

Chapter 4 - Structure of the Atom

Short Answer Type Questions

1. Is it possible for the atom of an element to have one electron, one proton and no neutron. If so, name the element.
2. Write any two observations which support the fact that atoms are divisible.
3. Will ^{35}Cl and ^{37}Cl have different valencies? Justify your answer.
4. Why did Rutherford select a gold foil in his α -ray scattering experiment?
5. Find out the valency of the atoms represented by the Fig. 4.3 (a) and (b).

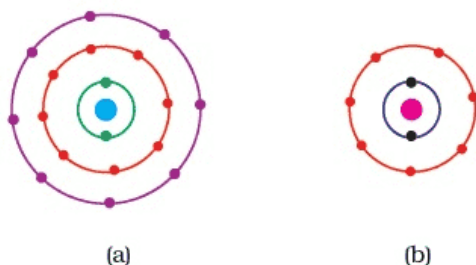


Fig. 4.3

6. One electron is present in the outer most shell of the atom of an element X. What would be the nature and value of charge on the ion formed if this electron is removed from the outer most shell?
7. Write down the electron distribution of chlorine atom. How many electrons are there in the L shell? (Atomic number of chlorine is 17).
8. In the atom of an element X, 6 electrons are present in the outermost shell. If it acquires noble gas configuration by accepting requisite number of electrons, then what would be the charge on the ion so formed?
9. What information do you get from the Fig. 4.4 about the atomic number, mass number and valency of atoms X, Y and Z? Give your answer in a tabular form.

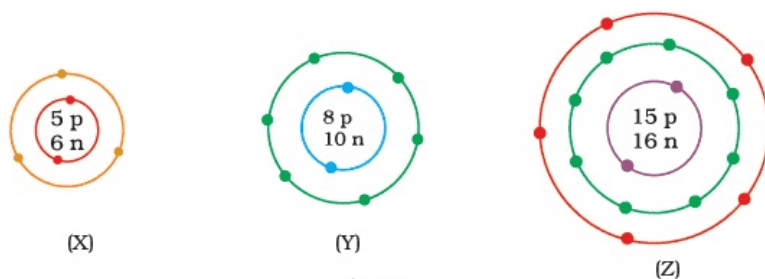


Fig. 4.4

10. In response to a question, a student stated that in an atom, the number of protons is greater than the number of neutrons, which in turn is greater than the number of electrons. Do you agree with the statement? Justify your answer.
11. Calculate the number of neutrons present in the nucleus of an element X which is represented as $^{31}_{15}\text{X}$.
12. Match the names of the Scientists given in column A with their contributions towards the understanding of the atomic structure as given in column B

(A)	(B)
(a) Ernest Rutherford	(i) Indivisibility of atoms
(b) J.J.Thomson	(ii) Stationary orbits
(c) Dalton	(iii) Concept of nucleus
(d) Neils Bohr	(iv) Discovery of electrons
(e) James Chadwick	(v) Atomic number
(f) E. Goldstein	(vi) Neutron
(g) Mosley	(vii) Canal rays
13. The atomic number of calcium and argon are 20 and 18 respectively, but the mass number of both these elements is 40. What is the name given to such a pair of elements?
14. Complete the Table 4.1 on the basis of information available in the symbols given below
 - (a) $^{35}_{35}\text{Cl}$
 - (b) $^{12}_6\text{C}$
 - (c) $^{81}_{35}\text{Br}$

Table 4.1

Element	n_p	n_n

15. Helium atom has 2 electrons in its valence shell but its valency is not 2, Explain.
16. Fill in the blanks in the following statements
- (a) Rutherford's α -particle scattering experiment led to the discovery of the ———
 - (b) Isotopes have same ———but different———.
 - (c) Neon and chlorine have atomic numbers 10 and 17 respectively. Their valencies will be———and———respectively.
 - (d) The electronic configuration of silicon is ———and that of sulphur is ———.
17. An element X has a mass number 4 and atomic number 2. Write the valency of this element?

Long Answer Type Questions

1. Why do Helium, Neon and Argon have a zero valency?
2. The ratio of the radii of hydrogen atom and its nucleus is $\sim 10^5$. Assuming the atom and the nucleus to be spherical, (i) what will be the ratio of their sizes? (ii) If atom is represented by planet earth ' R_e ' = 6.4×10^6 m, estimate the size of the nucleus.
3. Enlist the conclusions drawn by Rutherford from his α -ray scattering experiment.
4. In what way is the Rutherford's atomic model different from that of Thomson's atomic model?
5. What were the drawbacks of Rutherford's model of an atom?
6. What are the postulates of Bohr's model of an atom?
7. Show diagrammatically the electron distributions in a sodium atom and a sodium ion and also give their atomic number.
8. In the Gold foil experiment of Geiger and Marsden, that paved the way for Rutherford's model of an atom, $\sim 1.00\%$ of the α -particles were found to deflect at angles $> 50^\circ$. 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° .