

## Science Worksheet Class IX

### Structure of Atoms

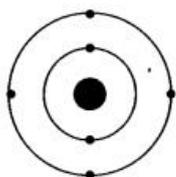
#### Section A

#### A. Choose the correct answer:

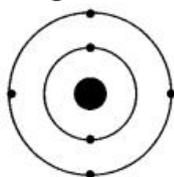
1. Which of the following isotopes is used as the standard for atomic mass?

- (a)  $^{12}\text{C}$
- (b)  $^{16}\text{O}$
- (c)  $^{13}\text{C}$
- (d)  $^1\text{H}$

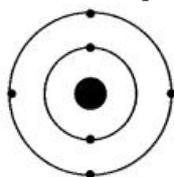
2. There are three isotopes of carbon which are named as C-12, C-13 and C-14 out of which C-12 is the most abundant isotope. In the given structures of 3 isotopes, what will be the composition of the nucleus?



C-12



C-13



C-14

- (a) C-12 :  $6p + 6n$ , C-13 :  $7p + 6n$ , C-14 :  $8p + 6n$
- (b) C-12 :  $6p + 6n$ , C-13 :  $6p + 7n$ , C-14 :  $6p + 8n$
- (c) C-12 :  $6p + 6n$ , C-13 :  $5p + 8n$ , C-14 :  $7p + 7n$
- (d) C-12 :  $6p + 6n$ , C-13 :  $12p + 1n$ , C-14 :  $5p + 9n$

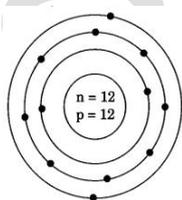
3. How many electrons are present in M-shell of an element with atomic number 20?

- (a) 5
- (b) 8
- (c) 12
- (d) 18

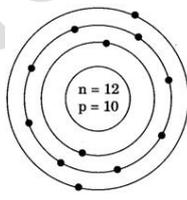
4. An alpha particle is also known as:

- (a) subatomic particle
- (b) an unionized helium atom
- (c) a neutral particle
- (d) a double-charged helium ion

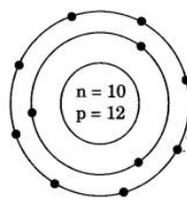
5. Identify the  $\text{Mg}^{2+}$  ion from the figure where, n and p represent the number of neutrons and protons respectively.



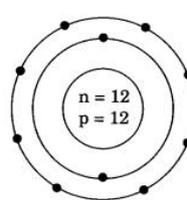
(a)



(b)



(c)



(d)

#### Answer the following:

- (a) The maximum number of electrons in a shell is given by \_\_\_\_\_.
- (b) The outermost shell of an atom is known as its \_\_\_\_\_.
- (c) Neon and chlorine have atomic numbers 10 and 17 respectively. Their valencies will be \_\_\_\_\_ and \_\_\_\_\_ respectively.
- (d) Write the symbol  $^{18}\text{Ar}_{40}$ , write down the number of neutrons present in the nucleus of the atom?
- (e) Name two any two noble gases?
- (f) An atom X has three orbits around its nucleus. What is its maximum electron holding capacity?
- (g) Diagrammatically show the electronic distribution of  $\text{Na}^+$  in its orbit?

- (h) If  $Z = 5$ , what would be the valency of the element? Also name the element?  
 (i) What is the reason for the identical chemical properties of all the isotopes of an element?

### Section B

- Why do Helium, Neon and Argon have a zero valency?
- What is the number of valence electron in:
  - Sodium ion ( $\text{Na}^+$ )
  - Oxide ion ( $\text{O}^{2-}$ )
- What are canal rays? Who discovered them? What is the charge and mass of canal ray? How are the canal rays different from electron in terms of charge and mass?
- List the main differences between an atom and an ion.
- The number of electrons, protons and neutrons in a species are equal to 18, 16 and 16 respectively. Assign proper symbol of the atom.
- Show diagrammatically the electron distributions in a sodium atom and a sodium ion and also given their atomic number.
- Atom A has a mass number 238 and atomic number 92 and atom B has mass number 235 and atomic number 92.
  - How many protons, atoms A and B have?
  - How many neutrons, atoms A and B have?
  - Are atoms A and B isotopes of the same element? How?
- Give reasons why?
  - Atom is electrically neutral.
  - Atom as a whole is an empty space.
  - Rutherford model of atom could not provide stability to the nucleus.
- An atom of an element has three electrons in the third shell which is the outermost shell. Write
  - the electronic configuration
  - the atomic number
  - number of protons
  - its valency
  - the name of the element
  - its nature whether metal or non-metal.
- The following data represent the distribution of electrons, protons and neutrons in atoms of four elements A, B, C, D.

Elements	Protons	Electrons	Neutrons
A	11	11	12
B	17	17	22
C	12	12	12
D	16	16	16

Answer the following questions:

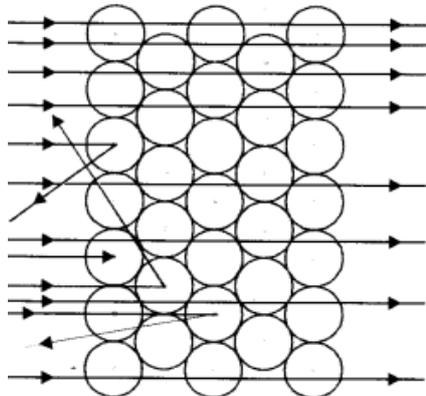
- Give the electronic distribution of element B.
  - The valency of element A.
  - The atomic number of element B.
  - The mass number of element D.
- Describe the main features of Bohr's model of an atom. Draw a neat and labelled diagram of energy levels.
  - An ion  $\text{Y}^{3-}$  contains 18 electrons and 16 neutrons. Calculate the atomic number and mass number of the element Y. Name the element Y.
  - Explain why did Rutherford select a gold foil in his alpha particle scattering experiments? What observations in a-scattering experiment led Rutherford to make the following observations:
    - Most of the space in an atom is empty.
    - Nucleus is positively charged.
    - Mention any two drawbacks of Rutherford's model.

14. Write the complete symbol for
- the nucleus with atomic number 56 and mass number 138.
  - the nucleus with atomic number 26 and mass number 55.
  - the nucleus with atomic number 4 and mass number 9.

15. Explain why :

- These isotopes have identical chemical properties.
- These isotopes are electrically neutral
- These isotopes differ in their masses.

16. Which popular experiment is shown in the figure?



- Structure of the Atom Class 9 Important Questions Science Chapter 4 image - 4
- List three observations of this experiment.
- State conclusions drawn from each observation of this experiment.
- State the model of atom suggested on the basis of the above experiment.

17. Match the following:

Column A	Column B
a) Isotopes	i) 2, 8
b) Ernest Rutherford	ii) Same number of neutrons, different mass numbers.
c) Magnesium ion	iii) Same atomic numbers, different mass numbers.
d) J. J. Thomson	iv) 2, 8, 2
e) Isotones	v) Concept of nucleus
f) Magnesium atom	vi) Discovery of electrons