

SAMAGRA SHIKSHA KERALA — FIRST TERM ASSESSMENT 2026-2027

CHEMISTRY — CLASS IX (SET-A / E 906-Ch)

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PART I — Questions 1 to 4

Score: $1 \times 4 = 4$

Question 1

1 Score

Correct Option: **B) Atomic number**

Textbook Reference: Dmitri Mendeleev stated the periodic law based on *Atomic Mass*, whereas Henry Moseley modified it based on *Atomic Number* through his X-ray diffraction experiments.

Question 2

1 Score

Correct Option: **a) A is correct but R is not correct.**

Explanation: Assertion (A) is true because an atom is electrically neutral. Reason (R) is false because neutrality occurs precisely because the total number of positive charges (protons) equals the number of negative charges (electrons).

Question 3

1 Score

Correct Option: **c) Statements (i) and (iii).**

Explanation: Statement (ii) is incorrect because the energy of orbits *increases* as the distance from the nucleus increases. Statements (i) and (iii) are fundamental postulates of Niels Bohr's atomic model.

Question 4

1 Score

Correct Option: **c) X – s, Y – p, Z – q**

Matching Details: (X) Metalloid → Silicon (s) | (Y) Transition element → Vanadium (p) | (Z) Actinoid → Uranium (q).

PART II — Questions 5 to 11

Score: $2 \times 7 = 14$

Question 5

2 Scores

- a) Name of the centre: Nucleus (1 Score)
- b) Charge of this centre: Positive charge (+ve) (1 Score)

Question 6

2 Scores

- a) Peculiarity of mass numbers: They all have the same mass number (Mass number = 40). (1 Score)
Mass numbers: Atom A = $18p + 22n = 40$; Atom B = $19p + 21n = 40$; Atom C = $20p + 20n = 40$.
- b) General Name: Isobars (1 Score)

Question 7

2 Scores

- a) Atomic number of R: 8 (Electronic configuration: 2, 6 / Element is Oxygen) (1 Score)
- b) Configuration of noble gas in the 2nd period: 2, 8 (Neon) (1 Score)

Question 8**2 Scores**

- **i) Observation 1 Conclusion:** Most of the space inside an atom is empty (vacant). (1 Score)
- **ii) Observation 2 Conclusion:** The entire positive charge and almost all mass of the atom are concentrated in a tiny central region (nucleus). (1 Score)

Question 9 (A)**2 Scores****Merits of the Modern Periodic Table (Any two — 1 score each):**

- Elements are classified based on their fundamental property: *Atomic Number*.
- Position of elements is directly correlated with their electronic configuration.
- Anomalies in Mendeleev's table regarding isotope positions and mass order irregularities are completely resolved.

OR**Question 9 (B)****2 Scores****Drawbacks of Mendeleev's Periodic Table (Any two — 1 score each):**

- Could not assign a fixed, correct position to Hydrogen.
- Higher atomic mass elements were placed before lower atomic mass elements (e.g., Cobalt 58.9 before Nickel 58.7).
- Isotopes could not be accommodated according to their atomic masses.

Question 10**2 Scores**

- **a) Negative charge proof:** Cathode rays deflect towards the **positive plate** when subjected to an external electric field. (1 Score)
- **b) Mass proof:** They are able to **rotate a light paddle wheel** placed in their path (possess kinetic energy and mass). (1 Score)

Question 11 (A)**2 Scores**

- **Element with largest size: R** (Configuration: 2, 1) (1 Score)
- **Reason:** Across a period from left to right, nuclear charge increases while the number of shells remains constant (2 shells). The higher nuclear charge pulls shells inward, shrinking the size. Since R has the lowest nuclear charge (+3), it has the **largest atomic radius/size**. (1 Score)

OR**Question 11 (B)****2 Scores**

- **a) Decreasing order of atomic size: $X > Y > Z$** (1 Score)
| Elements belong to Period 3: $X(\text{Na}, Z=11) > Y(\text{Si}, Z=14) > Z(\text{Cl}, Z=17)$. Size decreases left-to-right.
- **b) Group trend & Reason:** Atomic size **increases** down a group.
Reason: New electron shells are consecutively added as we move downwards, increasing distance between nucleus and outermost shell. (1 Score)

Question 12 (A)

3 Scores

- **a) Pair of isotopes:** $^{16}_8\text{O}$ and $^{17}_8\text{O}$ (1 Score)
- **b) Reason:** They are atoms of the same element having the *same atomic number (8 protons)* but *different mass numbers (16 and 17)* due to different neutron counts. (1 Score)
- **c) Isotope for pipeline leaks:** Sodium-24 (^{24}Na) (1 Score)

OR

Question 12 (B)

3 Scores

- **a) Differing particles:** Neutrons (1 Score)
- **b) Mass number of tritium:** 3 (Contains 1 proton + 2 neutrons) (1 Score)
- **c) Isotope in heavy water:** Deuterium (^2H or D) [Formula: D_2O] (1 Score)

Question 13

3 Scores

- **a) Group of element E:** Group 14 (1 Score)

Given A has $Z=5$ (Group 13, Boron). Moving across: E is next in Group 14 (Carbon group), G has $Z=15$ (Group 15, Phosphorus).

