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

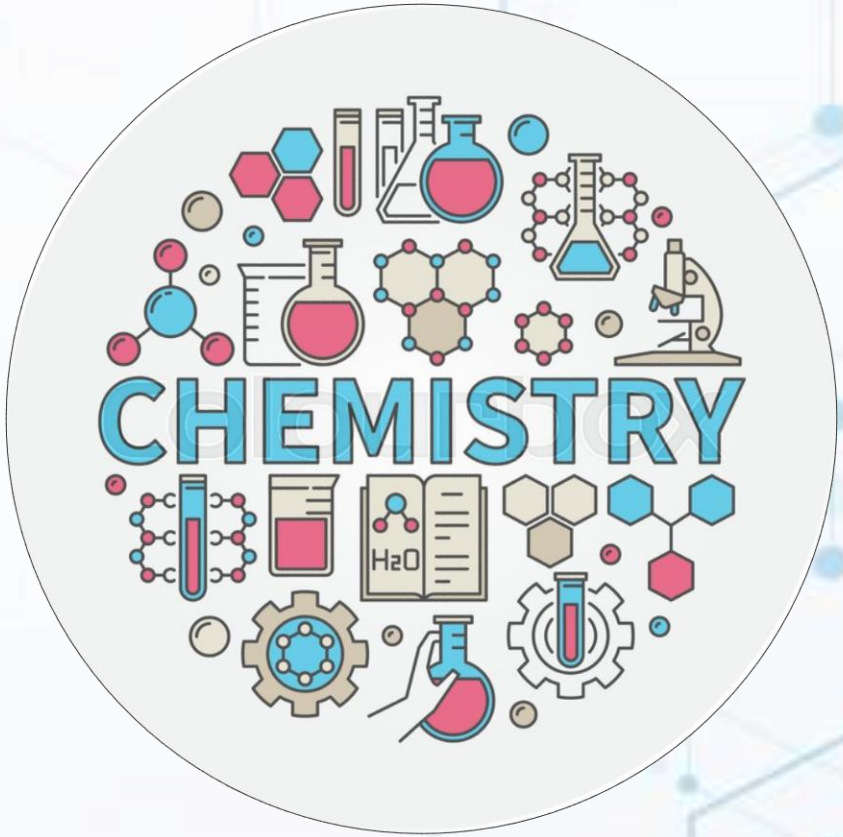
General Chemistry

First Lecture: Introduction to Chemistry

Asst. Lec. Alaa Salman Al-Labban

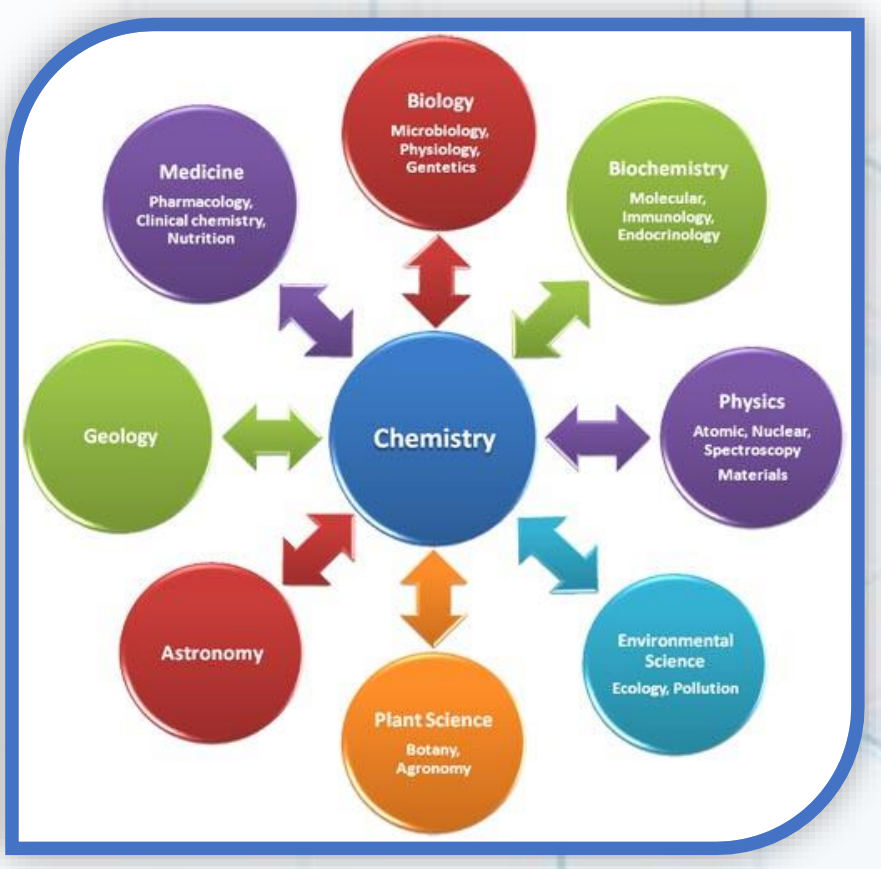
Out line

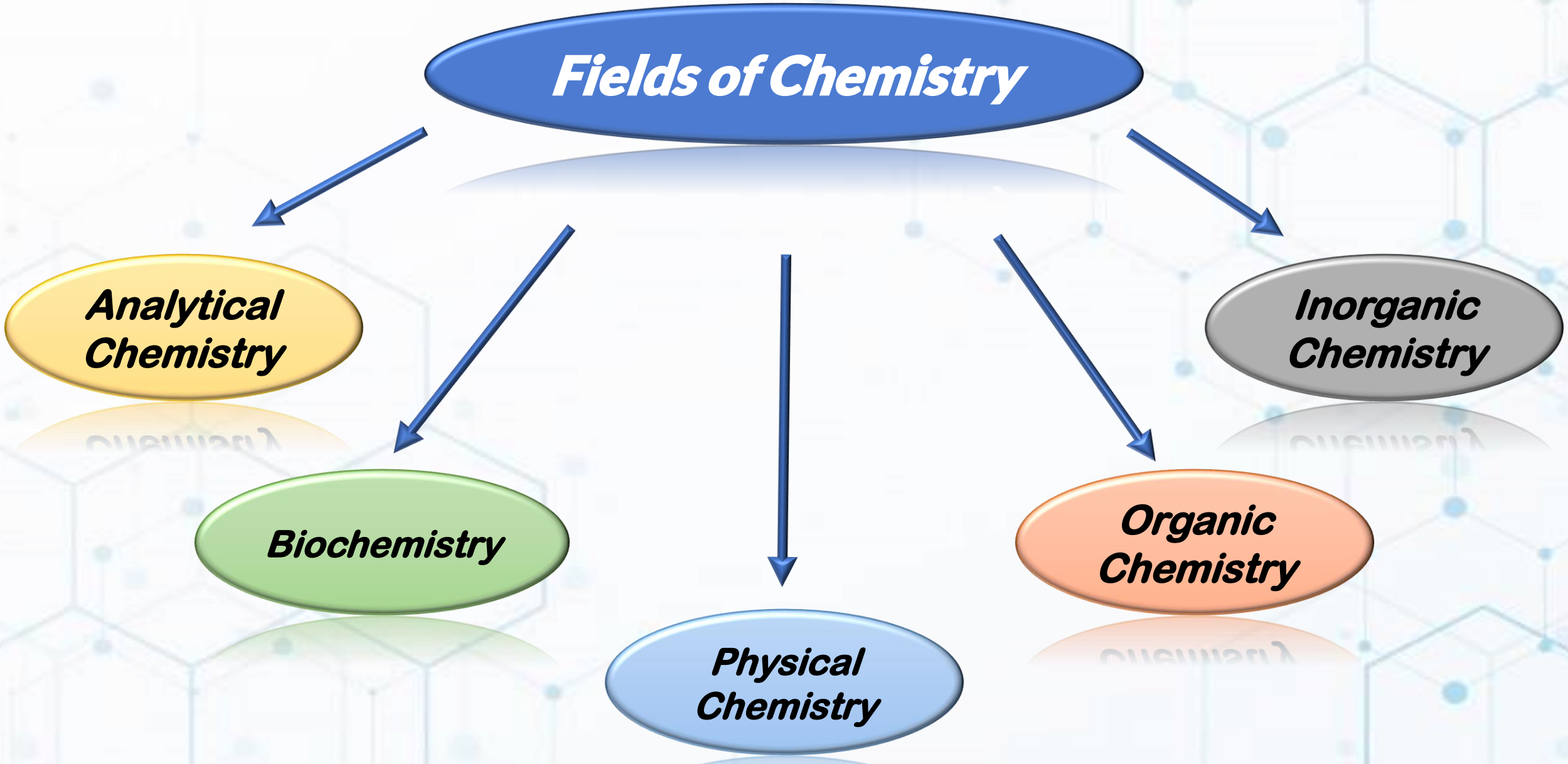
- ✓ What is chemistry?
- ✓ Branches of chemistry.
- ✓ Atom.
- ✓ Elements.
- ✓ Isotopes.
- ✓ Matter.



What is Chemistry?

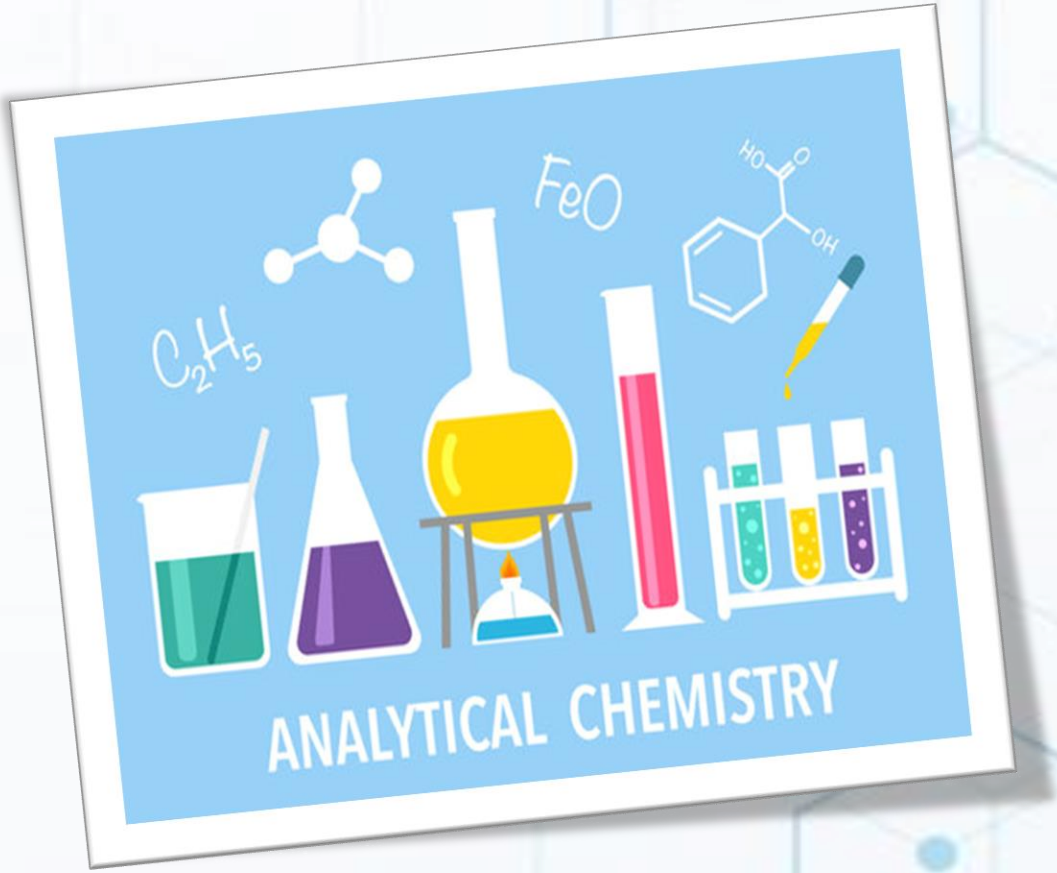
- **Chemistry:** Is a branch of sciences that studies the composition, structure, properties and reactivity of matter.
- **Why we are study chemistry?**
- Because of chemistry is a part of everything in our lives, and it is the science that help us to describe and explain our world. And chemistry is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




Fields of Chemistry
Analytical Chemistry
Biochemistry
Physical Chemistry
Organic Chemistry
Inorganic Chemistry

