Important Questions for Class 9

Science

Chapter 4 – Structure of Atoms

Very Short Answer Questions   **1 Mark**
1. What are canal rays?
Ans: Positively charged rays discovered by E. Goldstein are called canal rays.

2. If an atom contains one electron and one proton, will it carry any charge or not?
Ans: A single electron contains one negative charge and one single proton contains one positive charge so they neutralized by each other. That atom will not contain any charge.

3. Name the three sub-atomic particles of an atom.
Ans: Three sub-atomic particles of an atom are Proton, Neutron and Electron.

4. Rutherford's alpha-particle scattering experiment was responsible for the discovery of
(a) Atomic Nucleus
(b) Electron
(c) Proton
(d) Neutron
Ans: (d) Proton

5. Isotopes of an element have
(a) The same physical properties
(b) Different chemical properties
(c) Different number of neutrons
(d) Different atomic numbers
Ans: (a) The same physical properties.

6. Number of valence electrons in Cl^- ion are:
(a) 16
(b) 8

(c) 17
(d) 18
Ans: (b) 8

7. Which one of the following is a correct electronic configuration of sodium?
(a) 2,8
(b) 8,2,1
(c) 2,1,8
(d) 2,8,1
Ans: (b) 2,8

8. Atomic Number of an element is equal to:
(a) Number of Protons
(b) Number of electrons
(c) Number of neutrons
(d) Both (a) and (b)
Ans: (a) Number of Protons

9. The charge of proton (p^+) is:
(a) $+1.6 \times 10^{-19} C$
(b) $-1.6 \times 10^{-19} C$
(c) $+1.6 \times 10^{19} C$
(d) $-1.6 \times 10^{19} C$
Ans: (a) $+1.6 \times 10^{-19} C$

10. $_{10}^{20}Ne$ and $_{10}^{22}Ne$ are
(a) Isotopes
(b) Isobars
(c) Isotones
(d) Both (a) and (b)
Ans: (a) Isotopes

11. Helium $\left(_2^4 He\right)$ has:
(a) $2P+$ and $2n°$
(b) $2P+$ and $4n°$

(c) $4P+$ and $2n°$

(d) $2P+$ and $4n°$

Ans: (a) $2P+$ and $2n°$

12. In which form is oxygen available?

(a) O^{2-}

(b) O^{2+}

(c) O

(d) Both (a) and (c)

Ans: (a) O^{2+}

13. How many electrons does Na^+ has in its outermost shell?

(a) 10

(b) 11

(c) 18

(d) 8

Ans: (d) 8

14. Atomic number of an element during a Chemical reaction.

(a) Increases

(b) Remain Constant

(c) Decreases

(d) May be (a) or (c)

Ans: (b) Remain constant

15. The molecular formula for Aluminum chloride is

(a) Al_3Cl

(b) $AlCl_3$

(c) $AlCl_3$

(d) Both (b) and (c)

Ans: (c) $AlCl_3$

16. Atomicity of fluorine is:

(a) 1

(b) 2

(c) 3

(d) 4
Ans: (b) 2

17. Molecular formula for calcium fluoride is-
(a) CaF_2
(b) CaF
(c) Ca_2F
(d) $2CaF$
Ans: (a) CaF_2

18. Electronic configuration of calcium is
(a) 2,8,8,2
(b) 2,8,6,4
(c) 2,8,7,1
(d) 2,8,1,7
Ans: (a) 2,8,8,2

19. Nitrogen is:
(a) Monatomic
(b) Diatomic
(c) Triatomic
(d) Tetratomic
Ans: (b) Diatomic

Short Answer Question   **2 Marks**
**20. On the basis of Thomson's model of an atom, explain how the atomic neutral as a whole.**
Ans: As per Thomson's model of an atom, the number of electrons and the number of protons are equal in an atom. Electrons are positively charged and protons are negatively charged, hence the + and – charges are neutralized by each other that makes atom neutral as a whole.

21. On the basis of Rutherford's model of an atom, which subatomic particle is present in the nucleus of an atom?
Ans: The sub atomic particle proton is present in the nucleus of an atom according to Rutherford's model of an atom.

