

Lesson 1

Atomic Structure

Matter:-

Anything that has mass and volume.

- All matter is made up of molecules, molecules are made up of atoms .

Atom:-

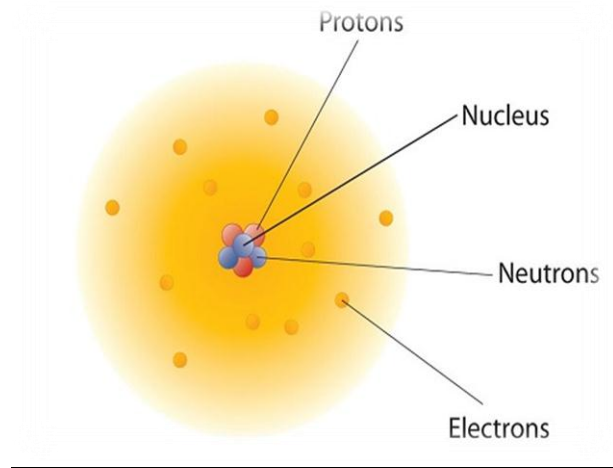
It is the unit of construction and composition of materials

Structure of the atom:-

Scientists have made many attempts to understand the structure of the atom:

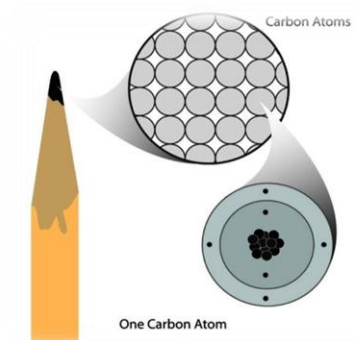
- 1) Scientists and philosophers gave the name of **the atom** to the part that became indivisible
- 2) In the early 19th century, **the scientist Dalton** developed a scientific theory about the atom in which he explained that it is indivisible
- 3) In 1909, **the scientist Rutherford** developed the first model of the atom on an experimental basis

Scientists have discovered that there is a **very, very small space in the atom** that contains two types of particles (protons and neutrons), and this space has never been **called the nucleus**, around which electrons revolve at high speeds in imaginary orbits called energy levels.



Atom :-

The smallest unit of matter that retains the properties of an element.



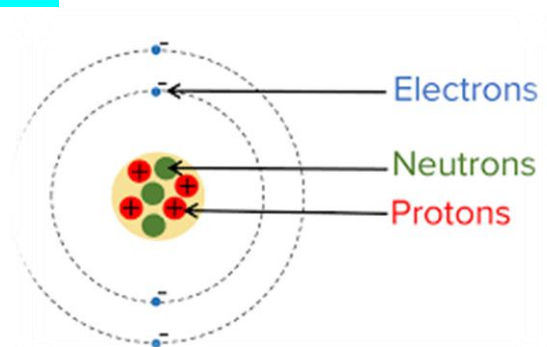
What is atomic structure ?

1) Nucleus:-

- The dense center of the atom containing **protons and neutrons**.
- It has a **positive charge** due to the protons.

2) Electron Shells:-

- Electrons move around the nucleus in **specific energy levels or shells**.
- The arrangement of electrons in these shells determines **the chemical properties of the atom**.



It consists of three main subatomic particles:-

Protons (p):-

These are **positively charged particles** found in the nucleus (center) of the atom.

Neutrons(n) :-

These particles have **no charge (neutral)** and are also located in the nucleus.

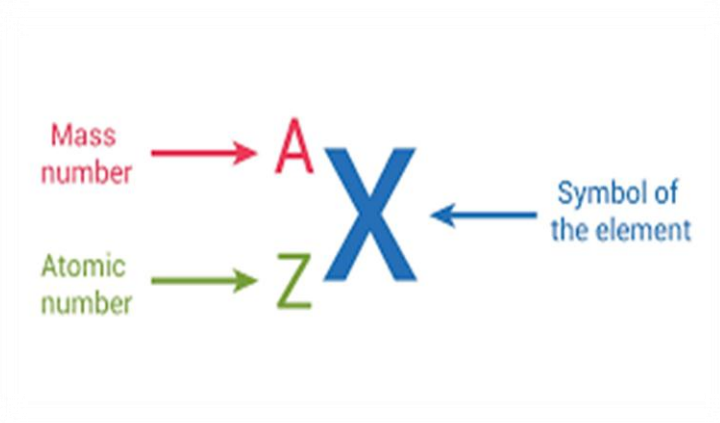
Electrons(e):-

These are **negatively charged** particles that orbit the nucleus in regions called **electron shells or energy levels**.