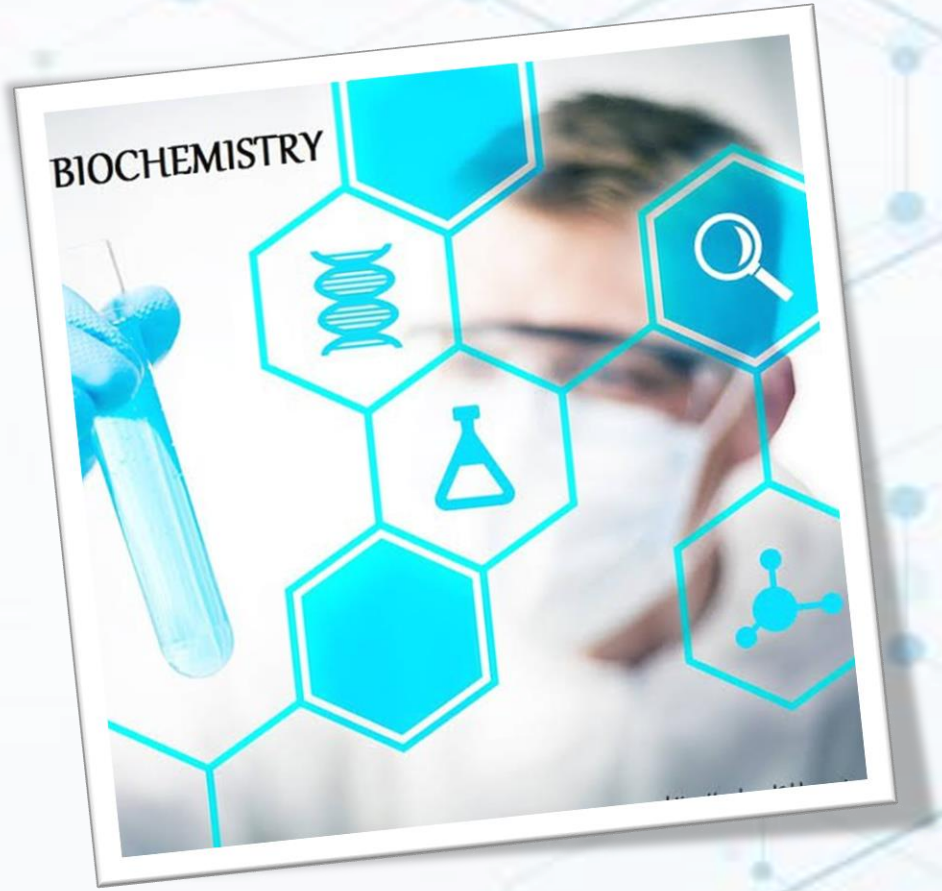
1. Analytical Chemistry

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



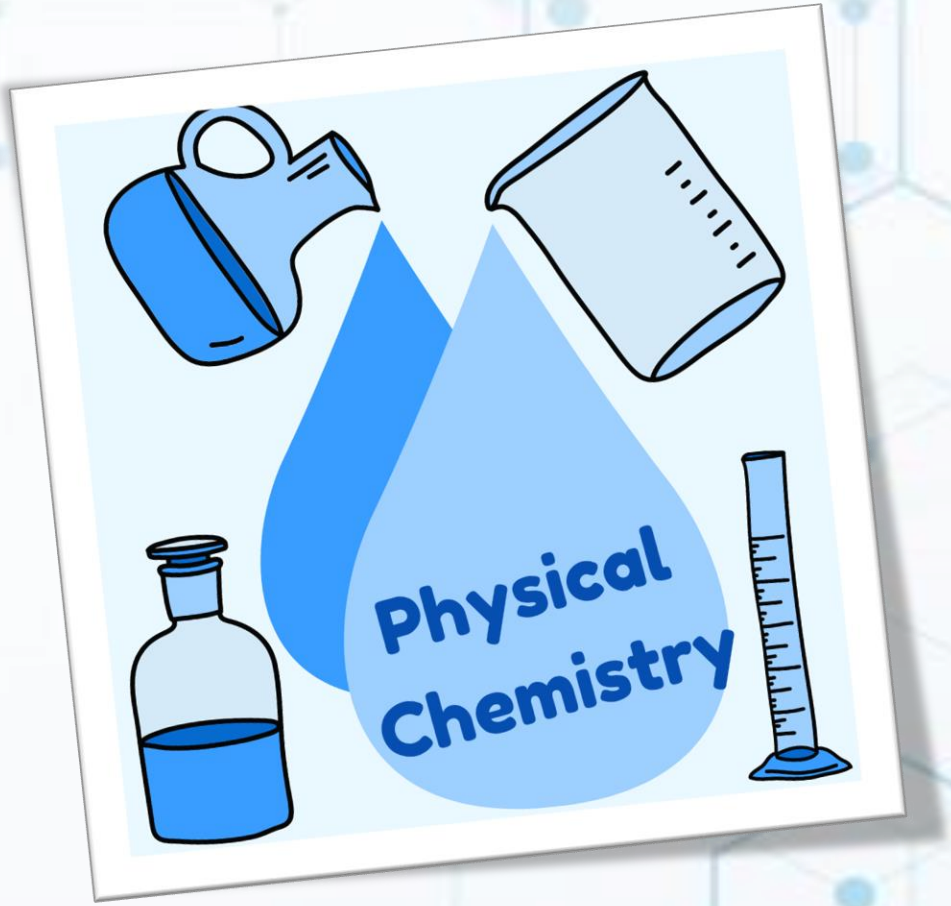
2. Biochemistry

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



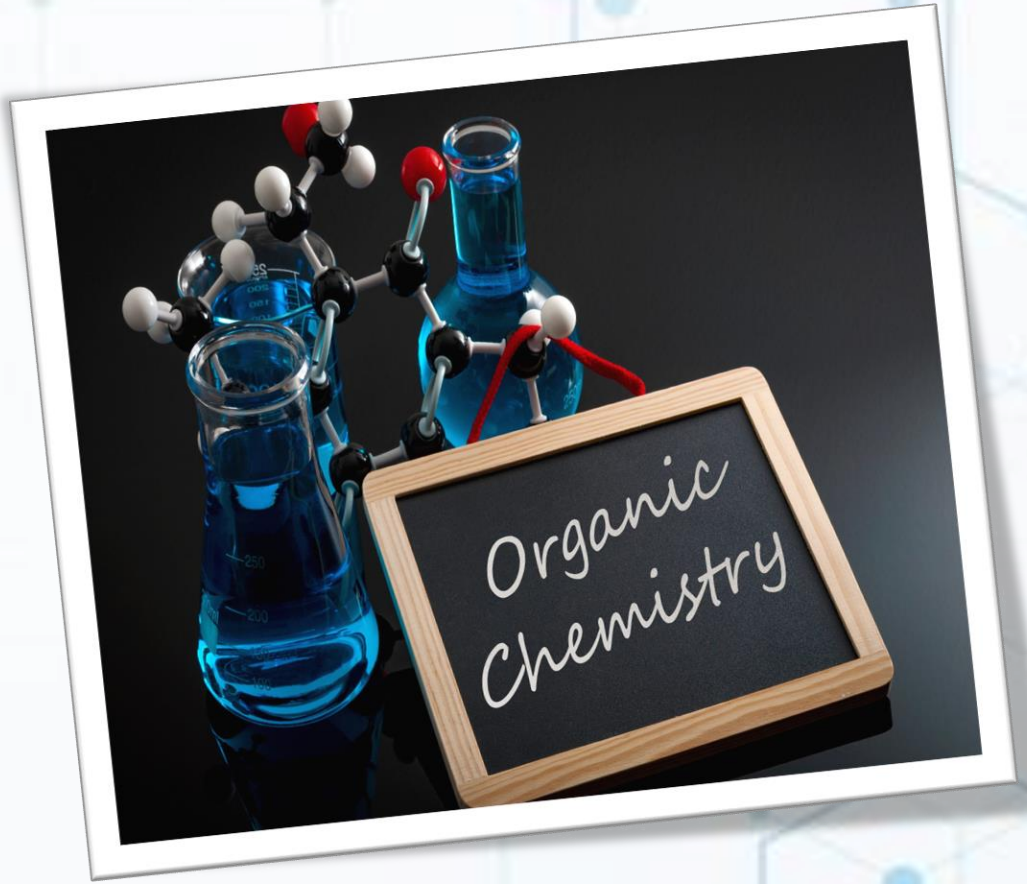
3. Physical Chemistry

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



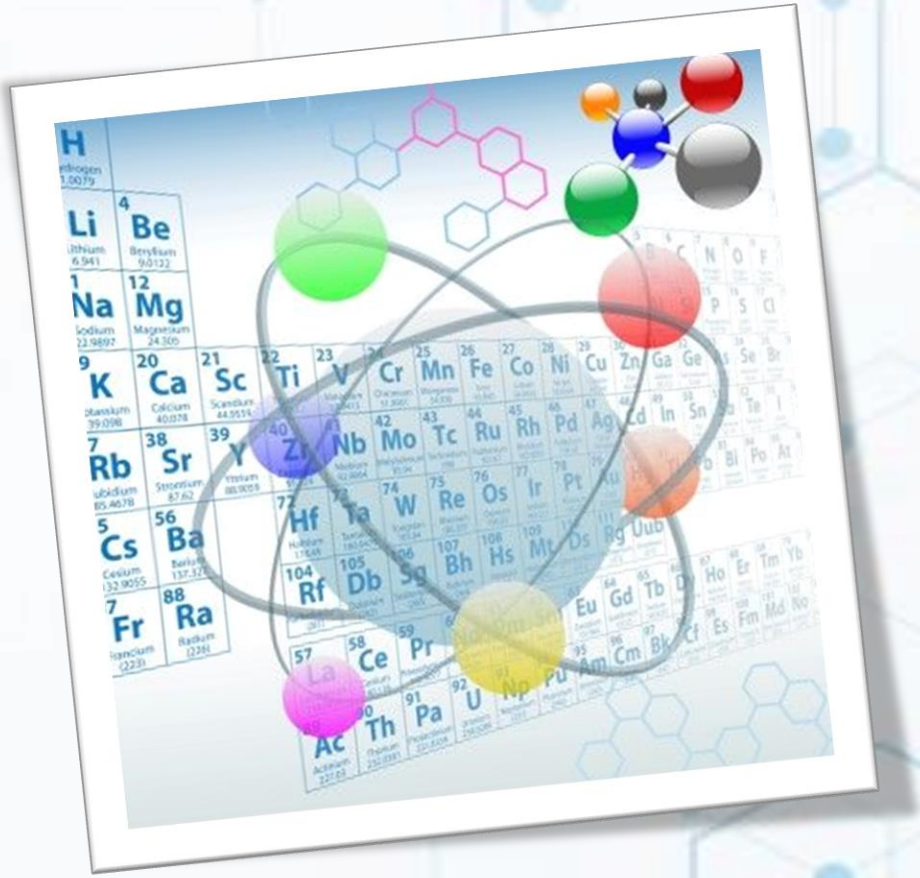
