24. Atomic Structure - 2

1. Who proposed the idea of atom as small particle?

John Dalton proposed the idea of the atom as the smallest possible particle of any substance.

2. Who explained neutrality of atom?

J.J.Thomson's atomic theory explained the electrical neutrality of atoms, it could not reveal the presence of nucleus in an atom, which was later proposed by Ernest Rutherford in 1909.

3. Who is father of nuclear physics?

Ernest Rutherford, a British physicist probed atoms with alpha particles. He was known as the "father of nuclear physics". He was awarded the Nobel prize for his contribution to the structure of atom in 1908.

4. What was Rutherford`s Experiment?

A stream of alpha particles was made to pass through a thin gold foil of about 4x10-5 cm thickness. Most of the alpha particles did go through the foil in a straight line. Some alpha particles were deflected through an average angle of 90o

.Rarely the path of 1 in 20,000 alpha particles scored a direct hit on the nucleus and returned in an angle of 180o.

5. What is alpha particle?

Alpha particles are helium ions He2+ (2 protons, 2 neutrons and no electrons). The mass of an alpha particle is about 8000 times the mass of an electron. Velocity of alpha particles is about 2x107 m/s.

6. What was Rutherford`s theory of Atom?

- Atom has a very small nucleus at the centre.
- There is a large empty space around the nucleus.
- Entire mass of an atom is due to the mass of nucleus.
- Electrons are distributed in the vacant space around the nucleus.
- The electrons are moving in circular paths around the nucleus.

7. Who is Niels Bohr?

Niels Bohr was born on October 7, 1885 in Copenhagen, Denmark. He was also an outstanding soccer player. He worked with Rutherford at the University of Manchester. Bohr's theory became the basis for modern physics known as Quantum Mechanics. Bohr received the Nobel Prize for physics in 1922.

8. Discuss about Bohr law?

- Niels Bohr modified Rutherford's atom model and put forth the following postulates.
- In atoms, electrons revolve around the nucleus in stationary circular paths.
- These paths are called orbits or shells or energy levels.
- As long as electrons revolve in the same orbit, it does not lose or gain energy.
- The circular orbits are numbered as 1, 2, 3, 4 or designated as K, L, M, N shells.
- These numbers are referred to as principal quantum numbers (n).
- As we move away from the nucleus, the energy of the orbit constantly increases.
- Maximum number of electrons that can be accommodated in an energy level (n) is given by 2n^2 .
- When an electron absorbs energy, it jumps from lower energy level to higher energy level.
- When an electron returns from higher energy level to lower energy level, it gives off energy.

9. What is orbit?

Orbit is defined as the path, by which electrons revolve around the nucleus.

10. What are neutrons?

In 1932, James Chadwick observed that when beryllium was exposed to alpha particles, particles with about the same mass as protons were emitted. These emitted particles carried no electrical charge. Hence, they were called as neutrons.

11. What is isotopes?

Atoms of the same element with different number of neutrons are called isotopes.

12. What are the fundamental particle of atom?

Protons: They are positively charged particles. They are present inside the nucleus.

Electrons: They are negatively charged particles. They revolve around the nucleus in circular orbits.

Neutrons: They are neutral particles. They are present inside the nucleus.

13. What are the sub atomic particles?

Besides Electrons, Protons and Neutrons, there are many sub-atomic particles such as:

- ff Mesons

- ff Positrons
- ff Neutrinos
- ff Quarks
- ff Pions
- ff Gluons

13. What is nucleons?

The elementary particles such as protons and neutrons are collectively referred to as nucleons.

14. What is atomic number?

The Atomic number of an atom can be defined as the number of protons present in the nucleus of the atom or the number of electrons present outside the nucleus of the atom. Thus the atomic number of hydrogen would be one and that of helium would be two. The symbol of Atomic Number is Z.

15. What is mass number?

The mass number (A) is defined as the sum of the number of protons and neutrons present in the nucleus of an atom of an element.

16. What are isotopes?

Isotopes are atoms of an element that differ in mass numbers, but have the same atomic number.

17. What are the characteristics of isotopes?

- Isotopes of an element differ in mass numbers only.
- Difference in mass number is due to the difference in number of neutrons.
- Isotopes of an element have the same chemical properties.
- However, variation in physical properties is noted in isotopes.
- Elements having isotopes exhibit fractional atomic mass.

18. What are the uses of isotopes?

- Many isotopes find use in medical field.
- Iron-59 isotope is used in the treatment of anaemia.
- Iodine-131 isotope is used in the treatment of goitre.
- Cobalt-60 isotope is used in the treatment of cancer.
- Phosphorous-32 isotope is used in eye treatment.
- Carbon-11 isotope is used in brain scan.

19. What are K,L,M,N?

It is known that atoms consist of a positively charged nucleus with protons and neutrons in it. Negatively charged electrons constantly revolve around the nucleus

in a set of orbits. The electron orbits are numbered as 1, 2, 3, etc. Starting from the orbit closest to the nucleus. These orbits are also called K, L, M, N shells, as mentioned in the atom model proposed by

Niels Bohr.

20. What are cell number and maximum number of electrons?

First shell (K)	2(12) = 2
Second shell (L)	2(22) = 8
Third shell (M)	2(32) = 18
Fourth shell (N)	2(42) = 32

21. What is valence electrons?

The number of electrons in the outer energy level (orbit) of an atom are the ones that can take part in chemical bonding. These electrons are referred to as the valence electrons.

22. Give the electronic name of elements given below?

- Hydrogen H
- Helium He

- Lithium Li
- Beryllium Be
- Boron B
- Carbon C
- Nitrogen N
- Oxygen O
- Fluorine F
- Neon Ne
- Sodium Na
- Magnesium Mg
- Argon Ar