22. Draw a sketch of Bohr's model of an atom with three shells.
Ans: Bohr's model of an atom with three shells is as follows:

Bohr's Model
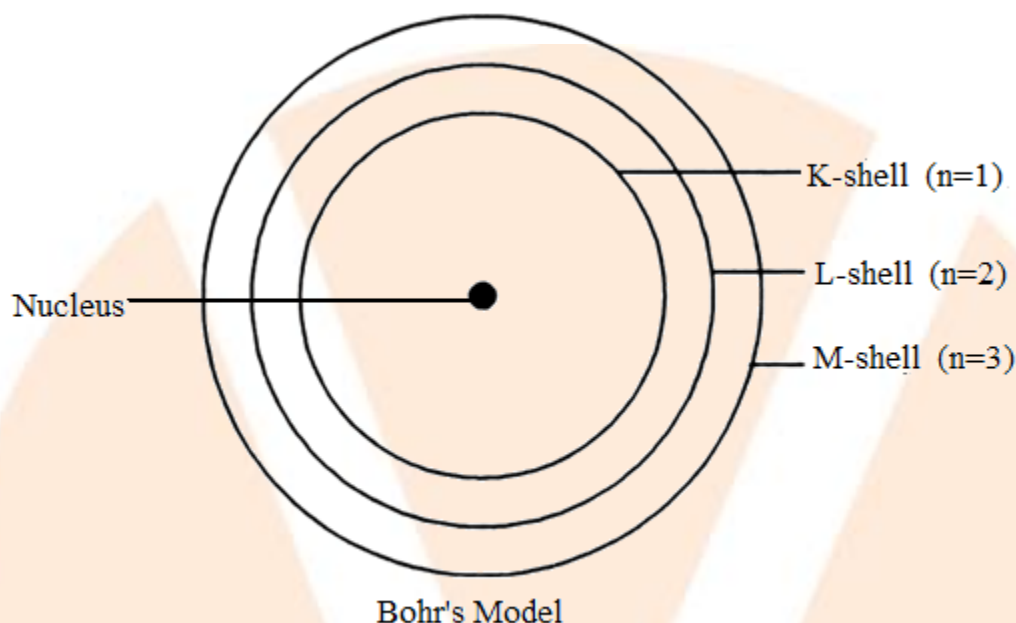
23. What do you think would be the observation if the $\alpha-$ particle scattering experiment is carried out using a foil of a metal other than gold?
Ans: If the $\alpha-$ particle scattering experiment is carried out using a foil of a metal other than gold we will get the different observation.

24. Helium atom has an atomic mass of 4 u and two protons in its nucleus. How many neutrons does it have?
Ans: The atomic mass of an atom is the sum of masses of protons and neutrons present in its nucleus.
Given that the mass of helium atom is 4 u and two protons present in its nucleus.
So the number of neutrons will be
Number of neutrons $=$ atomic mass $-$ number of protons
$\Rightarrow$ Number of neutrons $= 4 - 2$
$\therefore$ Number of neutrons $= 2$
Therefore, helium atom has 2 neutrons.

25. Write the distribution of electrons in carbon and sodium atoms.
Ans: Atomic number of carbon is 6 and atomic number of sodium is 11.

So distribution of electrons in carbon atom is $6 = 2,4$
Distribution of electrons in sodium atom is $11 = 2,8,1$.

26. If K and L shells of an atom are full, then what would be the total number of electrons in the atom?
Ans: K shell contains total 2 electrons and L shell contains maximum 8 electrons. If K and L shells of an atom are full, then the total number of electron in the atom will be 10.

27. 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?
Ans: The atomic number of an atom is equal to the number of protons or electrons present in its nucleus. So the atomic number of an atom with 8 electrons and 8 protons is 8.

(ii) What is the charge on the atom?
Ans: A single electron contains one negative charge and one single proton contains one positive charge. There are equal number of electrons and protons in an atom so they neutralize each other. The atom will be neutral.

28. With the help of Table 4.1, find out the mass number of oxygen and Sulphur atom.
Ans: The mass number of an atom is equal to the sum of protons and neutrons present in its nucleus.
Mass number of oxygen $= 8 + 8$
Mass number of oxygen $= 16$
Mass number of Sulpher $= 16 + 16$
Mass number of Sulpher $= 32$

29. What are the limitations of J.J. Thomson's model of the atom?
Ans: The J.J. Thomson's atomic model was failed to explain the organization of electrons in an atom.

