Chapter 4

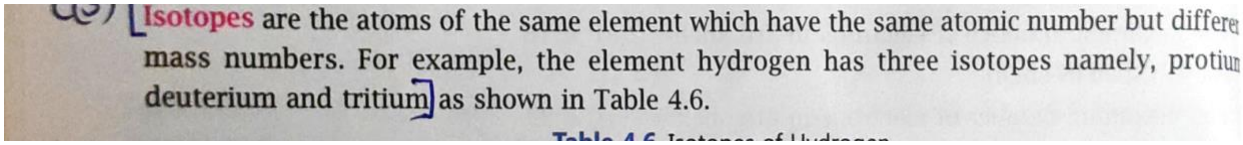
Atomic Structure.

Define these terms.

1. **Atomic number.**
   Atomic number is defined as the total number of protons present inside the nucleus of an atom. For an electrically neutral atom number of protons is equal to number of electrons, hence atomic number is also equal to number of electrons for an electrically neutral atom. It is represented by letter Z.

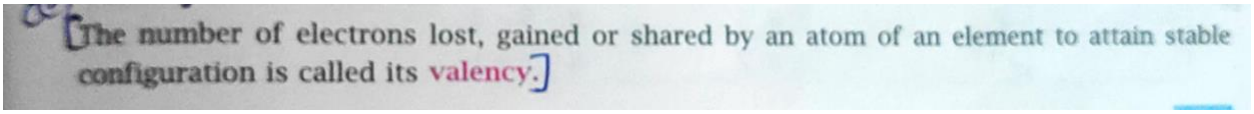
2. **Mass number.**
   Mass number is the sum of protons and neutrons present inside the nucleus of an atom. It is represented by letter A.

3. **Isotopes**

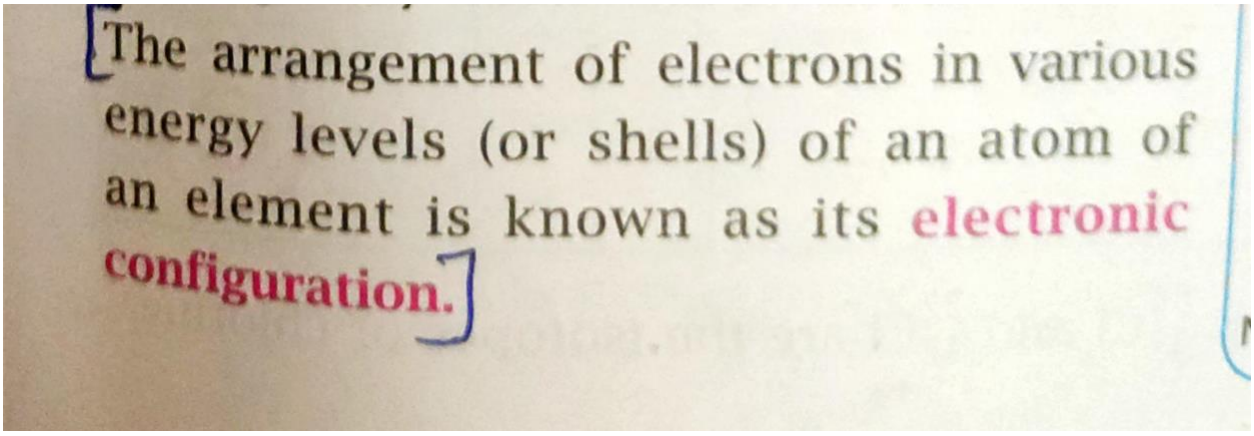

Isotopes are the atoms of the same element which have the same atomic number but differe
mass numbers. For example, the element hydrogen has three isotopes namely, protiu
deuterium and tritium as shown in Table 4.6.

4. **Radicals**
   A radical is an atom or group of atoms having a charge either negative or positive on it. They are of two types. Acid radicals and Basic radicals.

