Assignments in Science Class IX (Term II)

4 Structure of The Atom

IMPORTANT NOTES

1. Experiments on static electricity have proved that seemingly electrically neutral matter consists of electrically charged particles, such that positive charges in it are equal to the negative charges.
2. The electron was discovered by J.J. Thomson.
3. The proton was discovered by E. Goldstein.
4. Rutherford's experiment regarding the scattering of alpha particles led to the discovery of nucleus inside the atom.
5. J.J. Thomson's atomic model proposed that electrons are embedded in a positive sphere made from the protons.
6. Rutherford's atomic model proposed that a very, very small nucleus is present inside the atom and the electrons revolve around it in fixed orbits or shells, much like the planets revolve around the Sun. The stability of the atom could not be explained by this model.
7. Neils Bohr's model best explains the model of atom. According to him, electrons are distributed in different shells/orbits/energy levels around the nucleus and are associated with discrete amounts of energy. When an atomic shell is complete, the atom has least energy and is very stable and least reactive.
8. Chadwick discovered the presence of neutrons within the nucleus.
9. An atom consists of three sub-atomic particles, the protons, the neutrons and the electrons. The protons have a positive charge of 1.6×10^{-19} C and mass equal to 1 amu or 1 u (unified mass). The neutrons have no charge and mass equal to 1 amu. The electrons have a negative charge of 1.6×10^{-19} C and mass 1/1837 amu. The protons and neutrons constitute the nucleus, whereas the electrons revolve around the nucleus in energy levels designated as K, L, M, N, ...
10. Valency is the combining capacity of an element. Its value is the same as the number of electrons in the valence shell, if the number of electrons are 1, 2 or 3. Its value is (8 – No. of electrons in valence shell), if the number of electrons in the valence shell are 4, 5, 6 or 7. All atoms having only 2 electrons or 8 electrons in their valence shell have zero valency.
11. The mass number of an atom is equal to the number of nucleons (protons + neutrons) in the nucleus of an atom.
12. The atomic number of an atom is equal to the number of protons in its nucleus.
13. Isotopes are atoms of the same element, having same atomic number, but different mass numbers.
14. Isobars are atoms of different elements, having same mass number, but different atomic numbers.

GOYAL BROTHERS PRAKASHAN

ASSIGNMENTS FOR SUMMATIVE ASSESSMENT

I. VERY SHORT ANSWER QUESTIONS (1 Mark)

PREVIOUS YEARS' QUESTIONS

1. Name the fundamental particle not present in the nucleus of hydrogen atom. **[2011 (T-II)]**

OTHER IMPORTANT QUESTIONS

1. Why does the nucleus not disintegrate inspite of repulsion among the protons?
2. Mention one postulate about Rutherford's atomic model which makes the atom highly unstable.
3. What are discrete orbitals of atoms?
4. What is the difference between magnesium atom and magnesium ion in terms of number of electrons?

5. Among H^+ and H^-, which one has a single electron in its outermost shell?

6. The mass of an atom of any natural element is taken as the average mass of all the naturally occurring atoms of that element. Replace the underlined phrase by a word.

7. An element X is represented as $^{7}_{3}X$. How many protons and neutrons are present in the element?

8. ^{235}Z and ^{238}Z are two isotopes. How do the two isotopes differ (w.r.t. name and number of subatomic particles)?

9. Represent the structure of $^{23}_{11}Na$ geometrically.

10. Why is an atom electrically neutral?

11. What will be the charge on an ion formed by an atom which has seven valence electrons?

12. Why is the atom of an element P (at. no. 16) more reactive than an atom of an element Q (at. no. 18)?

13. What is the similarity in the electronic configuration of the following set of elements? $_{9}F$, $_{17}Cl$ and $_{35}Br$

14. What is the maximum number of electrons present in the N-shell?

15. What is the difference between mercury atom $\left(^{200}_{80}Hg\right)$ and mercurous ion in terms of the fundamental particles?