30. Na$^+$ has completely filled K and L shells. Explain.
Ans: Sodium (Na) has atomic number 11, so the electronic configuration of Na is 2,8,1.

It has single electron in outermost shell, when it gives away that electron it becomes Na^+ and has electronic configuration 2,8. Also K shell contains total 2 electrons and L shell contains maximum 8 electrons. So Na^+ has completely filled K and L shells.

31. If $z = 3$, what would be the valency of the element? Also, name the element.
Ans: $z = 3$ represents that element has 3 electrons in its shells. The electronic configuration is 2,1. It means in outermost shell electron has 1 electron, so its valency is 1. The element is Lithium.

32. Composition of the nuclei of two atomic species X and Y are given as under

	X	Y
Protons	6	6
Neutrons	6	8

Give the mass number of X and Y. What is the relation between the two species?
Ans: The mass number of an atom is equal to the sum of protons and neutrons present in its nucleus.
So the mass number of X is $= 6 + 6 = 12$
Mass number of Y is $= 6 + 8 = 14$
Number of protons is same in X and Y but the atomic numbers are different. X and Y are isotopes.

33. For the following statements, write T for True and F for False.
(a) J.J. Thomson proposed that the nucleus of an atom contains only nucleons.
Ans: False

(b) A neutron is formed by an electron and a proton combining together. Therefore, it is neutral.
Ans: True

(c) The mass of an electron is about 12000 times that of proton.
Ans: True

**(d) An isotope of iodine is used for making tincture iodine, which is used as a**

medicine.
Ans: False

34. The nucleus of an atom of Bi – 210 (atomic number = 83) emits $\beta-$ particle and becomes a polonium nuclide. Write as equation for the nuclear change described.
Ans: Whenever $\beta-$ particle emits from the nucleus of an atom, atomic number of that atom is increased by 1 but the mass number remains same.
So when $\beta-$ particle emits from Bi – 210 (atomic number = 83) it becomes polonium nuclide. The equation for the nuclear change is as follows:
$^{210}_{83}\text{Bi} \rightarrow {}^{210}_{84}\text{Po} + {}^{0}_{-1}\text{e}$.
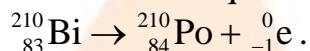
35. How can one conclude that electrons are fundamental particles?

Ans: The $\dfrac{e}{m}$ ratio of electron remains similar irrespective of the nature of gas and electrodes inside the discharge tube. So we can conclude that electrons are fundamental particles.

36. What happens to the nucleus of an atom when it emits a $\gamma-$ ray?
Ans: There is no change in mass or charge of nuclide when it emits $\gamma-$ ray. The energy of nucleus decreases equal to the energy of photon emitted.

37. Write the electronic configuration of following ions:
(a) Cl^-
Ans: Electronic configuration of Cl^- ion is 2,8,8.

(b) Mg
Ans: Electronic configuration of Mg ion is 2,8,2.

(c) Al^{3+}
Ans: Electronic configuration of Al^{3+} ion is 2,8.

(d) O
Ans: Electronic configuration of O is 2,6.

38. State Mendeleev's periodic law?

Ans: Mendeleev's Periodic law states that the properties of elements are periodic function of their atomic mass. Properties of elements are depends on the atomic mass.

39. Define ionization energy and electron affinity?

Ans: Ionization energy of a component is that the amount of energy that has got to be supplied to at least one mole of the element within the gaseous state to get one mole of caters within the gaseous state.

Electron affinity point is that the energy change that accompanies the formation of 1 mole of anions within the gaseous state from one mole of the atoms of the element within the gaseous state.

40. Why is atomic number is more important than atomic weight in predicting the chemical properties of elements?

Ans: Atomic number is that the number of protons in an atom and through a reaction the number of protons remains unchanged. Atomic number also gives number of electrons. Electrons are present in shell which participate in chemical reactions and decides chemical properties. Whereas relative atomic mass is that the sum of number of protons and number of neutrons so number is more important in predicting the chemical properties of elements.

41. What are the advantages of the Periodic Table?

Ans: In periodic table elements are arranged in a tabular form. So it is easy to remember the properties of elements if the position is known. Also the compounds formed by the elements are predictable if the position of element is known. Periodic table made easy and systematic the study of chemistry.