4. Organic Chemistry

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



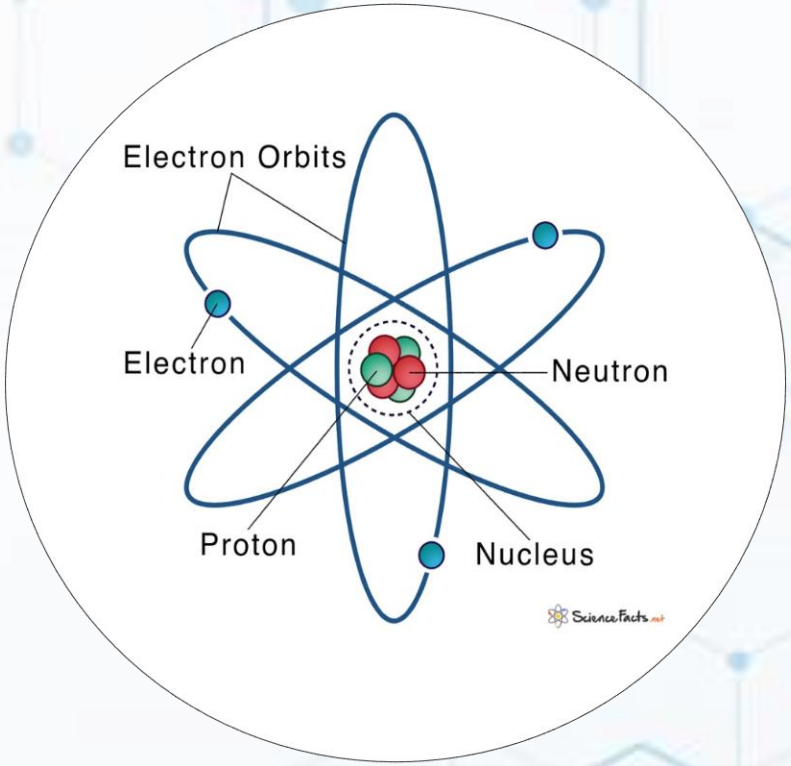
5. Inorganic Chemistry

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



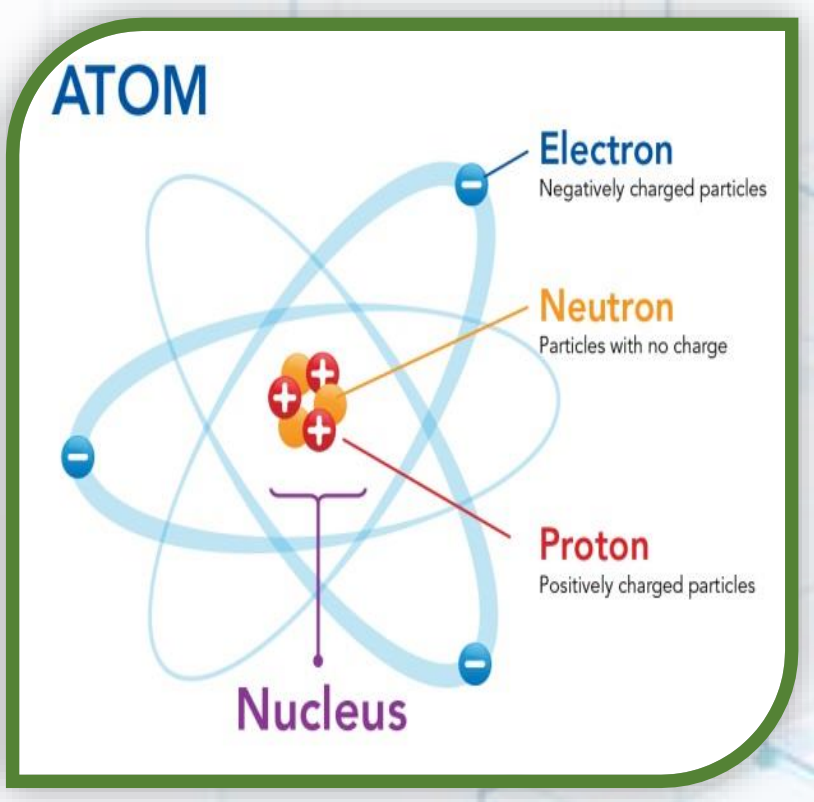
Atom

- **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.



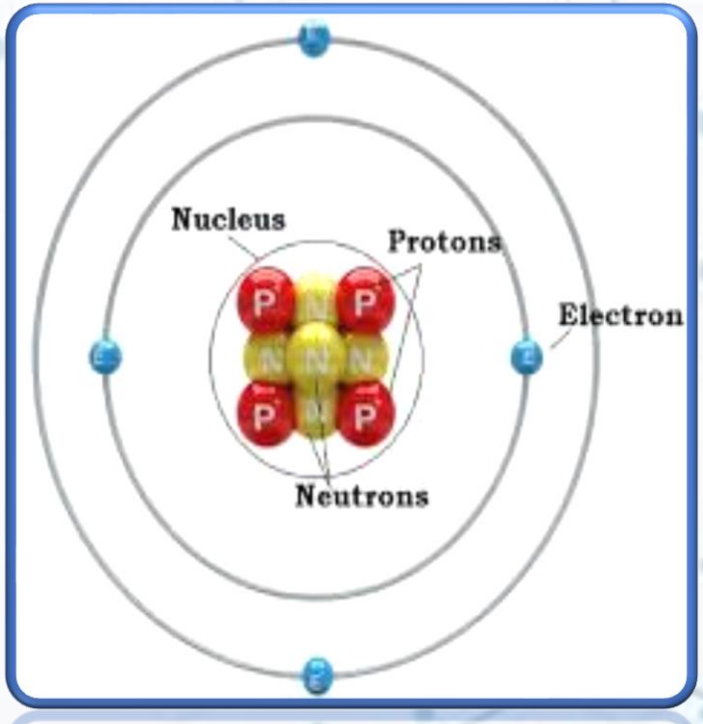
Atom