16. What is the atomic number of a species which contains 20 protons, 20 neutrons and 18 electrons?

17. A uni-negative ion contains 18 electrons. What will be its atomic number?

18. Which isotope of hydrogen contains one neutron?

19. Write the mass number of the isotope of the element $^{A}_{Z}X$ which has two excess neutrons.

II. SHORT ANSWER QUESTIONS – I (2 Marks)

PREVIOUS YEARS' QUESTIONS

1. If K and L shells of an atom are full, then what would be the total number of electrons in the atom ? What is the valency of this element? **[2011 (T-II)]**

2. The composition of the nuclei of two atomic species X and Y is given as under : **[2011 (T-II)]**

	X	Y
Protons	6	6
Neutrons	6	6

Give the mass numbers of X and Y. What is the relationship between these two species?

3. Composition of the nuclei of two atomic species A and B are given as under : **[2011 (T-II)]**

	A	B
Protons	17	17
Neutrons	18	20

(i) What are the mass numbers of A and B?

(ii) How are they related to each other?

4. State two main postulates of Thomson's model of an atom. **[2011 (T-II)]**

5. (i) What is the similarity in the electronic structure of the following set of atoms?

(a) Lithium (b) Sodium (c) Potassium

(ii) Which of the above elements is most reactive and why? **[2011 (T-II)]**

6. How many electrons, protons and neutrons will be there in an element $^{19}_{9}X$? What will be the valency of the element? **[2011 (T-II)]**

7. What is the number of valence electrons in (i) sodium ion (Na^+) (ii) oxide ion (O^{2-}) (Atomic number of Na = 11; O = 8). **[2011 (T-II)]**

8. Bromine exist into two isotopes one having Br (49.7%) atomic number 35 and mass number 79 and the other Br (50.3%) having atomic number 35 and mass number 81. Calculate the average atomic mass of bromine atom. **[2011 (T-II)]**

9. The following data represents the distribution of electrons, protons and neutrons in atoms of four elements A, B, C, D. **[2011 (T-II)]**

Element	Protons	Neutrons	Electrons
A	9	10	9
B	16	16	16
C	12	12	12
D	17	22	17

GOYAL BROTHERS PRAKASHAN

Answer the following questions :

(a) Give the electronic distribution of element B.

(b) The valency of element A

(c) The atomic number of element B?

(d) The mass number of element D?

10. If the symbolic representation of an atom in $^{6}_{3}X$, what is its valency, name and also give the reason for the valency ? **[2011 (T-II)]**

11. (a) Explain the following terms : **[2011 (T-II)]**

(i) Isotopes (ii) Isobars

12. The atom of an element has 9 protons, 9 electrons and 10 neutrons.

(a) Write the atomic number of the element.

(b) Calculate the mass number of the element.

(c) Write its electronic configuration.

(d) Predict the valency of the element.

[2011 (T-II)]

13. The atomic numbers of atoms of two elements are 18 and 20 respectively and their mass numbers are 40. Mention the term that can be given to relate such pairs of atoms. Will they have the same chemical properties? Justify your answer. **[2011 (T-II)]**

14. Describe Bohr's model of an atom.

[2011 (T-II)]

15. An atom of an element has one electron in the outermost M shell. State its :

(a) Electronic configuration

(b) Number of protons

(c) Atomic number

(d) Valency of this element **[2011 (T-II)]**

16. Which of the Na^{+} and He has completely filled K and L shells. Give reason to support your answer. **[2011 (T-II)]**

17. The electronic configuration of an element 'X' is 2, 8, 2 : **[2011 (T-II)]**

(a) Find the number of electrons present in the atom of element X

(b) Write its atomic number.

(c) This element 'X' is a metal or a non metal?

(d) Find out the valency of the element X.

18. (a) J. Chadwick discovered a, subatomic particles which has no charge and has mass nearly equal to that of a proton. Name the particle and give its location in the atom.

(b) If 'K' and 'L' shells of an atom are completely filled electrons, then what would be (i) the total number of electrons in the atom and (ii) its valency? **[2011 (T-II)]**

19. The number of electrons in the outermost 'L' shell of an atoms is 5. **[2011 (T-II)]**

(a) Write its electronic configuration.

(b) What is its valency and why ?

20. Composition of the nuclei of two atoms "X" and "Y" are given below. **[2011 (T-II)]**

	X	Y
Protons	4	4
Neutron	4	6

Give the mass number of X and Y. Mention the relationship between the two atoms ?