42. Which of the following electronic configuration are wrong and why?
(a) 2,8,2
(b) 2,8,8,2
(c) 2,8,9,1.

Ans: From the given electronic configuration, 2,8,9,1 is wrong because in third shell maximum number of electrons is 8. The correct electronic configuration is 2,8,8,2.

43. What are ions? What are its two types?

Ans: When one or more electrons are detached from a neural atom, a positively charged particle is formed and called an ion. Ions may be cations and anions.

44. Show diagrammatically the formation of O^{2-} ion?

Ans: Atomic number of oxygen is 8 and its electronic configuration is 2,6. In outermost shell oxygen has 6 electrons. To complete its octet and becomes stable it needs 2 electrons. By gaining 2 electrons it becomes O^{2-} ion.

Diagrammatic representation of formation of O^{2-} ion is as follows:

Oxygen atom (2,6) O^{2-} ion (2,8)
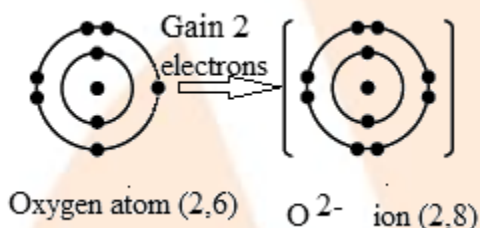
45. Define isotopes and isobars?

Ans: Isotopes are atoms which have identical atomic number but different mass number. Example of isotopes is ${}^{12}_{6}C, {}^{14}_{6}C$.

Isobars are atoms have different atomic number but same mass number. Example of isobars is ${}^{40}_{18}Ar, {}^{40}_{19}K$.

Short Answer Questions   3 Marks
46. For the symbol H, D and T tabulate three sub-atomic particles found in each of them.

Ans: H represents the hydrogen atom, D represents the deuterium atom and T represents the tritium atom. Three sub-atomic particles present in each of them is represented as follows:

Symbol	Number of electrons	Number of protons	Number of neutrons
H (hydrogen)	1	1	0
D (deuterium)	1	1	1
T (tritium)	1	1	2

47. Write the electronic configuration of any one pair of isotopes and isobars.

Ans: Electronic configuration of pair of isotopes of carbon is ${}^{12}_{6}C, {}^{14}_{6}C$. Isotopes have same number of electrons and protons.

Electronic configuration of pair of isobars of argon and calcium is ${}^{40}_{18}Ar, {}^{40}_{20}Ca$.

48. Compare the properties of electrons, protons and neutrons.

Ans: Comparison of electrons, protons and neutrons is as follows:

Protons	Neutrons	Electrons
Protons are positively charged. Mass of proton is equal to one hydrogen atom i.e. 1 a.m.u. Protons are present in the nucleus of an atom.	Neutrons are neutral (no charge). Mass of neutron is equal to a proton. Neutron is present inside the nucleus of an atom.	Electrons are negatively charged. Mass of an electron is equal to $\dfrac{1}{1838}$ of the mass of a proton. Electrons are present outside the nucleus of an atom.

49. What are the limitations of Rutherford's model of the atom?

Ans: Rutherford's model of atom is failed to explain the stability of atom because as per his model electrons revolve around the nucleus and while moving through orbit should emit energy and this energy loss will shrink the orbit and finally the electron would hit the nucleus and thus atom is unstable but it is not true.

50. Define valency by taking examples of silicon and oxygen.

Ans: The valency of electrons is determined by electrons present in the outermost shell of an atom. Electrons present in the outermost shell of an atom are known as the valence elctrons. Electrons gain or lose electrons to complete its octet. The valency of silicon is 14 and electronic configuration is 2,8,4. So silicon can gain or lose 4 electrons. So the valency of silicon is +4 or -4.

Atomic number of oxygen is 8 and electronic configuration is 2,6. To complete its octet oxygen gain 2 electrons hence the valency of oxygen is 2.

51. If bromine atom is available in the form of, say, two isotopes $_{35}^{79}\text{Br}\left(49.7\%\right)$ & $_{35}^{81}\text{Br}\left(50.3\%\right)$, Calculate the average atomic mass of bromine atom.

