

## Class 9 CBSE Test paper Solved Chapter 3: Structure of atoms - 5

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1. Q. On the basis of Thomson's model explains how the atom is neutral?

Ans: J.J. Thomson believed that an atom is made up of positively charged substance in the form of a sphere. Electrons are embedded same way as the apples are embedded in an apple pie. Furthermore, the total positive charge of the sphere is equal to total negative charge of the electrons and hence the atom remained electrically neutral.

2. Q. What is the limitations of Thomas atomic model?

Ans: Thomson's model could successfully explain the electrical neutrality of atom. However, it failed to explain how the positively charged particles are shielded from the negatively charged electrons without getting neutralized

3. Q. State the postulates put forward by Neil's Bohr about the model of an atom. Draw a diagram to show the arrangement of energy levels in an atom.

Ans: Main postulates of Bohr 's model of an atom are:

- (a) Electrons do not radiate energy. Within an orbit, the energy of an electron is constant.
- (b) These orbits or shells are represented by the letters K, L, M, N or the numbers,  $n = 1, 2, 3, 4, \dots$
- (c) Electrons revolve in discrete orbits or energy levels.
- (d) There is a limit to the number of electrons which each energy level or shell can hold. For example, K shell can hold a maximum of 2, L shell 8, M shell 18 and N shell 32 electrons.

4. Q. State three features of the nuclear model of an atom put forward by Rutherford.

- Ans: (i) There is a positively charged centre in an atom called the nucleus. Nearly all the mass of an atom resides in the nucleus.
- (ii) The electrons revolve around the nucleus in well defined orbits.
- (iii) The size of the nucleus is very small as compared to the size of the atom.

5. Q. What is the valency of Aluminium whose atomic number is 13 ? Give reason.

Ans: Atomic number of Al = 13 Electronic configuration of Al = 2, 8, 3

Since Al has 3 valence electrons in its outer most shell its valency is 3.

6. Q. (a) What is the relationship between two elements X and Y whose atomic numbers are 18 and 20 respectively but their mass numbers remain same as 40 ?

(b) Which has more number of electrons Na or  $\text{Na}^+$  ? Why ?

(c) Name the isotope used to treat (a) Goitre (b) Cancer.

Ans: (a) Isobars (b) Na contains one electron more than  $\text{Na}^+$ . The (+) ve charge indicates it has lost one electron.

(c) (i) Isotope of iodine is used in the treatment of goiter. (ii) Isotope of Cobalt is used in the treatment of cancer.

7. Q. (a) What are canal rays? Who discovered them? What is the charge and mass of canal ray? (b) How are the canal rays different from Electrons in terms of charge and mass ?

Ans: (a) New radiations in a gas discharge tube which are positively charged. E Goldstein discovered them. Charge on canal rays is positive and mass is one unit

(b) Electron are negatively charged and mass approximately  $1/2000$  that of Canal rays.

8. Q. List the features of Rutherford's nuclear model of an atom and also discuss the draw back of this model of an atom.

Ans: There is a positively charged centre in an atom called the nucleus and the mass of the atom is concentrated in the nucleus. The electrons revolve around the nucleus in well - defined orbits. The size of the nucleus is very small as compared to the size of the atom.

Draw back - Electrons move in an orbit around nucleus and would undergo acceleration. During acceleration charged particles would radiate energy and would lose energy and ultimately fall into nucleus. So atom would be highly unstable, but actually atoms are quite stable.

9. Q. Helium atom has atomic mass of  $4u$  and has 2 protons in its nucleus. How many neutrons does it have ?

Ans: mass no. of helium is = 4 No. of protons = 2 No. of neutrons =  $4 - 2 = 2$

10. Q. If number of electrons in an atom is 8 and number of protons is also 8, then

(i) what is the atomic number of the atom? and (ii) what is the charge on the atom?

Ans. (i) Atomic number of the atom = Number of protons in its nucleus = 8

(ii) The charge on the atom is zero, because total number of positive charges due to the protons is equal to total number of negative charges due to electrons.

11. Q. Nucleus of an atom is heavy and positively charged. Justify your answer

Ans. In an atom, the mass of protons and neutrons are one unit each while the mass of electron is negligible. Since a nucleus consists of protons and neutrons, it is heavy. Also the proton is positively charged while the neutron is neutral, which makes the nucleus positively charged.