- **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.



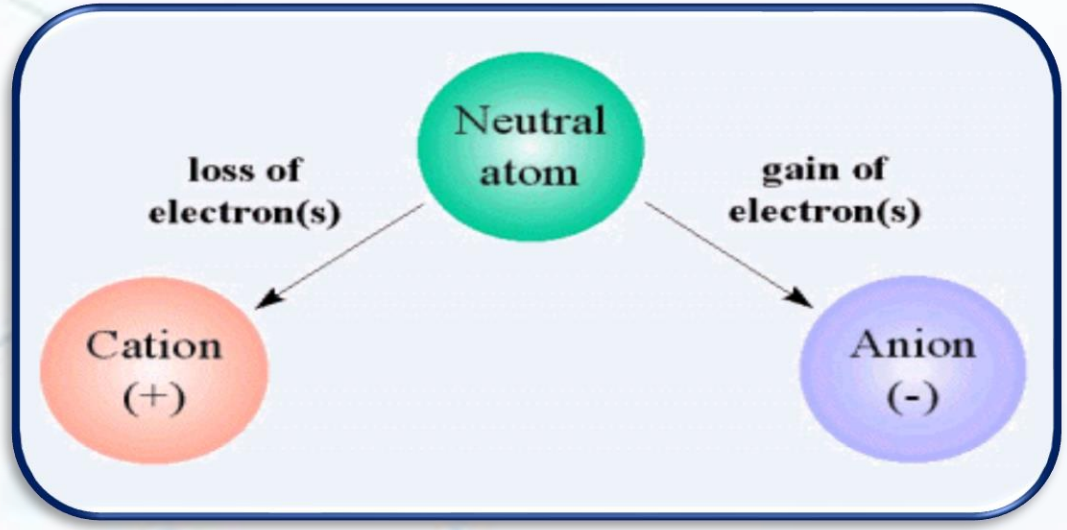
Atom

- 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.



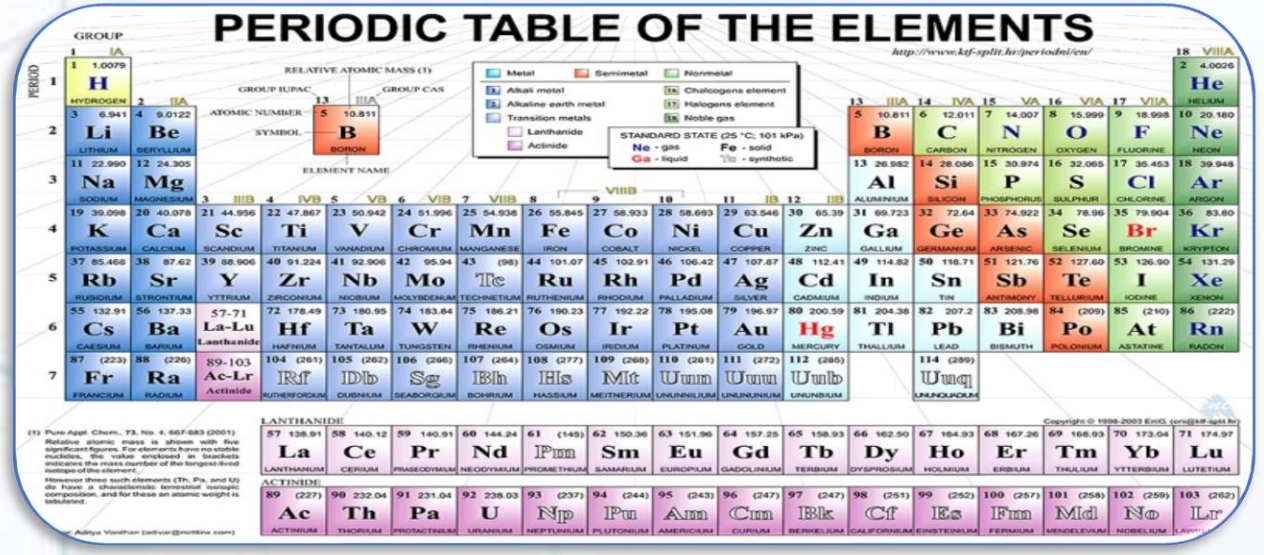
Atom

- If the number of protons and electrons are equal, that atom is electrically neutral.
- If the atom has more protons than electrons, it will has 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.



