

# WORKSHEET\_110224

## CHAPTER 04 STRUCTURE OF THE ATOM

SUBJECT: SCIENCE

CLASS : IX

MAX. MARKS : 40

DURATION : 1½ hrs

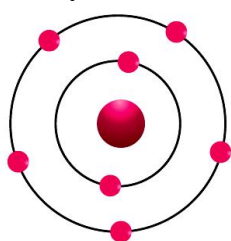
### General Instructions:

- (i). All questions are compulsory.
- (ii). This question paper contains 20 questions divided into five Sections A, B, C, D and E.
- (iii). Section A comprises of 10 MCQs of 1 mark each. Section B comprises of 4 questions of 2 marks each. Section C comprises of 3 questions of 3 marks each. Section D comprises of 1 question of 5 marks each and Section E comprises of 2 Case Study Based Questions of 4 marks each.
- (iv). There is no overall choice.
- (v). Use of Calculators is not permitted

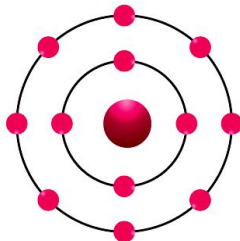
### SECTION – A

Questions 1 to 10 carry 1 mark each.

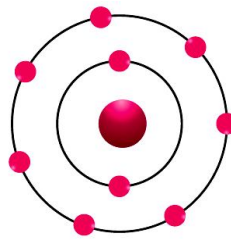
1. Which of the following in figures given below do not represent Bohr's model of an atom correctly?



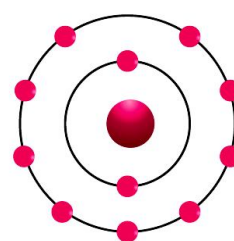
(i)



(ii)



(iii)



(iv)

- (a) (i) and (ii) (b) (ii) and (iii) (c) (ii) and (iv) (d) (i) and (iv)

2. Arrange the following atomic model's experiments in the order of their chronology.

- (I) Rutherford's atomic model  
(II) Thomson's atomic model  
(III) Bohr's atomic model

Options:

- (a) (I), (II) and (III) (b) (II), (III) and (I) (c) (II), (I) and (III) (d) (III), (II) and (I)

3. Characteristics of an Isotope represent:

- (I) Isotopes have different numbers of neutrons.  
(II) Isotopes have same number of electrons and protons.  
(III) Isotopes have different chemical properties.  
(IV) Isotopes have different physical properties.

Which of the following represent the properties of an Isotope?

- (a) (I) and (II) (b) (II) and (III) (c) (III) and (IV) (d) (I), (II) and (IV)

4. Elements with valency 1 are:

- (a) always metals  
(b) always metalloids  
(c) either metals or non-metals  
(d) always non-metals

5. The ion of an element has three positive charges. Mass number of the atom is 27 and the number of neutrons is 14, what is the number of electrons in the ion?

- (a) 13 (b) 10 (c) 14 (d) 16

6. Which of the following statement is always correct?
- (a) An atom has an equal number of electrons and protons.
  - (b) An atom has an equal number of electrons and neutrons.
  - (c) An atom has an equal number of protons and neutrons.
  - (d) An atom has an equal number of electrons, protons and neutrons.

7. The picture shows the symbol for sodium.



What can be concluded about sodium from the symbol?

- (a) It contains 11 neutrons.
  - (b) It contains 12 protons.
  - (c) It contains 12 neutrons.
  - (d) It contains 34 electrons.
8. Which of the following is NOT true about Bohr & Bury's rule for electronic configuration, where n is the shell no.?
- (a) The maximum number of electrons present in a shell is given by the formula  $2n^2$ .
  - (b) The maximum number of electrons present in a shell is given by the formula  $2n$ .
  - (c) The maximum number of electrons that can be accommodated in the outermost orbit is 8.
  - (d) Electrons are not accommodated in a given shell, unless the inner shells are filled.

**In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.**

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true and R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.

9. **Assertion (A):** The size of the nucleus is very small as compared to the size of the atom.

**Reason (R):** The electrons revolve around the nucleus of the atom.

10. **Assertion (A):** For noble gases, valency is zero.