Ans: The average atomic mass of bromine is

$$= \frac{79 \times 49.7 + 81 \times 50.3}{100}$$

$$= \frac{3926.3 + 4074.3}{100}$$

$$= \frac{8000.6}{100}$$

$$= 80u$$

Average atomic mass of bromine atom is 80 u.

52. The average atomic mass of a sample of an element X is 16.2 u. What are the percentages of isotopes $^{16}_{8}X$ $^{18}_{8}X$ and in the sample?

Ans: Average atomic mass of sample is given as

$$\frac{16X + 18 \times (100 - X)}{100}$$

We get

$$\Rightarrow 16.2 = \frac{16X + 18 \times (100 - X)}{100}$$

$$\Rightarrow 1620 = -2X + 1800$$

$$\Rightarrow 2X = 1800 - 1620$$

$$\Rightarrow 2X = 180$$

$$\therefore X = 90$$

The percentage of isotopes is $^{16}_{8}X(90\%)$ and $^{18}_{8}X(10\%)$.

53. In a gold – foil experiment:
(a) Why did many α – particles pass through the gold foil undeflected?
Ans: Most of the space within the atom was empty so many α – particles pass through the gold foil undeflected.

(b) Why did few α – particles deflect through small angles.
Ans: In a gold foil at center there is a positive charge so few α – particles deflect through small angles.

(c) Why did few $\alpha-$ particles, after striking the gold foil, retrace their path.
Ans: In a gold foil there is a positively charged nucleus which is very tiny so few $\alpha-$ particles, after striking the gold foil, retrace their path.

54. Compare the three major particles in atoms with respect to their mass and charge?
Ans: Comparison of three major particles proton, neutron and electron with respect to their mass and charge is as follows:

|	Particles	Symbol	Mass	Charge
1.	Proton	P^+	$1836(9.1\times10^{-31})Kg$	$+1.6\times10^{-19}C$
2.	Neutron	N^0	$1836(9.1\times10^{-31})Kg$	0
3.	Electron	e^-	$9.1\times10^{-31}Kg$	$-1.6\times10^{-19}C$

Inside an atom electron revolves around the nucleus in a circular path. Protons and neutrons are present inside the nucleus.

55. Write an experiment to show cathode rays are deflected by magnetic fields?
Ans: Experiment to show that cathode rays were deflected by magnetic fields is as follows:
- First take a discharge tube with fluorescent material inside it.
- Place a horse – shoe magnet in the center of the discharge tube.
- When cathodic rays are produced and travel through discharge tube, then cathode rays get deflected by magnetic field of the magnets in the direction of anode. Also they are negatively charged.

The diagram of experiment is as follows:
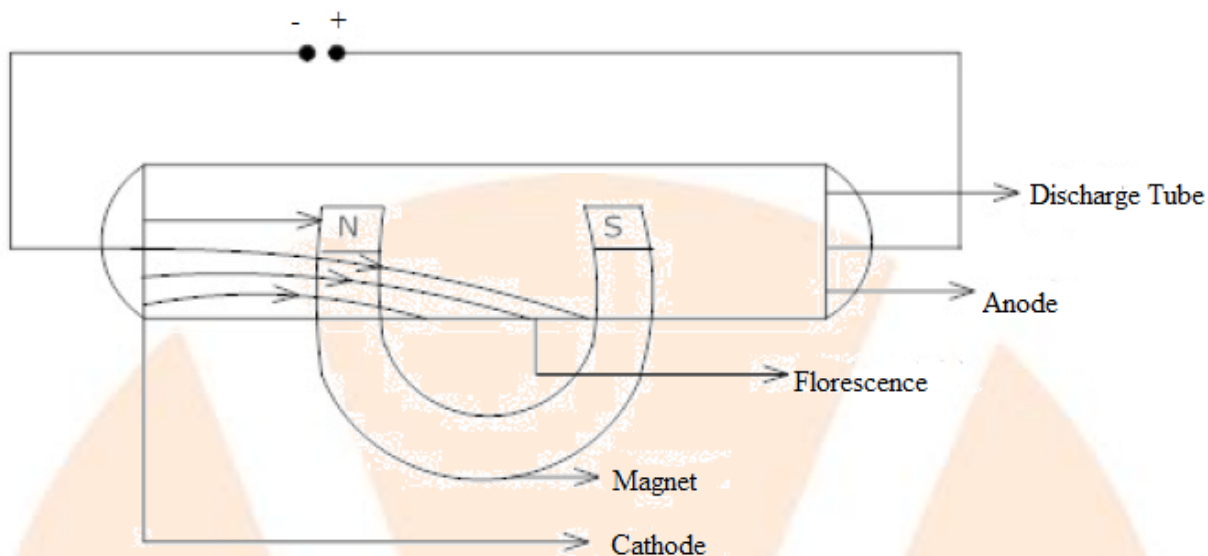
56. Write the postulates of Bohr theory?