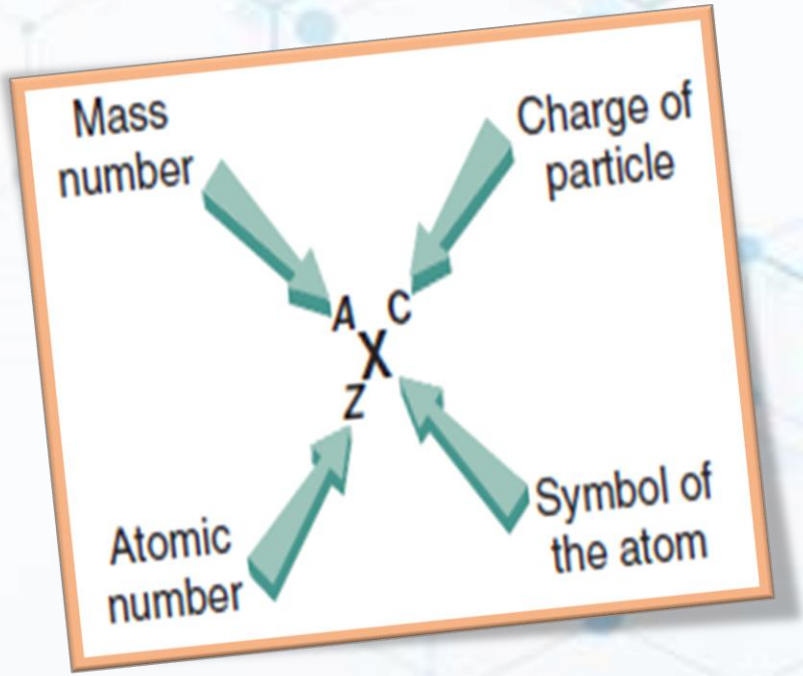
Elements

- 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.



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.