21. The following data represents the distribution of electrons, protons and neutrons in atoms of four elements A, B, C, D.

Element	Protons	Neutrons	Electrons
A	19	21	19
B	17	18	17
C	17	20	17
D	18	22	18

Answer the following questions :

(i) Describe the electronic distribution in atom of element B.

(ii) Is element B a metal or a non-metal? Why?

(iii) Which two elements form a pair of ISOTOPES?

(iv) Which two elements form a pair of ISOBARS? **[2011 (T-II)]**

22. An atom of an element has three electrons in its 3rd orbit which is the outermost shell.

Write :

(i) The electronic configuration

(ii) Atomic number

(iii) Number of protons

(iv) Valency **[2011 (T-II)]**

23. Nucleus of an atom is heavy and positively charged. Justify your answer. **[2011 (T-II)]**

24. Composition of the nuclei of two atomic species 'X' and 'Y' are given below :

	X	Y
Proton	8	8
Neutron	8	10

GOYAL BROTHERS PRAKASHAN

(i) Give the mass number of 'X' and 'Y'.

(ii) What is the relationship between the two species? **[2011 (T-II)]**

25. Define relative atomic mass. Name one tetra atomic and one octa-atomic element. **[2011 (T-II)]**

OTHER IMPORTANT QUESTIONS

1. What will be the mass of one atom of potassium, if there are 94 atoms of K-39 and 6 atoms of K-41?

2. What is the ratio of neutrons/protons in $^{208}_{82}Pb$ and $^{209}_{83}Pb$?

3. (i) Why is an alpha particle called a helium nuclei?

(ii) What is the charge on the above mentioned particle?

4. State one difference and one similarity between the isotopes of an element.

5. Select a pair of isotopes from the following list:

$^{24}_{11}A$, $^{24}_{12}B$, $^{23}_{11}C$, $^{27}_{13}D$

Give reasons for your choice.

6. Give reasons :

(i) Isotopes have different mass numbers.

(ii) Isotopes are electrically neutral.

7. $^{16}_{8}O$, $^{17}_{8}O$ and $^{18}_{8}O$ represent different atoms of oxygen.

(i) What do superscripts and subscripts represent?

(ii) Which subatomic particle is responsible for the change in superscript?

8. Amongst the electrons revolving around the nucleus which electrons

(i) determine the chemical properties of an element?

(ii) do not determine the chemical properties of an element?

Give reasons for your answer.

9. State two differences between a cation and an atom, by taking sodium ion (Na+) and sodium atom (Na) as an example.

10. An atom has mass number 40 and atomic number 20.

(i) How many electrons are revolving around the nucleus?

(ii) How many electron shells are there in the atom?

GOYAL BROTHERS PRAKASHAN

III. SHORT ANSWER QUESTIONS - II (3 Marks)

PREVIOUS YEARS' QUESTIONS

1. List three main features of Rutherford's nuclear model of an atom. **[2011 (T-II)]**

2. On the basis of the number of protons, neutrons and electrons in the samples given below identify (a) the cation (b) the pair of isobars and (c) the pair of isotopes. **[2011 (T-II)]**

Sample	Protons	Neutrons	Electrons
A	17	18	16
B	18	19	18
C	17	20	17
D	17	17	17

3. (a) Give one important application of an isotope of cobalt.

(b) Elements from A to E have in them the distribution of e,p and n as follows.

Elements	Electrons	Neutrons	Protons
A	4	4	3
B	8	9	9
C	18	22	18
D	17	20	17
E	17	18	17

Making use of these data find

(i) cation

(ii) anion

(iii) a pair of isotopes

(iv) an atom of noble gas **[2011 (T-II)]**

4. Define valency of an element. Find the valency of chlorine and magnesium (At. No. of Chlorine = 17, Magnesium = 12). **[2011 (T-II)]**

5. In the following table the mass number and the atomic number of certain elements are given. **[2011 (T-II)]**

Elements	A	B	C	D	E
Mass No	1	7	14	40	40
At. No	1	3	7	18	20

(a) Select a pair of isobars from the above table.

(b) What would be the valency of element C listed in the above table?

(c) Which two subatomic particles are equal in number in a neutral atom?