Ans: The postulate of Bohr's theory is as follows:

- An electron revolves around the nucleus in the orbit of an atom in a definite path known as orbits or shells.
- Energy of each orbit is fixed.
- Energy increases from inner shell to the outer shells i.e. energy for orbit nearest the nucleus is lowest.
- If energy is supplied then electron moves from lower orbit to the higher orbit.

**57. Explain the variation of atomic radius along a period and down a group.**

Ans: The atomic radius of an atom increases when we move down as extra shell is added. The atomic radius decreases when we move from left to right as the nuclear charge of an element increases.

58. Why metals are electropositive and non-metals are electronegative in nature?

Ans: Metals are electropositive in nature because all metals give away electrons from their outermost shell in order to complete the octet and become stable. So metals become positively charged. Non-metals are electronegative in nature because all non-metals gain electrons in order to complete the octet and become stable. So non-metals become negatively charged.

59. Explain the formation of Al^{3+} ion and why is it formed?

Ans: Aluminum has atomic number of 13. The electronic configuration of Al is 2,8,3. It has 3 electrons in the outermost shell and to become stable it needs to complete its octet. In outermost shell maximum number of electrons must be 8. So it is easy to lose 3 electrons and complete the octet. By giving away the 3 outermost electrons it becomes Al^{3+} ion.

Al (2,8,3) Al^{3+}(2,8)
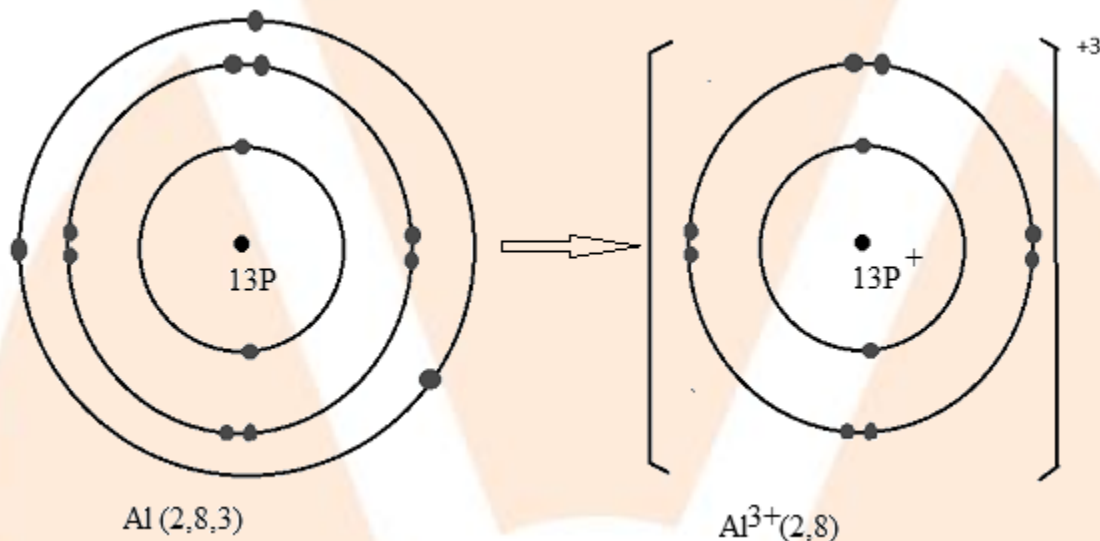
60. Find the percentage composition of sucrose $\left(C_{12}H_{22}O_{11}\right)$.

