Solid.**
- ✓ **Liquid.**
- ✓ **Gas.**
- ✓ **Plasma.**



Matter

- ❑ **Solid:** a state of matter that has a **definite shape and volume**.
- ❑ **Liquid:** a state of matter that has **no definite shape but has a definite volume**.
- ❑ **Gas:** a state of matter that has **no definite shape or volume**.
- ❑ **Plasma:** a state of matter that are **gases that have so much energy that electrons of an atom cannot stay** in orbitals around one atomic nucleus. The atomic ions and free electrons mix around.



Matter

➤ All **matter** classified to:

✓ Pure substance.

✓ Mixture.

➤ There are two types of a **pure substance**:

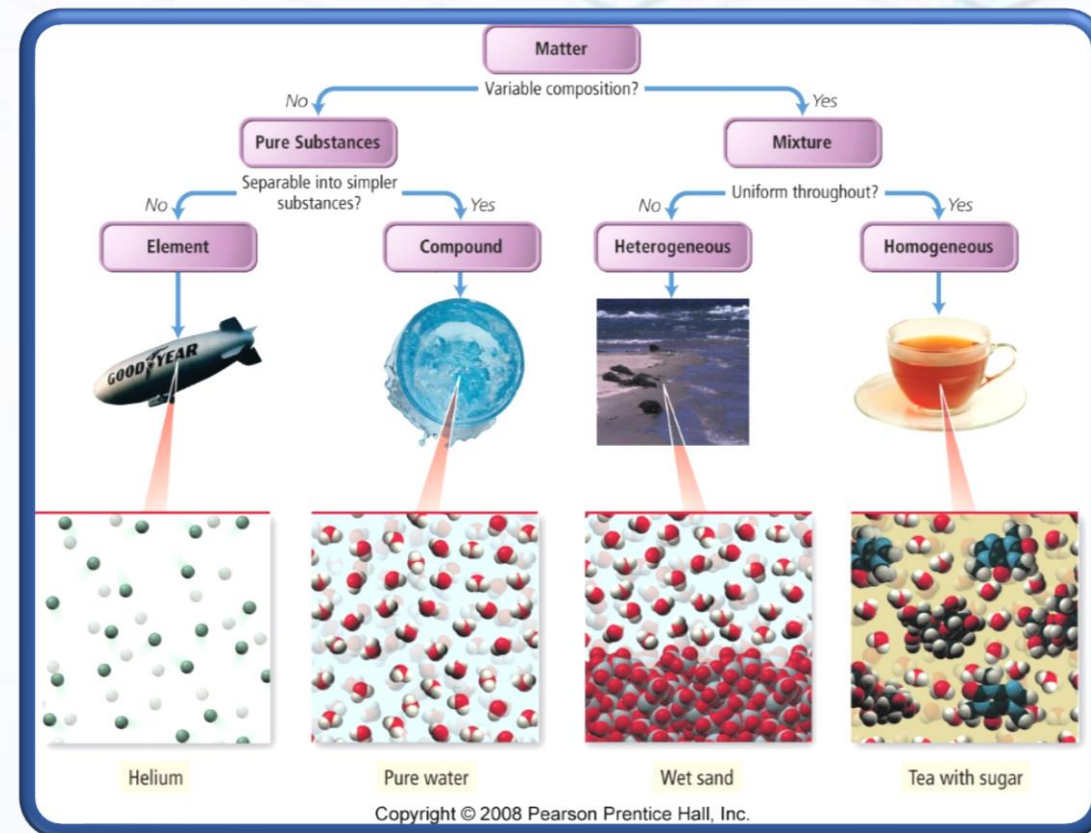
☐ Elements.

☐ Compounds.

➤ A **mixture** may be either:

❖ Homogenous mixture.

❖ Heterogeneous mixture.





Thank
You