

Atomic Number and Mass Number

Atomic Number:

1. The **atomic number** of an element is the **number of protons** in the nucleus of each atom of that element.
2. An atom can be classified as an element based solely on its atomic number. For example, any atom with an atomic number of 8 (its nucleus contains 8 protons) is an oxygen atom, and any atom with a different number of protons would be a different element.
3. It is represented with letter **Z**

Atomic Number (Z) = Total number of **protons** present in the nucleus

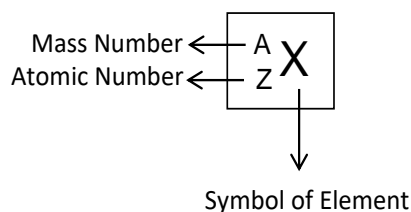
= Total number of **electrons** present in the atom

Mass Number:

1. The **mass number** is defined as the total number of protons and neutrons in an atom.
2. It is represented with letter **A**

$$\text{Mass Number} = \text{Number of Protons} + \text{Number of Neutrons}$$

The atomic number (Z) and Mass number (A) of an element **X** are usually represented along with the symbol of element.



Isotopes:

Elements having same atomic number, but different atomic masses are known as Isotopes.

Example:

Carbon-12, Carbon-13, Carbon-14 are three isotopes of carbon atom. Here 12, 13 and 14 are the atomic masses of isotopes of carbon, respectively. Since, atomic number is the unique property of an atom, thus the atomic number of carbons is 6 even in the case of three types of carbon (isotopes)

$^{12}_6\text{Carbon}$, $^{13}_6\text{Carbon}$, $^{14}_6\text{Carbon}$,

Hydrogen-1, Deuterium-2, Tritium-3 are three isotopes of hydrogen.

The isotopes of hydrogen are written as:

$^1_1\text{Hydrogen}$, $^2_1\text{Deuterium}$, $^3_1\text{Tritium}$

Uses of Isotopes:

- Carbon-14 (C-14) is used in carbon dating. This technology is utilised for finding the age of materials found in archaeological excavation.
- An isotope of uranium is used as fuel in nuclear reactor.
- An isotope of cobalt is used in treatment of cancer.
- An isotope of iodine is used in treatment of goitre.