6. An element X has a mass number 27 and it contains 13 protons. **[2011 (T-II)]**

(i) Write the symbolic representation of the element.

(ii) Find the number of neutrons and electrons in the element.

(iii) Write the electronic configuration of the element.

7. Define : **[2011 (T-II)]**

(i) Atomicity (ii) Valency (iii) Molecule

OTHER IMPORTANT QUESTIONS

1. What are the important properties of the neutron? Compare these properties with those of the electron and proton.

2. In the gold foil experiment of Geiger and Marsden, that paved the way for Rutherford's model of an atom, 1.00% of the α-particles were found to deflect at angles > 50°. If one mole of α-particles were bombarded on the gold foil, compute the number of α-particles that would deflect at angles less than 50°.

3. Show diagramatically the electron distributions in a sodium atom and a sodium ion and also give their atomic number.

4. Write down the symbols of the ions formed from the elements A (at. no. 11), B (at. no. 17) and C (at. no. 16). Also write the electronic configuration of the ions.

5. Choose the noble gases from the table.

Element	A	B	C	D
Mass number	4	40	27	20
Number of neutrons	2	22	14	10

IV. LONG ANSWER QUESTIONS (5 Marks)

PREVIOUS YEARS' QUESTIONS

1. (i) How Rutherford proved that positively charged particles are present in the nucleus of an atom?

(ii) Illustrate in brief the drawbacks of Rutherford's atomic model.

(iii) The total number of nucleons in the atoms of calcium and argon is 40 and the atomic number of calcium and argon are 20 and 18 respectively. Name the pair of these two elements and also find out the number of neutrons present in the nucleus of argon atom. **[2011 (T-II)]**

2. (i) State Bohr's postulates about the model of an atom. Draw a sketch of Bohr's model of an atom with three shells.

(ii) Mention one use of each of the following :

(a) Isotope of cobalt

(b) Isotope of iodine **[2011 (T-II)]**

3. (i) Draw a sketch of Bohr's model of an atom with three shells. **[2011 (T-II)]**

(ii) State the rules followed for writing the number of electrons in different energy shells.

4. (i) What is the drawback of Rutherford's model of an atom?

(ii) Mention the postulates Neils Bohr put forth to overcome the objections raised against Rutherford's atomic model.

(iii) Chlorine occurs in nature in two isotopic forms, with atomic masses 35 u and 37 u in the ratio of 3 : 1. Calculate the average atomic mass of chlorine atom. **[2011 (T-II)]**

5. (a) Write the name of the sub-atomic particle discovered by J. Chadwick. What type of charge occurs on this particle? In which part of atom this particle is located?

(b) List three steps of experiment performed by Rutherford for his model of an atom.

(c) Define isobars, write its one example.

(d) Which scientist concluded that size of nucleus is very small as compared to size of an atom? **[2011 (T-II)]**

6. Read the following passage and with your own knowledge answer the following questions : **[2011 (T-II)]**

GOYAL BROTHERS PRAKASHAN

In order to overcome the objections raised against Rutherford's model of the atom, Neil Bohr put forward the following postulates about the model of an atom.

(i) Only certain special orbits known as discrete orbits of electrons are allowed inside the atom.

(ii) While revolving in discrete orbits the electrons do not radiate energy. Write the following statements in your answer book after completing them :

(a) Atoms are made up of ....., ... and .....

(b) ..... amended Rutherford's short-comings.

(c) Electrons do not radiate energy while revolving in ..... orbits

(d) Discrete orbits are also known as .....

(e) The K shell can accommodate ..... electrons whereas L can accommodate..... electrons.

(f) Atomic mass of an element is the sum of number of ..... and .....

7. (a) List the important observations made by Rutherford from his α-particle scattering experiment.

(b) An element Z contains two naturally occuring isotopes $^{35}_{17}Z$ and $^{37}_{17}Z$. If the average atomic mass of this element be 35.5 u, calculate the percentage of two isotopes. **[2011 (T-II)]**

8. (a) State the three rules proposed by Bohr and Bury regarding distribution of electrons in different orbits of atoms.

