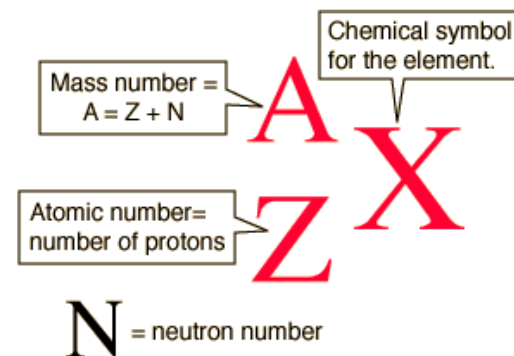


# Atomic Structure

Class IX

# Mass & Atomic number

- ▶ **Mass number (A) = (Protons + Neutrons)**
  - **Example:** Mass number of Nitrogen atom is 14 then it contains 7 protons and 7 neutrons.
- ▶ **Atomic number (z) = Number of Protons ;**
  - It is also equal to the number of electrons in the atom.
  - **Example:** The atomic number of an element is 12 then its atom contains 12 protons and 12 electrons.
- ▶ **Notation of element (X):** Atomic number <sup>Element</sup> Mass number (<sub>z</sub> X<sup>A</sup>)
  - **Example:** Helium atom has 2 protons and 2 neutrons with atomic no. as 2 and its notation as  ${}_2\text{He}^4$

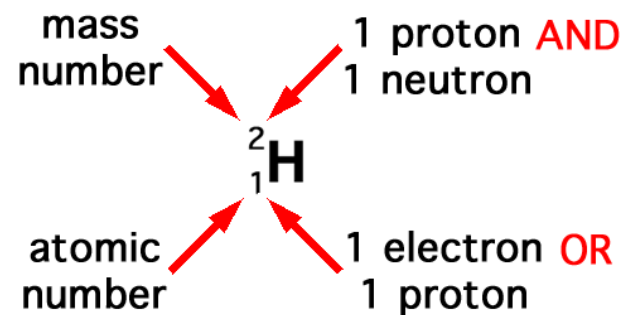
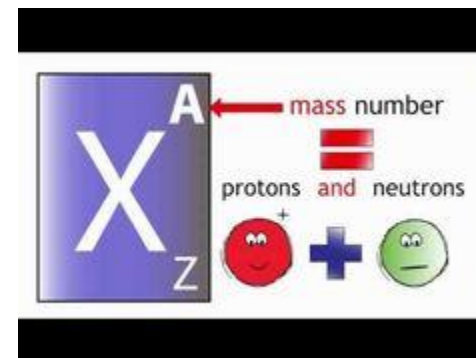


# Numerical Ability

- ▶ An element X has mass number 40 and atomic number 18. Find out the number of protons, number of electrons and number of neutrons present in the atom X?

▶ Solution:

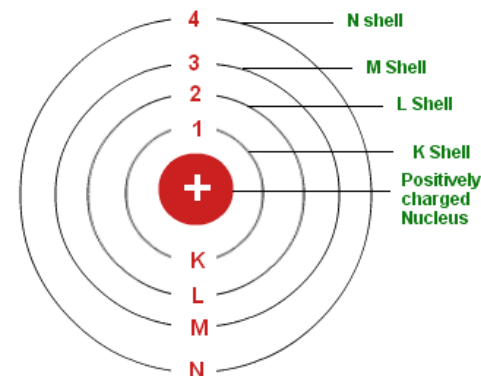
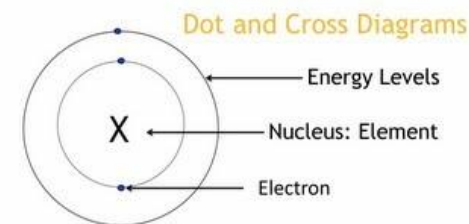
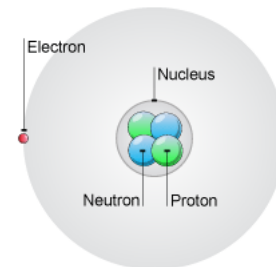
- Atomic number = 18 = No. of Protons  $\Rightarrow$  18
- Number of electrons: number of electrons = Number of protons = 18
- Mass Number = 40 = Protons + Neutrons  $\Rightarrow$   $18 + n$ ; where  $n$  = no. of neutrons; Therefore,  $n = 40 - 18 = 22$  (Number of neutrons = Mass number - Atomic number)



