CLASS IX

Question Bank

CH 4: Structure of Atom

Multiple choice questions:

Q1. Rutherford's experiment of scattering of particles showed for the first time that an atom has:
(a) Neutrons (b) Protons (c) Electrons (d) Nucleus

Q2. Name the part of the atom, where most of its mass is concentrated.
(a) Valence shell (b) Inside the nucleus (c) Outside the nucleus (d) Nowhere

Q3. Which subatomic particle is present inside the nucleus?
(a) Electrons (b) protons (c) Neutrons (d) Both b and c

Q4. Atom is electrically _____.
(a) Positively charged (b) Negatively charged (c) Neutral (d) Both b and a

Q5.Electrons was discovered by?
(a)Chadwick (b) Dalton (c) Thomson (d) Rutherford

Q6. Which subatomic particle has no charge?
(a) Electrons (b) protons (c) Neutrons (d) All of these

Q7. Protons were discovered in the form of?
(a) Cathode rays (b) X-Rays (c) Radioactive Rays (d) Canal rays

Q8. Thomson compared the structure of atom with that of a:
(a) Mango (b) Grapes (c) Watermelon (d) Orange

Q9. Which subatomic particle revolves outside the nucleus?
(a) Electrons (b) protons (c) Neutrons (d) None of these

Q10. Neutrons were discovered by?
(b) Chadwick (b) Dalton (c) Bohr (d) Thomson

Q11. 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

Q12. 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

Q13. Which of the following classes of elements differ in their chemical properties?
(a) Allotropes (b) Isotopes (c) Isobars (d) Allotropes

Q14. Which of the following has equal number of protons and neutrons?
(a) Sulphur (b) Magnesium (c) Oxygen (d) All of these

Q15. An isotope of iodine $^{53}I_{128}$ is used in the treatment of _____.
(a) Jaundice (b) Malaria (c) Goitre (d) All of these

Q16. All isotopes of an element have _____ valency.
(a) Same (b) Different (c) Increasing (d) Decreasing

Q17. An atom has 6 protons in its nucleus. What is the atomic number of the element?
(a) 2 (b) 4 (c) 6 (d) 8

Q18. An element has mass number 37 and atomic number 17. How many neutrons are present in its nucleus?
(a) 10 (b) 20 (c) 40 (d) 60

Q19. $^{20}Ca_{40}$ and $^{18}Ar_{40}$ are the atoms of Calcium and Argon. How are they related to one another?
(a) Allotropes (b) Isotopes (c) Isobars (d) None of these

Q20. What is the maximum number of electrons in the K-shell of an element?
(a) 2 (b) 4 (c) 6 (d) 8

Very short answer type questions:

Q1. Name the fundamental particle not present in the nucleus of hydrogen atom.
Q2. Why does the nucleus not disintegrate inspite of repulsion among the protons??
Q3. Mention one postulate about Rutherford's atomic model which makes the atom highly unstable?
Q4. What is the difference between magnesium atom and magnesium ion in terms of number of electrons?
Q5. Among H^+ and H^-, which one has a single electron in its outermost shell?
Q6. What is the difference between mercury atom $_{80}Hg^{200}$ and mercurous ion in terms of the fundamental particles?
Q7. Why is an atom electrically neutral?
Q8. State two main postulates of Thomson's model of an atom.
Q9. State two differences between a cation and an atom, by taking sodium ion (Na^+) and sodium atom (Na) as an example?
Q10. Nucleus of an atom is heavy and positively charged. Justify your answer.
Q11. 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.
Q12. Define relative atomic mass. Name one tetra atomic and one octa-atomic element.
Q13. What are the constituents of atom?
Q14. Who amended Rutherford's shortcomings?
Q15. What are Canal Rays?
Q16. What are discrete orbitals of atoms?
Q17. 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.
Q18. What is the similarity in the electronic configuration of the following set of elements?
$_9F$, $_{17}Cl$ and $_{35}Br$
Q19. What is the maximum number of electrons present in the N-shell?
Q20. An element X is represented as $_3X^7$. How many protons and neutrons are present in the element?
Q21. ^{235}Z and ^{238}Z are two isotopes. How do the two isotopes differ (w.r.t. name and number of subatomic particles)?
Q22. What is the atomic number of a species which contains 20 protons, 20 neutrons and 18 electrons?
Q23. Represent the structure of $_{11}Na^{23}$ geometrically.
Q24. A uni-negative ion contains 18 electrons. What will be its atomic number?
Q25. Which isotope of hydrogen contains one neutron?
Q26. What will be the charge on an ion formed by an atom which has seven valence electrons?
Q27. Write the mass number of the isotope of the element $_Z X^A$ which has two excess neutrons.
Q28. Why is the atom of an element P (at. no. 16) more reactive than an atom of an element Q (at.no. 18)?
Q29. 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?
Q30. Explain the following terms: (i) Isotopes (ii) Isobars?