properties of protons neutrons and electrons:-

Properties of the proton, neutron, and electron

| Particle | Symbol | Charge | Mass |
|----------|---------------------|--------|------------|
| Proton | p or p ⁺ | +1 | 1 amu |
| Neutron | n or n ⁰ | 0 | 1 amu |
| Electron | e or e ⁻ | -1 | .00054 amu |



Atomic Number (Z):-

- This is the number of protons in the nucleus .

Mass Number (A):-

- This is the total number of protons and neutrons in the nucleus.

Exercises:-

| النمبر |
|-------------------------|
| ${}^7_3\text{Li}$ |
| ${}^4_2\text{He}$ |
| ${}^{24}_{12}\text{Mg}$ |
| ${}^{35}_{17}\text{Cl}$ |
| ${}^{23}_{11}\text{Na}$ |

| <u>SYMPOL</u> | <u>Li</u> | <u>He</u> | <u>Mg</u> | <u>Cl</u> | <u>Na</u> |
|----------------------|------------------|------------------|------------------|------------------|------------------|
| Atomic Numper | | | | | |
| MASS NUMBER | | | | | |
| NUM. PROTONS | | | | | |
| NUM.ELECTRON | | | | | |
| NUM.NEUTRON | | | | | |

Rules for writing element symbols:-

- 1) The symbol for an element represents a single atom of it
- 2) The symbol is derived from the name of the element in Latin
- 3) The first letter is written as a capital letter... If some elements in the first letter are similar, another letter is taken from the Latin name and written as a Small letter.

| رمز العنصر | الإنجليزية | اللاتينية | العربية |
|------------|------------|-------------|----------|
| C | Carbon | Carbo | كربون |
| N | Nitrogen | Nitrogenium | نيتروجين |
| Cl | Chlorine | Chlorum | كلور |
| Cr | Chromium | Chromium | كروم |

| رمز العنصر | الإنجليزية | اللاتينية | العربية |
|------------|------------|-----------|----------|
| Na | Sodium | Natrium | صوديوم |
| K | Potassium | Kalium | بوتاسيوم |
| Cu | Copper | Cuprum | نحاس |
| Fe | Iron | Ferrum | حديد |

أمثلة لرموز بعض العناصر الشهيرة



| الرمز | العنصر | الرمز | العنصر | الرمز | العنصر |
|-------|------------|-------|-----------------|-------|------------|
| I | اليود | K | البوتاسيوم | H | الهيدروجين |
| C | الكربون | Mg | الماغنسيوم | He | الهيليوم |
| Ca | الكالسيوم | Li | الليثيوم | Hg | الزئبق |
| Cl | الكلور | Zn | الخاصين (الزنك) | O | الأكسجين |
| Cu | النحاس | N | النيتروجين | F | الفلور |
| Cr | الكروم | Ne | النيون | Fe | الحديد |
| Ar | الأرجون | Na | الصوديوم | P | الفوسفور |
| Al | الألومنيوم | B | البورون | Pb | الرصاص |
| Au | الذهب | Be | البريليوم | S | الكبريت |
| Ag | الفضة | Br | البروم | Si | السيليكون |

Exercises

- 1) ----- are positively charged particles
- 2) Neutrons are found in -----
- 3) Electrical charge of electrons -----
- 4) The atomic mass of protons ----- than electrons
- 5) The atomic number is equal to the number of ----- in the nucleus of the atom
- 6) The first letter of the item code is written -----
- 7)----- The total numbers of protons and neutrons in the nucleus of the atom
- 8) ----- He developed the first scientific theory about the atom
- 9) ----- Establishing an experimental model of the atom
- 10) All materials building unit -----
- 11) Atomic mass of protons ----- Atomic mass of neutrons
- 12) Helium symbol -----
- 13) Gold symbol -----
- 14) Copper symbol-----
- 15) Ar symbol of -----