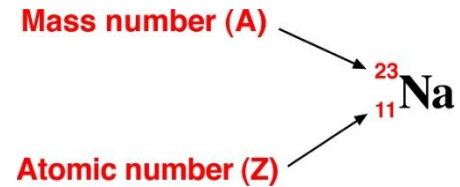
Hydrogen Atom

# Electronic configuration

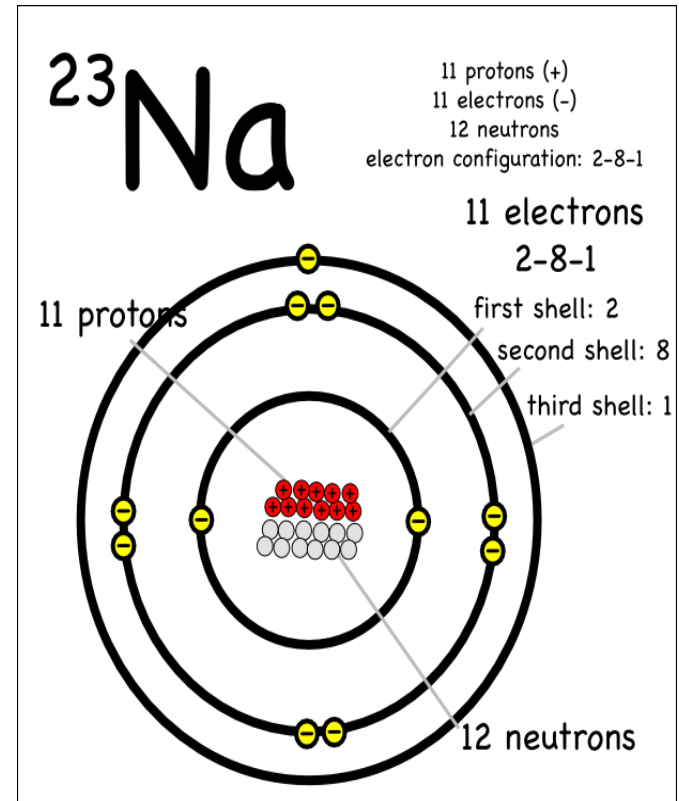
- ▶ The arrangement of electrons in the shells is known as electronic configuration.
- ▶ The number of protons in an atom does not change, fewer or extra electrons can create a special atom called an ion.
- ▶ Ions are atoms with extra electrons or missing electrons. When you are missing an electron or two, you have a positive charge. When you have an extra electron or two, you have a negative charge.
- ▶ Electrons are found in shells (fixed energy levels) or orbitals that surround the nucleus of an atom.
- ▶ These shells are also called orbits, represented by the letters K, L, M, N,... or the numbers  $n=1, 2, 3, 4, \dots$