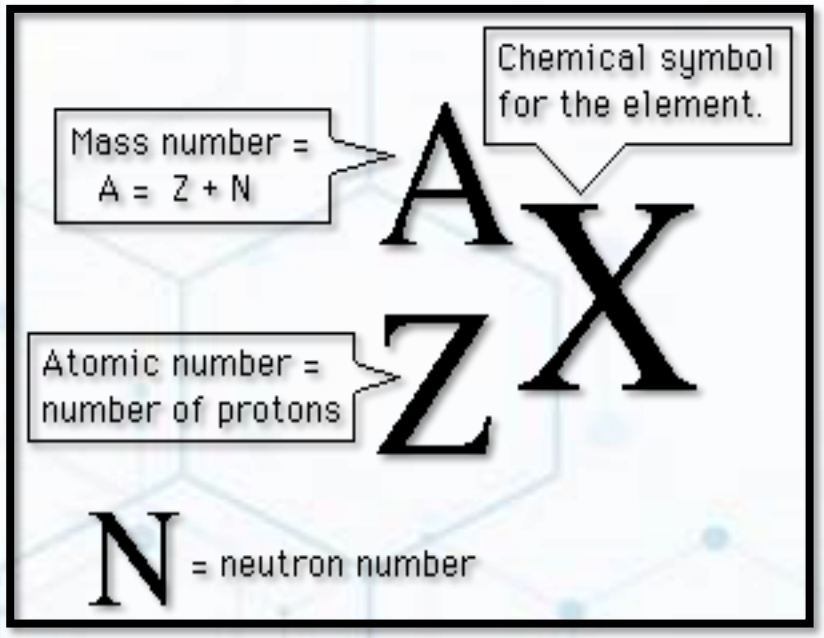


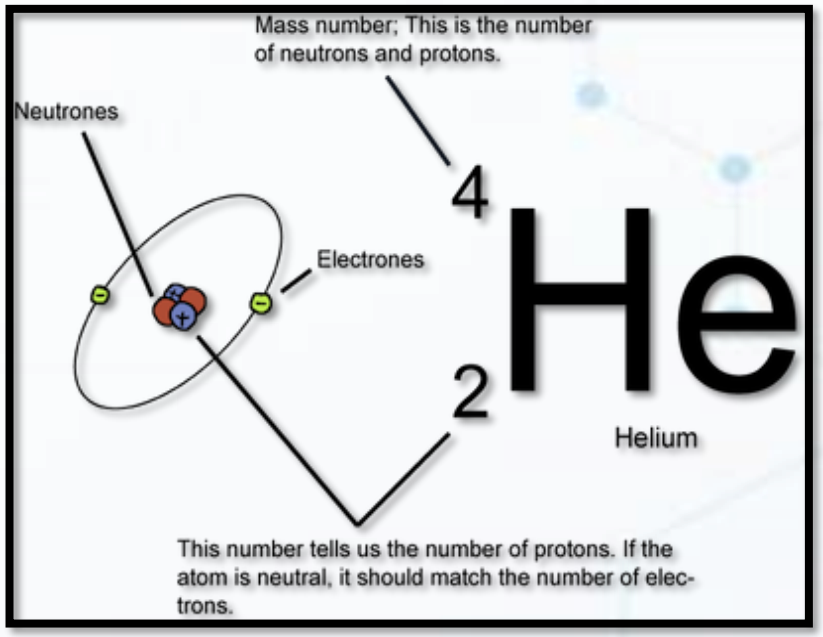
$Z = no.\ P = no.\ E$

Elements

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

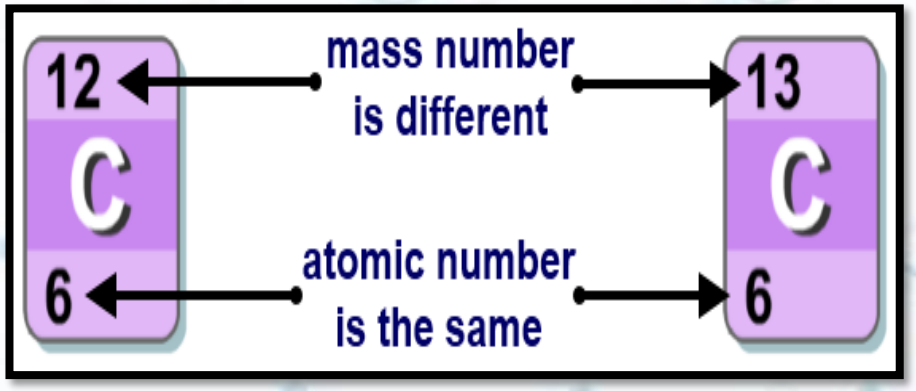
$$A = no.\ P + no.\ N$$

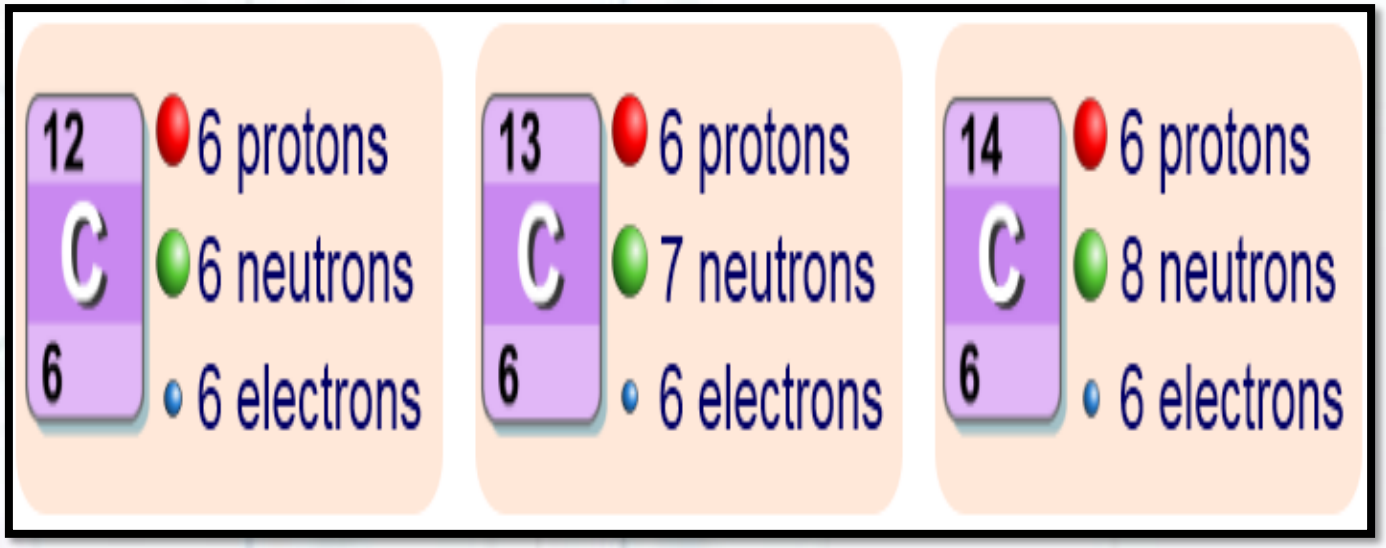


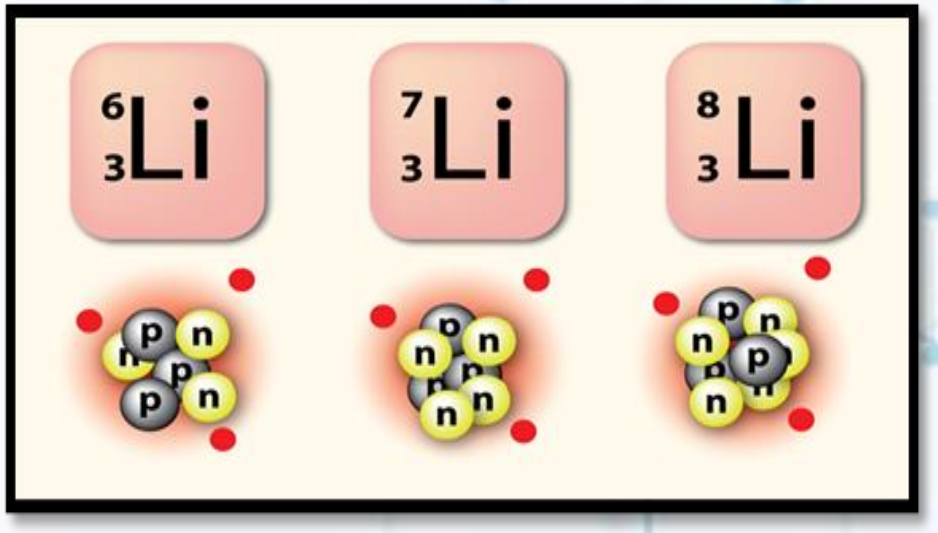


Isotopes

