FIRST TERM MODEL QUESTION PAPER 2024 WITH ANSWER KEY SET 3

CHEMISTRY - Standard IX

Time: 1.5 hours

Max. Marks: 40

(Prepared by www.educationobserver.com)

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1. 15 minutes is given as cool-off time.
2. This time is to be used for reading the question paper.
3. You are not supposed to write anything during the cool-off time.
4. Attempt the questions according to the instructions.

Section A: Multiple Choice Questions (MCQs) [1 mark each]

1. Which of the following particles is negatively charged?
   a) Proton
   b) Neutron
   c) Electron
   d) Positron
2. The smallest unit of a chemical element that retains the properties of that element is:
   a) Atom
   b) Molecule
   c) Compound
   d) Ion
3. Which scientist discovered protons?
   a) J.J. Thomson
   b) Robert Millikan
   c) Eugen Goldstein
   d) James Chadwick
4. What is the maximum number of electrons that can be accommodated in the M shell?
   a) 2
   b) 8
   c) 18
   d) 32
5. Which of the following elements belongs to Group 17 in the periodic table?
   a) Argon
   b) Bromine
   c) Sodium
   d) Calcium

Section B: Short Answer Questions (Answer any 4 out of 5) [2 marks each]

1. Define isotopes. Give an example.
2. Differentiate between a cation and an anion with examples.
3. State the main postulates of Bohr's atomic model.
4. What is the significance of valence electrons?
5. Write the electron configuration of phosphorus (Atomic number: 15).

Section C: Descriptive Questions (Answer any 4 out of 5) [3 marks each]

1. Compare the structure and properties of protons, neutrons, and electrons.
2. Describe Rutherford's gold foil experiment and its conclusions.
3. Explain the difference between Mendeleev's periodic table and the modern periodic table.
4. What are isobars? Provide an example and explain their significance.
5. Discuss the role of valency in predicting the chemical reactivity of elements.

Section D:

1. A certain element has the electron configuration 2, 8, 1. Predict its position in the periodic table and describe its properties.
2. Draw a labeled diagram to show the arrangement of subatomic particles in a carbon atom (Atomic number: 6).
3. An atom has an atomic number of 20 and a mass number of 40. Calculate the number of protons, neutrons, and electrons in the atom and explain its stability.
4. Explain the concept of atomic size and how it changes across a period and down a group in the periodic table.
5. Describe the process and observations of J.J. Thomson's cathode ray tube experiment and how it led to the discovery of electrons.

Answer Key

Section A: MCQs

1. c) Electron
2. a) Atom
3. c) Eugen Goldstein

4. c) 18
5. b) Bromine

Section B: Short Answer Questions

1. Isotopes are atoms of the same element with the same atomic number but different mass numbers. Example: Carbon-12 and Carbon-14.
2. A cation is a positively charged ion (e.g., Na^+), while an anion is a negatively charged ion (e.g., Cl^-).
3. Bohr's model states that electrons revolve around the nucleus in fixed orbits with specific energy levels and do not lose energy while in those orbits.
4. Valence electrons are the outermost electrons that determine the chemical bonding and reactivity of an element.
5. Electron configuration of phosphorus: 2, 8, 5.

Section C:

1. Protons are positively charged and found in the nucleus, neutrons have no charge and add mass to the nucleus, while electrons are negatively charged and orbit the nucleus.
2. In Rutherford's experiment, most alpha particles passed through the gold foil, some deflected, and very few bounced back, leading to the conclusion that atoms have a small, dense, positively charged nucleus.
3. Mendeleev's table was based on atomic mass, while the modern table is based on atomic number, which better organizes elements and resolves inconsistencies.
4. Isobars are atoms with the same mass number but different atomic numbers, such as Carbon-14 and Nitrogen-14. They are significant in understanding nuclear stability.
5. Valency determines an element's ability to bond. For example, elements with a valency of 1 (like sodium) are highly reactive as they easily lose or gain electrons.

Section D:

1. The element with electron configuration 2, 8, 1 is sodium. It belongs to Group 1, Period 3, and is highly reactive as it easily loses one valence electron.
2. (Include a labeled diagram showing 6 protons and 6 neutrons in the nucleus, with 2 electrons in the K shell and 4 electrons in the L shell.)
3. The atom has 20 protons, 20 neutrons, and 20 electrons. It is stable as it has a full outer shell (calcium).
4. Atomic size decreases across a period due to increasing nuclear charge and increases down a group due to added electron shells.

5. J.J. Thomson's experiment showed that cathode rays were negatively charged particles (electrons) common to all atoms, leading to the understanding that atoms contain subatomic particles.