Short answer type questions:

Q1. List three main features of Rutherford's nuclear model of an atom.
Q2. Define :
(i) Atomicity (ii) Valency (iii) Molecule.
Q3. What are the important properties of the neutron? Compare these properties with those of the electron and proton.

Q4. In the gold foil experiment of Geiger and Marsden, that paved the way for Rutherford's model of an atom, 1.00% of the a-particles were found to deflect at angles > 50°. If one mole of α-particles were bombarded on the gold foil, compute the number of a-particles that would deflect at angles less than 50°.?

Q5. Why an alpha particle is called a Helium nuclei?

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

Q6. On the basis of Thomson's model of an atom, explain how the atom is neutral as a whole.

Q7. Compare the properties of electrons and protons.

Q8. Give reasons: Ions are more stable than atoms.

Q9. Explain the limitations of Thomson's Model.

Q10. Explain the limitations of Rutherford's Model.

Q11. Select a pair of isotopes from the following list:

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

Give reasons for your choice.

Q12. Give reasons:

(i) Isotopes have different mass numbers.

(ii) Isotopes are electrically neutral

Q13. Define valency of an element. Find the valency of chlorine and magnesium (At. No. of Cl = 17, Mg =12).

Q14. 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.

Q15. An element X has a mass number 27 and it contains 13 protons;

(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

Q16. What is the ratio of neutrons/protons in $_{82}Pb^{208}$ and $_{83}Pb^{209}$?

Q17 An atom has mass number 40 and atomic number20.

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

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

Q18. $_{8}O^{16}$, $_{8}O^{17}$ and $_{8}O^{18}$ represent different atoms of oxygen.

(i) What do superscripts and subscripts represent?

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

Q19. The electronic configuration of an element 'X' is 2, 8, 2:

(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.?

Q20. 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.

Long answer type questions:

Q1. (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.

Q2. (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..

Q3. (a) Describe briefly Thomson's model of an atom.

(b) Who discovered Proton?

(c) What are Canal Rays?

(d) What is the mass of proton as compared to electron?

Q4. (a) Describe the main features of Bohr's model of an atom. Draw a neat and labelled diagramof energy levels.

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

(i) ^{2658}A, ^{2858}B (ii) ^{3579}X, ^{3580}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?

Q5. (a) Why the chemical properties of isotopes are same?

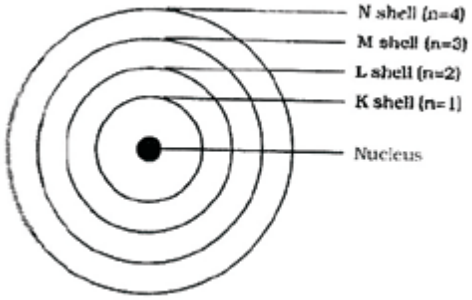
(b) Draw Bohr model for helium atom.

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

Q6 (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 $_{26}Fe^{54}$, $_{26}Fe^{56}$ and $_{26}Fe^{57}$ in the ratio of 5%, 90% and 5% respectively. What will be the average atomic mass of iron (Fe)?

Q7.



(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?