(b) Given that natural sample of iron has isotopes $^{54}_{26}Fe$, $^{56}_{26}Fe$ and $^{57}_{26}Fe$ in the ratio of 5%, 90% and 5% respectively. What will be the average atomic mass of iron (Fe)? **[2011 (T-II)]**

9. (a) Describe the main features of Bohr's model of an atom. Draw a neat and labelled diagram of energy levels. **[2011 (T-II)]**

(b) Which of the following pairs are isotopes and which are isobars ?

(i) $^{58}_{26}A$, $^{58}_{28}B$ (ii) $^{79}_{35}X$, $^{80}_{35}Y$

Give reasons for your choice.

(c) Elements A and B have atomic numbers 18 and 16 respectively. Which of these two would be more reactive and why?

10. (a) Describe the main features of Rutherford's model of an atom. State one major drawback of the model.

(b) The number of protons, neutrons and electrons in particles from A and E are given below :

Particle	Protons	Neutrons	Electrons
A	17	18	17
B	3	4	2
C	18	22	18
D	17	20	17
E	9	10	10

Find a pair of isotopes from the above particle by giving suitable reason.

(c) If K and L shells of atoms are full then what would be the total number of electrons in the atom ? **[2011 (T-II)]**

11. (a) Write the maximum number of electrons which can be accommodated in K, L, M, N shells and give the rule on basis of which decides it.

(b) Atom A has a mass number 238 and atomic number 92 and atom B has a mass number 235 and atomic number 92.

(i) How many protons, atoms A and B have?

(ii) How many neutons, atom A and B have?

(iii) Are atoms A and B isotopes of the same element ? How? **[2011 (T-II)]**

12. (a) Illustrate Rutherford's experiment to explain the model of an atom.

(b) If an ion M^{3+} contains 10 electrons and 14 neutrons. What are the atomic number and mass number of the element M? **[2011 (T-II)]**

13. (a) What are the postulates of Bohr's model of an atom?

(b) An ion X^{2-} contains 10 electrons and 8 neutrons. What are the atomic number and mass number of the elements X? **[2011 (T-II)]**

14. (a) Draw the diagram of Rutherford's alpha scattering experiment.

(b) What were three observations of this experiment? **[2011 (T-II)]**

15. (a) Why the chemical properties of isotopes are same? **[2011 (T-II)]**

(b) Draw Bohr model for helium atom.

(c) What are the number of protons, neutrons and electrons in $^{59}Co_{27}$ and $^{108}Ag_{47}$?

GOYAL BROTHERS PRAKASHAN

16. (a) Describe briefly Thomson's model of an atom.

(b) Who discovered Neutron?

(c) What are Canal Rays?

(d) What is the mass of proton as compared to electron? **[2011 (T-II)]**

17. (a) Explain the following with one example of each.

(i) Atomic number (ii) Mass number

(b) Give the distribution of electrons in sodium and chlorine atom. **[2011 (T-II)]**

18. (a) On the basis of Thomson's model of an atom explain how the atom is neutral.

(b) Write the limitations of J.J. Thomson's model of an atom. **[2011 (T-II)]**

19. List the main postulates of Bohr's atomic model. Write the distribution of electrons in calcium (At. no-20) and explain how electorns are distributed in different orbits. **[2011 (T-II)]**

20. Give reasons for the following : **[2011 (T-II)]**

(a) Isotopes of an element are chemically similar.

(b) An atom is electrically neutral.

(c) Noble gases show least reactivity.

(d) Nucleus of an atom is heavy and positively charged.

(e) Ions are more stable than atoms.

21. (a) Explain why did Rutherford select a gold foil in his alpha scattering experiments?

(b) What observations in a scattering experiment led Rutherford to make the following observations:

(i) Most of the space in an atom is empty.

(ii) Nucleus is positively charged.

(c) Mention any two drawbacks of Rutherford's model. **[2011 (T-II)]**

22. (a) Give Bohr - Bury rules for distribution of electrons in different shells (any 2).

(b) For chlorine, Z = 17, A = 35. Give the number of protons, electrons and neutrons in (i) Chlorine (ii) Chloride ion.

[2011 (T-II)]

23. Give a brief account of the development of the presently accepted model of atom with the contribution made by different scientists. Write two features of this atomic model.

[2011 (T-II)]

24. Explain Neil Bohr's model of an atom with its postulates and an illustration. There are two elements $_{13}A^{26}$ and $_{14}B^{26}$. Find the number of subatomic particles in each of these. What is the relation between these atoms?