5. **Valency**

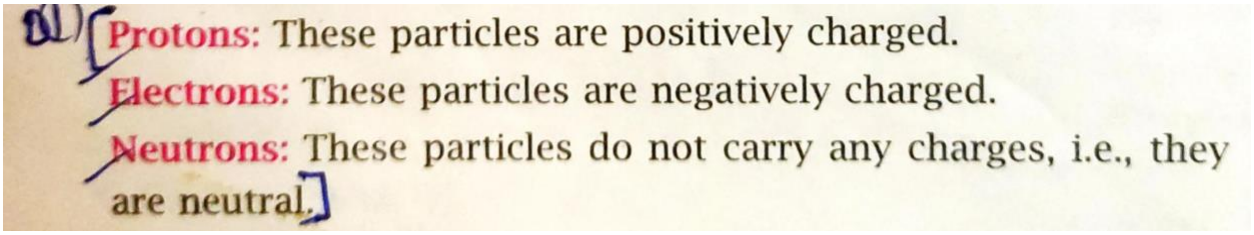

The number of electrons lost, gained or shared by an atom of an element to attain stable configuration is called its valency.

6. **Electronic configuration**

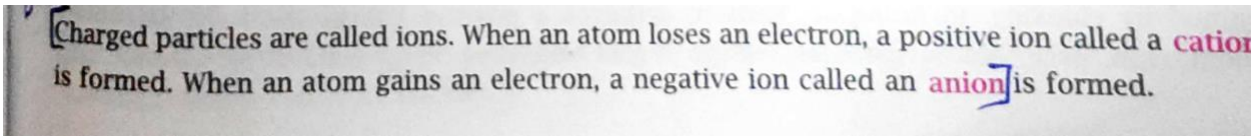

The arrangement of electrons in various energy levels (or shells) of an atom of an element is known as its electronic configuration.

Differentiate between the following

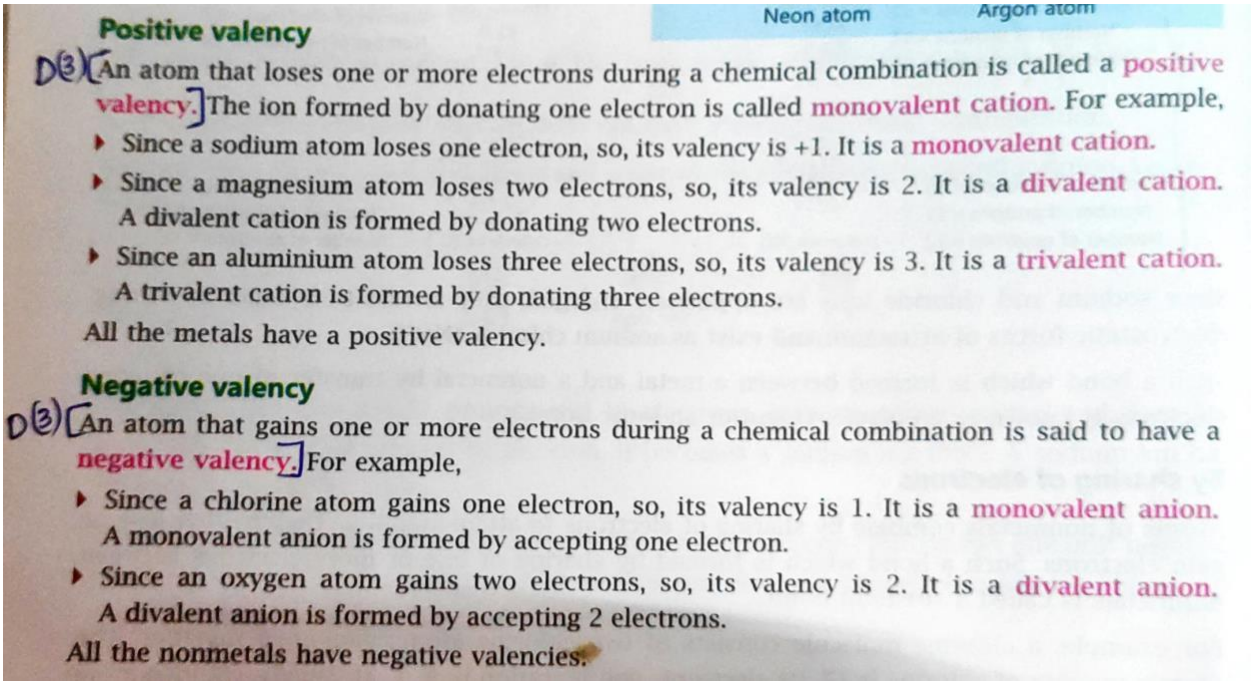
1. Proton , Electron and neutron


Protons: These particles are positively charged.
Electrons: These particles are negatively charged.
Neutrons: These particles do not carry any charges, i.e., they are neutral.

