

Fundamental particles:

- According to Dalton atom is the smallest indivisible particle. But discharge tube experiments have proved that atom consists of some more smaller particles.
- Electrons, protons and neutrons are the fundamental particles of an atom.
- Cathode rays are negatively charged consisting of electrons.
- Anode rays are positively charged ions.
- Protons and neutrons are present in the nucleus and are called as nucleons.
- Protium contains only electron and proton. Except protium all the atoms contain electron, proton and neutron.
- Electrons are the negatively charged particles with unit negative charge and negligible mass.
- Protons are the positively charged particles with unit mass.
- Neutrons are neutral particles with unit mass.

Fundamental particle	Charge	Mass	Specific Charge (e/m)
Electron	1.6022×10^{-19} coulomb (or) 4.802×10^{-10} e.s.u.	9.1095×10^{-31} kg (or) 0.000548 a.m.u. 1/1836 of H atom	1.76×10^8 c/g
Proton	1.6022×10^{-19} coulomb (or) 4.802×10^{-10} e.s.u.	1.67252×10^{-27} kg (or) 1.007548 a.m.u.	9.58×10^4 c/g
Neutron	'0'	1.6749×10^{-27} kg (or) 1.00898 a.m.u.	'0'

- The ratio of charge to mass is called specific charge.
 - Electron has the highest specific charge because of its negligible mass.
 - The mass of electron increases with increase in velocity. Thus e/m of electron decreases with increase in velocity.
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- If electron moves with a velocity equal to that of light, then its mass becomes infinity and e/m becomes zero.
- e/m of cathode rays is independent of nature of the gas in the discharge tube, because electrons are universal constituents.
- e/m of anode rays depends on the nature of the gas in the discharge tube.
- The number of electrons or protons present in an atom of an element is called its atomic number.
- A neutral atom contains equal number of electrons and protons.
- Atomic number is denoted by Z .
- Atomic number is equal to the nuclear charge of an element.
- Moseley proposed a simple relationship between frequencies of the characteristic x-rays of an element and its atomic number.

$$\sqrt{\nu} = a(Z - b)$$

- ν is the frequency of characteristic x-rays.
 - Z = atomic number
 - 'a' and 'b' are constants having definite values for that element.
 - The sum of number of protons and neutrons in the atom of an element is called its mass number and it is denoted by 'A'
 - Number of neutrons = $A - Z$.
 - Mass number is always a whole number.
 - Atoms of elements having the same atomic number but different mass numbers are called isotopes.
 - Isotopes of an element have the same number of protons and electrons but differ in the number of neutrons.
 - Isotopes of an element have same chemical properties but different physical properties.
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