Ans: The molecular mass of sucrose $\left(C_{12}H_{22}O_{11}\right)$ is

$\left(C_{12}H_{22}O_{11}\right) = 12 \times 12 + 22 + 11 \times 16$

$\left(C_{12}H_{22}O_{11}\right) = 144 + 22 + 176$

$\left(C_{12}H_{22}O_{11}\right) = 342 g / mol$

342 g of sucrose contains 144g Carbon, 22 g Hydrogen and 176 g Oxygen.
So 100 g sucrose contains:

$C = \dfrac{100 \times 144}{342} = 42.11g$

$H = \dfrac{100 \times 22}{342} = 6.43g$

$O = \dfrac{100 \times 176}{342} = 51.46g$

So the percentage composition of sucrose is

$C = 42.11\%$

$H = 6.43\%$

$O = 51.46\%$.

61. Complete the following table:

	Ion	Number of electrons	Z	N	A
(a)	$^{86}Rb^{+}_{37}$				
(b)	$^{24}Mg^{2+}_{12}$				
(c)	$^{80}Br^{-}_{35}$				

Ans: In the given table element is represented as $^{A}_{Z}X$.

Here, X is the symbol of element,

Z is the symbol of atomic number which is equal to number of protons,

A is the symbol of mass number which is equal to the sum of number of protons and number of neutrons.

By using above information we get the complete table as:

	Ion	Number of electrons	Z	N	A
(a)	$^{86}Rb^{+}_{37}$	36	37	49	86
(b)	$^{24}Mg^{2+}_{12}$	10	12	12	24
(c)	$^{80}Br^{-}_{35}$	36	35	45	80

62. Calculate the following:

(a) The number of gram – atoms of oxygen

Ans: Oxygen atom is represented as O_2. In oxygen 2 gram atoms are present.

(b) The number of atom of oxygen

Ans: Gram atomic mass of oxygen is 6.023×10^{23} atoms.

16 g of oxygen has 6.023×10^{23} atoms.

So 32 g of oxygen has $\dfrac{6.023 \times 10^{23} \times 32}{16} = 1.205 \times 10^{24}$ atoms.

(c) The number of molecules in 32 g of ozone $\left[O_3 \right]$.

Ans: We know that 48 g of ozone contains 6.023×10^{23} molecules.

So 1 g of ozone contains $\dfrac{6.023 \times 10^{23}}{48}$ molecules.

Thus 32 g of ozone has $\dfrac{6.023 \times 10^{23} \times 32}{48} = 4.015 \times 10^{23}$ molecules.

(d) What mass of water will contain the same number of molecules as 8.0 g of ferrous oxide [FeO]?

Ans: We know that the atomic mass of 18 g of water is 6.023×10^{23} atoms.

Ferrous oxide is $56 + 16 = 72g$

So atomic mass of 72 g of FeO is 6.023×10^{23} atoms.

Now, 1 g of FeO is $= \dfrac{6.023 \times 10^{23}}{72}$

Also, 8 g of FeO is $= \dfrac{6.023 \times 10^{23} \times 8}{72}$.

8 g of FeO is $= 0.669 \times 10^{23}$.

Now, 18 g of water is 6.023×10^{23} atoms.

So we get

$\dfrac{18}{6.023 \times 10^{23}}$ gms $= 1$ atom

$\Rightarrow \dfrac{18 \times 0.669 \times 10^{23}}{6.023 \times 10^{23}}$ gms $= 0.669 \times 10^{23}$ atoms

Therefore, 2g of water contains $= 0.669 \times 10^{23}$.

So 2g of water will contain the same number of molecules as 8 g of ferrous oxide.

63. How will you find the valency of chlorine, Sulphur and magnesium?

Ans: The valency of electrons is determined by electrons present in the outermost shell of an atom. Electrons present in the outermost shell of an atom are known as the valence elctrons. Those electrons determine the valency of that atom.

The atomic number of chlorine is 17 and the electronic configuration is 2,8,7.

Thus chlorine has 7 electrons in outermost shell and to complete its octet it needs 1 more electron. So the valency of chlorine is one.

The atomic number of Sulphur is 16 and the electronic configuration is 2,8,6.

Thus Sulphur has 6 electrons in outermost shell and to complete its octet it needs 2 more electron. So the valency of Sulphur is two.