2. Cation and Anion


Charged particles are called ions. When an atom loses an electron, a positive ion called a cation is formed. When an atom gains an electron, a negative ion called an anion is formed.

3. Positive and Negative valencies (write that has been marked using blue ink)


Neon atom Argon atom

Positive valency

An atom that loses one or more electrons during a chemical combination is called a positive valency. The ion formed by donating one electron is called monovalent cation. For example,

- Since a sodium atom loses one electron, so, its valency is +1. It is a monovalent cation.
- Since a magnesium atom loses two electrons, so, its valency is 2. It is a divalent cation. A divalent cation is formed by donating two electrons.
- Since an aluminium atom loses three electrons, so, its valency is 3. It is a trivalent cation. A trivalent cation is formed by donating three electrons.

All the metals have a positive valency.

Negative valency

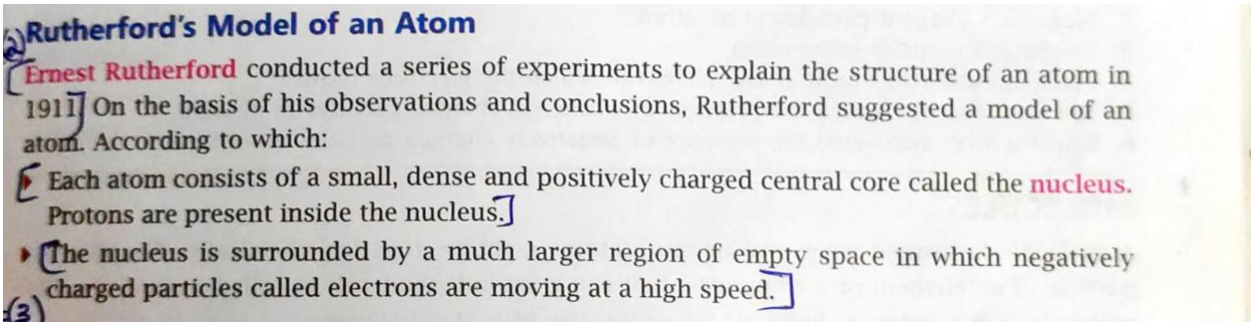
An atom that gains one or more electrons during a chemical combination is said to have a negative valency. For example,

- Since a chlorine atom gains one electron, so, its valency is 1. It is a monovalent anion. A monovalent anion is formed by accepting one electron.
- Since an oxygen atom gains two electrons, so, its valency is 2. It is a divalent anion. A divalent anion is formed by accepting 2 electrons.

All the nonmetals have negative valencies.

Answer these questions.

2. Explain Rutherford model of an atom.



Rutherford's Model of an Atom

Ernest Rutherford conducted a series of experiments to explain the structure of an atom in 1911. On the basis of his observations and conclusions, Rutherford suggested a model of an atom. According to which:

- Each atom consists of a small, dense and positively charged central core called the nucleus. Protons are present inside the nucleus.
- The nucleus is surrounded by a much larger region of empty space in which negatively charged particles called electrons are moving at a high speed.