[2011 (T-II)]

25. (i) Helium atom has an atomic mass of 4u and two protons in its nucleus. How many neutrons does it have?

(ii) Write down the electronic configuration of sulphur (Atomic no 16).

(iii) The atomic mass of an element X is 16.2 u. What are the percentages of isotope X having atomic number 8 and mass numbers 16 and 18. **[2011 (T-II)]**

26. Answer the following in one line or one word

(a) Who discovered neutron?

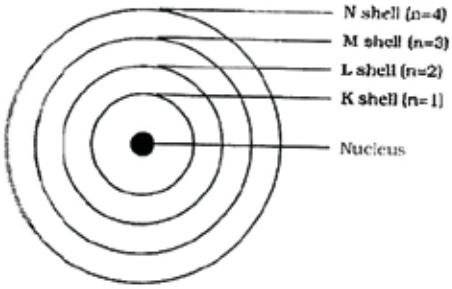
(b) On the basis of Thomson's model of an atom, explain how the atom is neutral as a whole.

(c) What is the maximum number of electrons that can be accommodated in the outermost shell, of an atom?

(d) What term is assigned to the atoms of different elements having same atomic mass but different atomic numbers.

(e) How many neutrons are present in a hydrogen atom? **[2011 (T-II)]**

27.

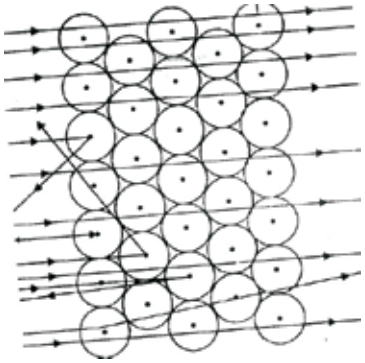


(i) Name the scientist who proposed this model of atom.

(ii) Write the three postulates of this model.

(iii) How many maximum electrons can be accommodated in M orbit ? **[2011 (T-II)]**

28.



GOYAL BROTHERS PRAKASHAN

(a) Which popular experiment is shown in the figure?

(b) List three observations of this experiment.

(c) State conclusions drawn from each observation of this experiment.

(d) State the model of atom suggested on the basis of the above experiment.

29. (a) An element 'X' has atomic number 19 and its mass number is 39. Calculate the number of electron and neutrons in it.

(b) Explain Bohr and Bury rules for distribution of electrons into different shell. Write the distribution of electrons in sodium atom (Z =11).

(c) Define isobars. Give one example. **[2011 (T-II)]**

30. (a) Write the symbol and name of the element having 14 proton. **[2011 (T-II)]**

(b) Complete the table.

Element	Atomic No	Mass No	Proton	Neutron
Cl	17	-	-	18
Si	-	28	-	-
F	-	-	9	10

(c) Give one drawback of Rutherford model.

31. (a) State the three observations made by Rutherford on his a particle scattering experiment.

(b) Write the number of protons and neutrons of an element whose atomic mass is 27 and atomic number is 13. Write its valency and identify the element. **[2011 (T-II)]**

32. State postulates of Neils Bohr to describe model of an atom. Draw diagram indicating the distribution of electrons in the atoms of the elements having atomic numbers 6, 16, 20. Write the name and symbols of the elements. **[2011 (T-II)]**

33. (a) In the gold-foil experiment, what observation led Rutherford to conclude : **[2011 (T-II)]**

(i) Most of the space inside the atom is hollow.

(ii) The central portion of the atom is positively charged.

(iii) Volume occupied by the nucleus is very small as compared to the total volume of the atom.

(iv) Almost the entire mass of the atom is concentrated at its centre.

34. (i) Summarise the rules for writing of distribution of electrons in various shells for the first eighteen elements.

(ii) State the postulates put forward by Neils Bohr in order to overcome the objections raised against Rutherford's model of atom. **[2011 (T-II)]**

35. (a) What are isobars?

(b) Atomic number of an element Y is 17.

(i) Write its electronic configuration.

(ii) What is the number of valence electrons in Y?

(iii) How many electrons are needed to complete the octet of Y?

(iv) It is a metal or non metal ?