The atomic number of Magnesium is 12 and the electronic configuration is 2,8,2.

Thus Magnesium has 2 electrons in outermost shell. It is easy to give away two valence electrons. So the valency of Magnesium is two.

64. Describe Bohr's model of the atom.

Ans: There are some drawbacks in Rutherford's atomic model. So to overcome this and to explain structure of atom in detail Neil Bohr in 1912 proposed a model of atom. The postulates of Bohr's model are given below:

- An electron revolves around the nucleus in the orbit of an atom with fixed energy.
- Energy of orbits increases from inner shell to the outer shells i.e. energy for orbit nearest the nucleus is lowest.
- If energy is supplied then electron moves from lower orbit to the higher orbit and if an electron jumps from higher orbit (energy level) to the lower orbit (energy level) then energy is emitted as electromagnetic waves.
- Each orbit or shell represents an energy level by an integer number as n=1,2,3,…. Such orbits are characterized as K,L,M,N……….. and titled from nucleus side to outwards.

65. Compare all the proposed models of an atom given in this chapter.

Ans: There are three proposed models of an atom are discussed in detail i.e. Thomson's model, Rutherford's model and Bohr's model.

The comparison between the three is given below:

Thomson's model	Rutherford's model	Bohr's model
According to the Thomson's model atom has negatively charged electrons in positively charged sphere. So the atom as a whole is neutral as negative and positive charges are equal in magnitude. This model fails to explain the stability of an atom.	This model explains that there is a nucleus in the center of an atom and electrons revolves around that nucleus. The arrangement of electrons is not explained in this model thus it seems to be incomplete.	According to Bohr's model electrons are revolves around the nucleus in a specific path known as orbits or shells with a fixed energy. An electron has complete atomic shells thus atom becomes more stable.

66. Summarize the rules for writing of distribution of electrons in various shells for the first eighteen elements.

Ans: The following rules are followed for writing the number of electrons in different energy levels or shells:

- The maximum number of electrons existing in a shell is given by the formula $2n^2$, where 'n' is the orbit number or energy level and is equal to 1,2,3,…
- Hence the maximum number of electrons in different shells are as follows:

In first orbit or also known as K-shell will be $2 \times 1^2 = 2$ (n=1).

In second orbit or also known as L-shell will be $2 \times 2^2 = 8$ (n=2).

In third orbit or also known as M-shell will be $2 \times 3^2 = 18$ (n=3) and so on.

- In outermost shell the maximum number of electron can be 8.
- First inner shells are filled than outer shells are filled. Electrons are not put up in a given shell, unless the inner shells are filled. That

67. Explain following with examples and Give any two uses of isotopes.
(i) Atomic number
Ans: Atomic number of an atom is equal to the number of protons present inside the nucleus of that atom. It is represented by Z.

(ii) Mass number
Ans: The atomic mass of an atom is the sum of masses of protons and neutrons present in its nucleus. It is represented by A. for example mass number of Carbon is 12 u because it has 6 protons and 6 neutrons in its nucleus.

(iii) Isotopes

Ans: Isotopes are atoms which have identical atomic number but different mass number. Example of isotopes is $^{12}_{6}C, ^{14}_{6}C$.

(iv) Isobars

Ans: Isobars are atoms have different atomic number but same mass number. Example of isobars is $^{40}_{18}Ar, ^{40}_{19}K$. Total number of neutrons is same in the atoms.

Two uses of isotopes are as follows:

● An isotope of uranium is used in nuclear reactor as a fuel.
● An isotope of cobalt is used in the treatment of cancer.

(v) Complete the following table.

Atomic number	Mass number	Number of neutrons	Number of protons	Number of electrons	Name of the atomic species
9	-	10	-	-	-
16	32	-	-	-	Sulphur
-	24	-	12	-	-
-	2	-	1	-	-
-	1	0	1	0	-

Ans: The complete table is as follows:

Atomic number	Mass number	Number of neutrons	Number of protons	Number of electrons	Name of the atomic species
9	19	10	9	9	Fluorine
16	32	16	16	16	Sulphur
12	24	12	12	12	Magnesium
1	2	1	1	1	Deuterium
1	1	0	1	0	Hydrogen ion