3. Bohr's model of an atom.

- Each atom is made up of small particles called protons and electrons
- In the centre of every atom there is a positive core called the nucleus
- Negatively charged electrons revolve around the nucleus infixed circular path called shells
- Each shell can hold a certain number of electrons
- Each shell is associated with A fixed amount of energy
- The mass of an electron is negligible as compared to the mass of an atom as a whole
- The energy shell close to the nucleus posesses minimum amount of energy

4. Dalton's Atomic theory.

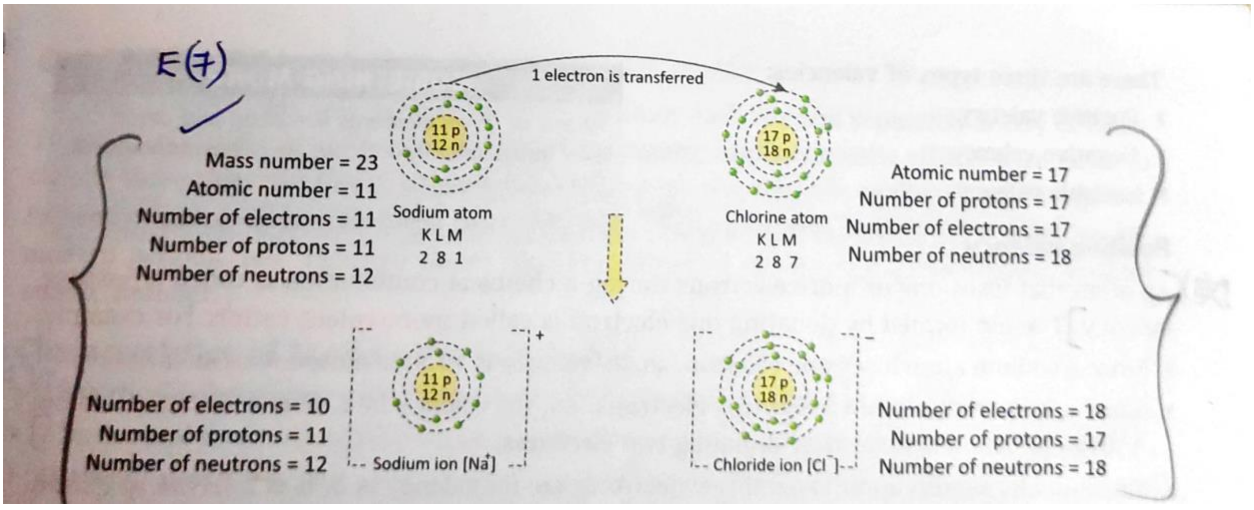
E(4) John Dalton

He put forward his atomic theory in the year 1808 which is as follows:

- Matter is made up of atoms.
- Atoms are indivisible, i.e., they cannot be divided further.
- Atoms of an element are identical, i.e., they have same size, mass and chemical properties.
- Atoms of different elements are not identical, i.e., they are different from each other. They have different size, mass and chemical properties.
- Atoms combine in whole number ratios.
- Atoms can neither be created nor be destroyed.

5.6.(Answered in textbook)

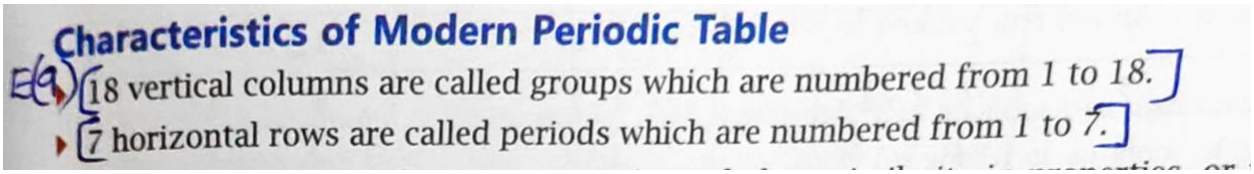
7.Draw a diagram showing the formation of sodium chloride.



8. is the basis for classifying elements in the modern periodic table.

In modern periodic table the elements are arranged in the increasing order of their atomic number. This is the basis for classifying elements in the modern periodic table.

9. Group and Period in modern periodic table.



10. the electronic configuration of….they belong.

Aluminium Al – 2,8,3 Period- 3, Group 13
Carbon – 2,4, Period 2, Group- 14
Flourine- 2,7 Period 2, Group- 17

Give reasons for the following.

1. Elements are classified to study them, systematically,easily and , in less time.
2. Radicals have negative or positive charge on them due to electron lost or gained during their formation.