**Reason (R):** Noble gases have 8 valence electrons.

## **SECTION – B**

**Questions 11 to 14 carry 2 marks each.**

11. What are the limitations of J.J. Thomson's model of the atom?

**OR**

Why did Rutherford select a gold foil in his alpha-ray scattering experiment?

12. If  $Z = 3$ , what would be the valency of the element? Also, name the element.

13. Define valency by taking example of silicon.

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

**OR**

Write the distribution of electrons in carbon and sodium atoms.

## **SECTION – C**

**Questions 15 to 17 carry 3 marks each.**

15. Mention the observations made by Bohr to overcome the limitations of Rutherford's atomic model.

16. Write the electronic configuration, number of neutrons, and valency of the following:

- (a) Phosphorus
- (b) Calcium
- (c) Neon

17. (a) In Chemistry class, teacher asked Nina that the electronic configuration of Fluoride ion and Neon is the same. Then what is the difference between them?

- (b) Why do inert gases have zero valencies?
- (c) Name three isotopes of Hydrogen.

**OR**

In what way is the Rutherford's atomic model different from that of Thomson's atomic model?

### **SECTION – D**

**Questions 18 carry 5 marks each.**

18. A stone is allowed to fall from the top of a tower 100 m high and at the same time another stone is projected vertically upwards from the ground with a velocity of 25 m/s. Calculate when and where the two stones will meet.

(a) Oxygen has three isotopes of atomic masses 16, 17, and 18 respectively.

Explain the following:

- (i) They have the same chemical properties.
- (ii) They are all electrically neutral.
- (b) Name the isotopes of hydrogen.

(c) Give one point of similarity and one point of difference between isotopes  $^{14}_6\text{C}$  and  $^{12}_6\text{C}$ .

**OR**

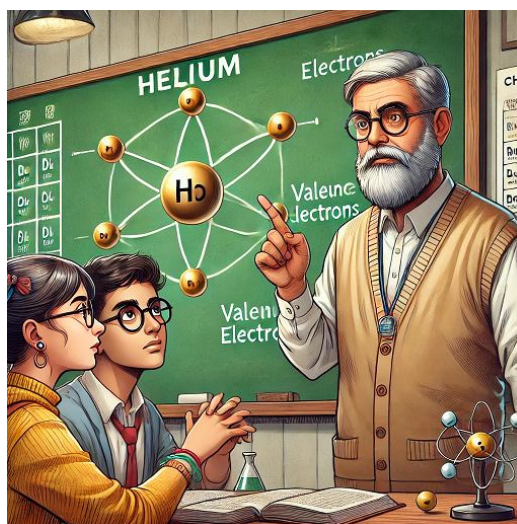
What is the gold foil experiment? Name the scientist who performed this experiment. Write the conclusions and shortcomings of Rutherford's model of atom.

### **SECTION – E (Case Study Based Questions)**

**Questions 19 to 20 carry 4 marks each.**

19. Read the following information and answer the questions based on information and related studied concepts.

Salima and Sheenu have a few doubts about the number of atoms in Helium. Salima says Helium atom has 2 electrons in its valence shell but its valency is not 2. According to Sheenu, Helium has 2 electrons and also its valency is 2. You are required to work as an arbitrator to solve the doubts of Salima and Sheenu. Similarly, they both have doubts regarding the valency and valence electrons of elements and are not able to recognise the difference between valence electrons and valency. Let's try to clear their doubts.



- (a) What is the valency of He?
- (b) How many valence electrons does each noble gas have?
- (c) Why is the valency of inert gases zero?

**20. Read the given passage and answer the questions that follow based on the passage and related studied concepts.**

A large amount of research and many studies have been conducted to ensure success in new treatment plants using chlorine as a disinfectant. A leading advantage of chlorination is that it has proven effective against bacteria and viruses; however, it cannot inactivate all microbes. Some protozoan cysts are resistant to the effects of chlorine. Chlorine inactivates a microorganism by damaging its cell membrane. Once the cell membrane is weakened, chlorine can enter the cell and disrupt cellular respiration and DNA activity (two processes that are necessary for cell survival).



- (a) What is the symbol for chlorine?
- (b) What is the atomic number and atomic mass of chlorine?
- (c) Find the number of protons, electrons and neutrons.

.....