

9th Class

➤ **Atoms:**

❖ **Definition:**

- An atom is the basic unit of matter, consisting of a nucleus containing positively charged protons and neutral neutrons, surrounded by negatively charged electrons.

❖ **Components of an Atom:**

1. **Nucleus:**

- The central, dense core of an atom.
- Composed of positively charged protons and neutral neutrons.
- Accounts for almost all of the atom's mass.

2. **Electrons:**

- Negatively charged subatomic particles.
- Orbit the nucleus in electron shells or energy levels.
- Determine the chemical properties of an element.

❖ **Subatomic Particles:**

1. **Protons:**

- Positively charged particles found in the nucleus.
- Each proton has a charge of +1.

2. **Neutrons:**

- Neutral particles (no charge) found in the nucleus.
- Contribute to the mass of the atom.

3. **Electrons:**

- Negatively charged particles that orbit the nucleus.
- Have a much smaller mass compared to protons and neutrons.

❖ **Atomic Structure:**

1. **Atomic Number (Z):**

- The number of protons in the nucleus of an atom.
- Determines the identity of an element.

- Elements are arranged on the periodic table in order of increasing atomic number.

2. Mass Number (A):

- The sum of protons and neutrons in the nucleus.
- Noted as $A=Z+N$, where N is the number of neutrons.

3. Isotopes:

- Atoms of the same element with different numbers of neutrons.
- Isotopes have the same atomic number but different mass numbers.

❖ Electron Configuration:

1. Electron Shells:

- Electrons occupy specific energy levels or shells around the nucleus.
- The first shell can hold up to 2 electrons, the second up to 8, and so on.

2. Valence Electrons:

- Electrons in the outermost shell.
- Determine the chemical behavior of an atom.
- Elements in the same group have similar valence electron configurations.

3. Orbitals:

- Regions within an electron shell where electrons are likely to be found.
- Different types of orbitals (s, p, d, f) have distinct shapes.

❖ Chemical Bonds:

1. Covalent Bonds:

- Formed by sharing electrons between atoms.
- Atoms can share one or more pairs of electrons.

2. Ionic Bonds:

- Formed by the transfer of electrons from one atom to another.
- Result in the formation of ions (charged particles).