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

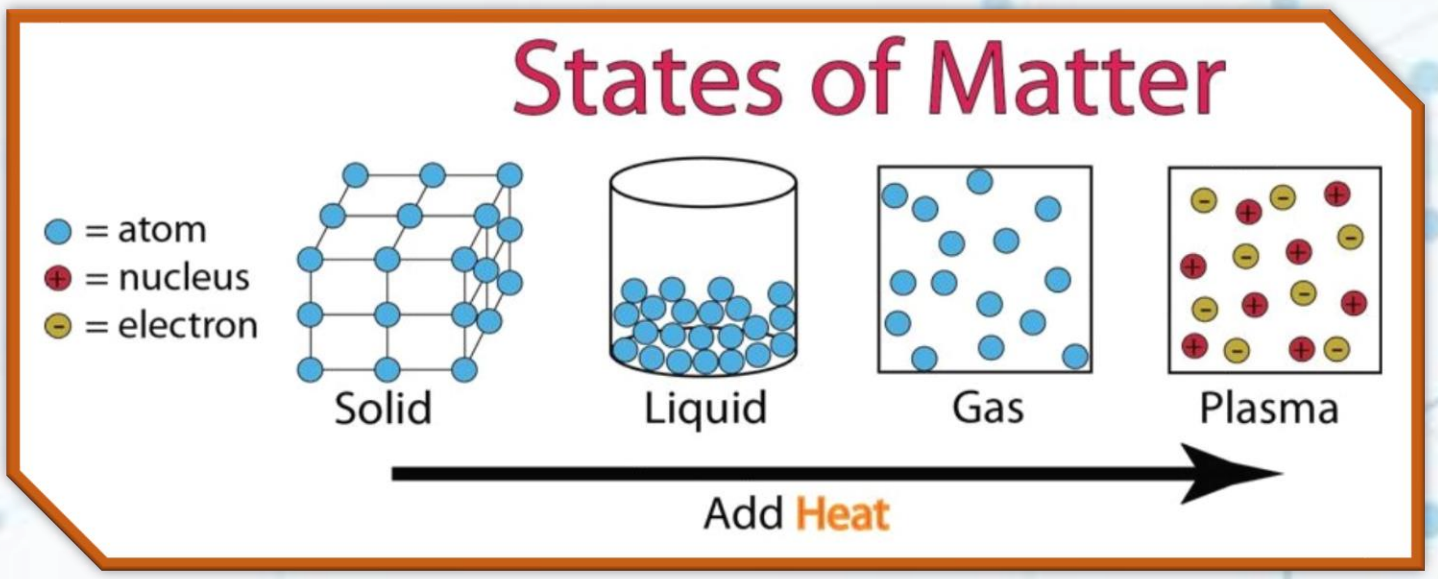






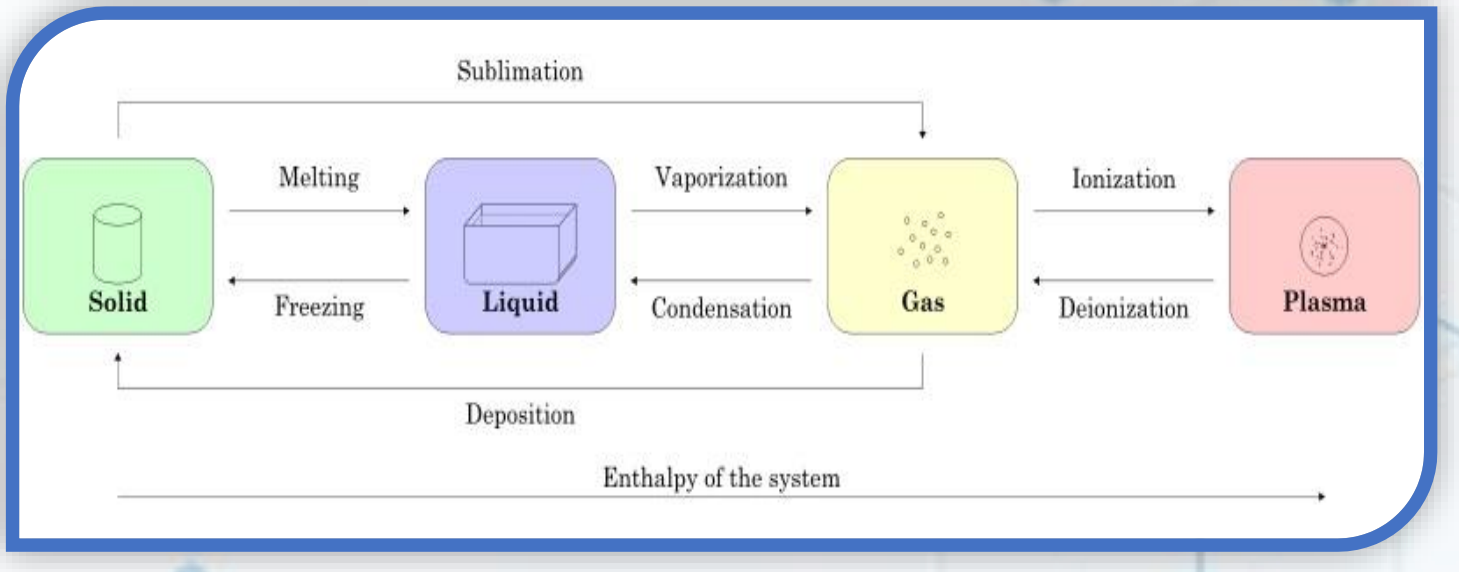
Matter

- **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.



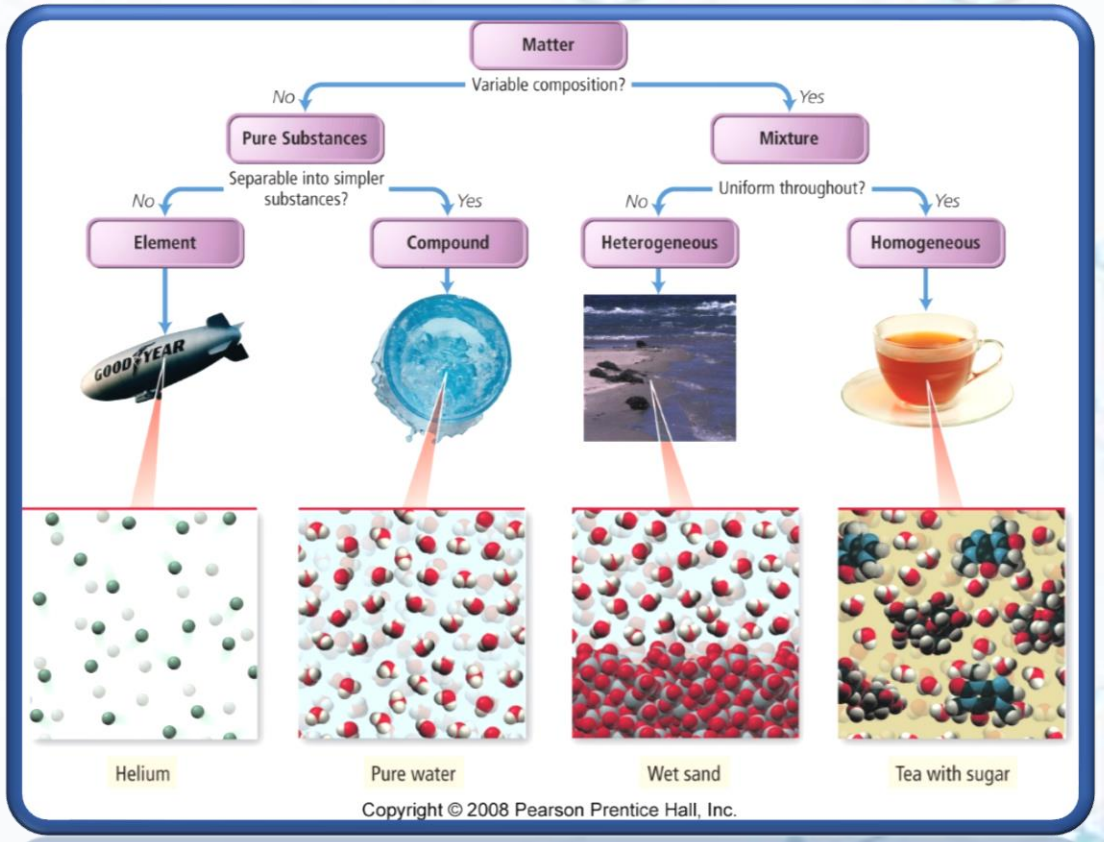
Matter

- **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.

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