- **b) Configuration of Group 1 element in G's period:** 2, 8, 1 (Sodium — Period 3, Group 1) (1 Score)
- **c) Atomic number of halogen in C's period:** 9 (Fluorine — Period 2 halogen) (1 Score)

Question 14 (A)

3 Scores

- **a) Nuclear charge:** +18 (or 18) (1 Score)
- **b) Orbit Electron Configuration Illustration:** (2 Scores)

Diagram Data:

- Nucleus: **18 Protons (18p), 22 Neutrons (22n)**
 - 1st Shell (K): **2 electrons**
 - 2nd Shell (L): **8 electrons**
 - 3rd Shell (M): **8 electrons**
- (Shell distribution: 2, 8, 8 — Argon atom)

OR

Question 14 (B)

3 Scores

- **a) Orbit Electron Configuration Illustration:** (2 Scores)

Diagram Data:

- Nucleus: **15 Protons (15p), 16 Neutrons (16n)**
 - 1st Shell (K): **2 electrons**
 - 2nd Shell (L): **8 electrons**
 - 3rd Shell (M): **5 electrons**
- (Shell distribution: 2, 8, 5 — Phosphorus atom)

- **b) Shell with lowest energy:** K shell (Innermost shell closest to the nucleus) (1 Score)

Question 15**3 Scores**

Calculations (Atomic number Z = Mass Number A – Neutrons n):

- K: $Z = 39 - 20 = 19$ (2, 8, 8, 1 → Period 4)
- L: $Z = 16 - 8 = 8$ (2, 6 → Period 2)
- M: $Z = 35 - 18 = 17$ (2, 8, 7 → Period 3)
- N: $Z = 20 - 10 = 10$ (2, 8 → Period 2)

- **a) Elements belonging to the same period: L and N** (Both have 2 shells / Period 2) (1 Score)
- **b) Atomic number of element K: 19** (1 Score)
- **c) Noble gas among these: N** (Neon, $Z=10$, has a stable octet 2, 8) (1 Score)

Question 16**3 Scores**

- **a) Highest stability: Y** (1 Score)

Reason: Its outermost shell contains 8 electrons, which represents a highly stable *octet electronic configuration* (noble gas Neon). (1 Score)

- **b) Electrons needed for Z to achieve stability: 2 electrons** (Configuration changes from 2, 6 to 2, 8) (1 Score)

Question 17**3 Scores**

Electron configuration: $K=2, L=8, M=3 \rightarrow$ Total electrons = 13 (Aluminium, Period 3, Group 13)

- **a) Electrons in shell with highest energy (M shell): 3** (1 Score)
- **b) Name and Symbol:** Name: Aluminium | Symbol: Al (1 Score)
- **c) Total number of elements in its period (Period 3): 8 elements** (Na to Ar) (1 Score)

PART IV — Question 18**Score: $4 \times 1 = 4$** **Question 18 (A)****4 Scores**

- **a) The filling of last electron takes place in:** penultimate shell (1 Score)
- **b) Family of elements:** Transition elements (d-block elements) (1 Score)
- **c) Characteristics of this family (Any two — 1 score each):**
 - They are all metallic elements.
 - They exhibit variable oxidation states (variable valencies).
 - They form coloured compounds and coloured ions.
 - Many transition metals and their compounds function as efficient catalysts.

OR**Question 18 (B)****4 Scores**

- **a) Groups included in main group elements:** Groups 1, 2 and 13 to 18 (s-block and p-block elements) (1 Score)
- **b) Group of alkaline earth metals:** Group 2 (1 Score)
- **c) Characteristics of main group elements (Any two — 1 score each):**
 - The differentiating (last) electron enters the outermost shell.
 - They show regular gradation in physical and chemical properties along groups and periods.
 - Includes metals (Groups 1, 2), non-metals, and metalloids.
 - Valence electron count directly determines group number (Groups 1 & 2) or corresponds to Group Number – 10 (Groups 13 to 18).