(c) The valency of Na is 1 and not 7. Give reason. **[2011 (T-II)]**

36. (a) Why are anode rays called canal rays ?

(b) Mention two postulates of J.J. Thomson's model.

(c) Compare the properties of electrons and protons. **[2011 (T-II)]**

37. (a) If an atom contains one electron and one proton, what will be the total charge on it?

(b) On the basis of Thomson's model of an atom, explain how the atom is neutral as a whole.

(c) Draw a sketch of Bohr's model of an atom with three shells. **[2011 (T-II)]**

38. (a) Define atomic number and atomic mass number of an element.

(b) One atom of an element contains 8 protons and 8 neutrons. Find :

(i) number of electrons

(ii) atomic number

(iii) atomic mass **[2011 (T-II)]**

OTHER IMPORTANT QUESTIONS

1. How are electrons distributed in different orbits?

2. The ratio of the radii of hydrogen atom and its nucleus is 10^5. Assuming the atom and the nucleus to be spherical,

(i) What will be the ratio of their sizes?

(ii) If an atom is represented by planet Earth 'R_e' = 6.4×10^6m, estimate the size of the nucleus.

(iii) How many neutrons are present in each of the three isotopes of hydrogen?

COYAL BROTHERS PRAKASHAN

ASSIGNMENTS FOR FORMATIVE ASSESSMENT

A. Science Quiz

1. (i) An atom has mass number 14 and 8 neutrons in its nucleus. The atom is an isotope of

(a) carbon (b) nitrogen

(c) oxygen (d) silicon

(ii) An element has mass number 31 and atomic number 15. The number of electrons, protons and neutrons in it are respectively

(a) 15, 16, 15 (b) 16, 15, 15

(c) 15, 15, 16 (d) 31, 15, 15

(iii) Rutherford's experiment of scattering of particles showed for the first time that an atom has:

(a) neutrons (b) protons

(c) electrons (d) nucleus

(iv) Which of the following classes of elements differ in their chemical properties?

(a) Allotropes (b) Isotopes

(c) Isobars (d) Allotropes and isobars

(v) Which of the following has equal number of protons and neutrons?

(a) Sulphur (b) Magnesium

(c) Oxygen (d) All of these

2. (i) An isotope of carbon $\left({}^{14}_{6}C\right)$ is used in dating of _____ samples.

(ii) An isotope of iodine $\left({}^{128}_{53}I\right)$ is used in the treatment of _____.

(iii) All isotopes of an element have _____ valency.

(iv) Isotope of uranium used in nuclear reactors is _____.

(v) An isotope of cobalt used in the treatment of cancer is _____.

(vi) The isobars of elements can be separated easily by _____ means.

(vii) _____ number is never fractional.

(viii) An element loses/gains electron from/in its valence shell so as to attain a structure of the nearest _____.

3. (i) An electron has 6 protons in its nucleus. What is the atomic number of the element?

(ii) An element has mass number 37 and atomic number 17. How many neutrons are present in its nucleus?

(iii) The symbols of an element are ${}^{1}_{1}E$, ${}^{2}_{1}E$ and ${}^{3}_{1}E$. What is the scientific name given to them?

(iv) ${}^{40}_{20}Ca$ and ${}^{40}_{18}Ar$ are the atoms of calcium and argon. How are they related to one another?

(v) What is the maximum number of electrons in the K-shell of an element?

(vi) How many electrons can be present in the valence shell of an atom.

(vii) ${}^{39}_{19}K$ changes to its ions by the loss/gain of electrons. How may electrons will it lose or gain?

(viii) ${}^{39}_{19}K$ changes to an ion of the nearest noble gas. What kind of change occurs when it forms a K ion?

(ix) Name the part of the atom, where most of its mass is concentrated.

(x) An element $\left[{}^{16}_{8}O\right]$ acquires two protons by nuclear bombardment. To which element does it change.

B. Projects / Models

Take 10 cm by 10 cm pieces of thermacol. On each of the piece draw the geometric model of:

(i) Sodium (ii) Phosphorus

(iii) Calcium (iv) Lithium

(v) Silicon (vi) Potassium

(vii) Sulphur (viii) Fluorine

GOYAL BROTHERS PRAKASHAN