

9th class

➤ Elements:

❖ Definition:

- An element is a substance that consists of only one type of atom. In other words, all the atoms in an element have the same number of protons in their atomic nuclei.

❖ Characteristics of Elements:

1. Atomic Number (Z):

- This is the number of protons in the nucleus of an atom.
- The atomic number uniquely identifies an element.

2. Atomic Symbol:

- A one or two-letter abbreviation used to represent an element.
- Examples include H for hydrogen, O for oxygen, and Fe for iron.

3. Atomic Mass:

- The average mass of an atom of an element, taking into account the masses and abundances of all its isotopes.

4. Isotopes:

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

❖ Components of Atoms:

1. Nucleus:

- The central, dense part of an atom that contains protons and neutrons.

2. Electrons:

- Negatively charged subatomic particles that orbit the nucleus in electron shells or energy levels.

3. Protons:

- Positively charged subatomic particles found in the nucleus of an atom.

4. Neutrons:

- Neutral (no charge) subatomic particles found in the nucleus of an atom.

❖ Structure of an Atom:

- Atoms have a nucleus composed of protons and neutrons, with electrons orbiting the nucleus in electron shells.

❖ Chemical Bonds and Compounds:

1. Chemical Bonds:

- Forces that hold atoms together in compounds.
- Types of bonds include covalent bonds (sharing electrons) and ionic bonds (transfer of electrons).

2. Molecules:

- Chemical compounds formed when atoms are bonded together.
- A molecule can be composed of atoms of the same or different elements.

3. Chemical Formulas:

- Representation of a compound's composition using symbols and subscripts.
- Example: H₂O represents water, with two hydrogen atoms and one oxygen atom.

❖ Chemical Reactions:

1. Reactants:

- Substances present at the beginning of a chemical reaction.

2. Products:

- Substances formed as a result of a chemical reaction.

3. Balancing Equations:

- Ensuring that the number of atoms of each element is the same on both sides of a chemical equation.

❖ Types of Elements:

1. Metals:

- Generally have luster, conduct heat and electricity, and are malleable and ductile.

2. Nonmetals:

- Lack properties of metals; may be gases or brittle solids.

3. Metalloids:

- Have properties of both metals and nonmetals; located on the "staircase" of the periodic table.