# An Example

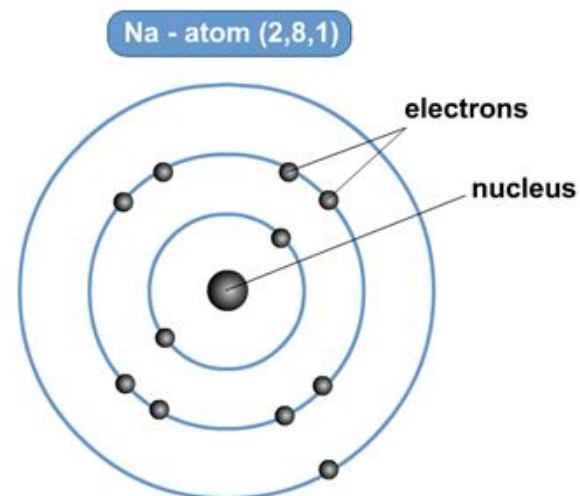


- ▶ Electronic configuration of sodium (Na) atom:
- ▶ Sodium has atomic number 11 and mass number 23.
  - Atomic no. = No. of protons = No. of electrons = 11
  - Mass number = Protons (p) + Neutrons (n),  
=>  $23 = 11 + n$ ;  $n = 12$ .
  - Electronic configuration is based on the no. of electrons which are 11. So, electron filling will take place acc to  $2n^2$  where n is the no. of shell;
  - K shell or 1<sup>st</sup> shell = 2 electrons
  - L shell or 2<sup>nd</sup> shell = 8 electrons
  - M shell or 3<sup>rd</sup> shell = 1 electron (Sodium has only 11 electrons)
  - ∴ Electronic configuration of sodium atom = 2, 8, 1



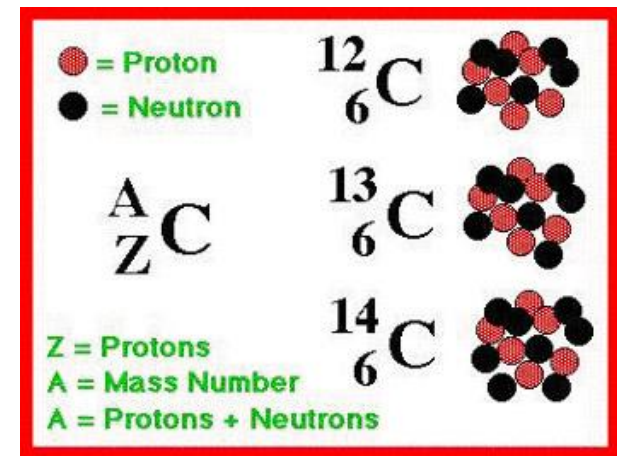
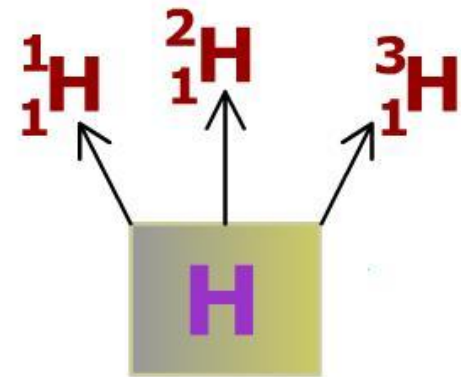
# Valence Electrons

- ▶ The electrons, which are present in the outermost shell of an atom are called valence electrons.
- Example: **Sodium [Na] Atom**
- Atomic number of sodium is 11
- Electronic configuration of sodium is 2 8 1
- In sodium 3<sup>rd</sup> shell is the outermost shell (valence shell) .
- In this shell it has 1 electron. Hence the number of valence electrons present in sodium is 1 .
- The chemical properties of an atom are dependent on these valence electrons. Since they are ones that participate in a chemical reaction.



# Isotopes & Isobars

- ▶ Atoms of the same element with the *same atomic number but different mass numbers* are called isotopes.
  - Examples:  ${}_1\text{H}^1$ ,  ${}_1\text{H}^2$ ,  ${}_1\text{H}^3$  are the isotopes of hydrogen,  ${}_6\text{C}^{12}$ ,  ${}_6\text{C}^{13}$ ,  ${}_6\text{C}^{14}$  are isotopes of carbon.
  - The chemical properties of all the isotopes of an element are the same. This is due to the presence of same number of electrons.
- ▶ **Uses of isotopes:**
  - An isotope of uranium is used as fuel in a nuclear reactor.
  - An isotope of cobalt is used in the treatment of cancer.
  - For treating goitre, an isotope of iodine is used.
- ▶ Atoms of different elements with *different atomic numbers but have the same mass number* are called isobars.  
Example:  ${}_{18}\text{Ar}^{40}$ ,  ${}_{19}\text{K}^{40}$  and  ${}_{20}\text{Ca}^{40}$ .





# End of Presentation

Remember the Atomic  
Structure.

It is the key to learn Chemistry



Three

Key

Points



*For detailed version of this, presentation, contact us.*