

Classification of Elements and Periodicity in Properties — CBSE Pattern Test 2

Class 11 Chemistry · 90 minutes · 40 marks · Sections A–D with answer key · Narayan Gurukul Academy

Test 2 — CBSE Pattern (90 minutes, 40 marks)

Class 11 Chemistry · Classification of Elements and Periodicity in Properties · Narayan Gurukul Academy (ClassApna)

General Instructions: (1) This paper has four sections — Section A (1×10), Section B (2×4), Section C (3×4) and Section D (5×2) — total 40 marks. Time allowed: 90 minutes.

(2) All questions are compulsory. No overall choice is given; internal choice, where allowed, is clearly marked.

(3) For MCQ questions choose the single correct option; for VSA answers write a single line.

(4) Take $g = 10 \text{ m/s}^2$. All symbols carry their usual meaning. Use of a calculator is not permitted.

Section A — MCQ & VSA ($10 \times 1 = 10$ marks)

- The main defect of Mendeleev's periodic table was
 - the ambiguous position of hydrogen and isotopes
 - the arrangement of noble gases
 - the number of groups
 - the use of valency
- The general outer electronic configuration of the p-block elements is
 - $ns^2 np^{1-6}$
 - ns^{1-2}
 - $(n-1)d^{1-10} ns^{1-2}$
 - $(n-2)f^{1-14}$
- Atomic radius increases down a group because of
 - the addition of new shells
 - an increase in nuclear charge
 - a decrease in shielding
 - a decrease in mass
- The radius of a cation is
 - smaller than its atom
 - larger than its atom
 - equal to its atom
 - independent of charge
- Ionisation enthalpy decreases down a group because of
 - an increase in atomic size
 - an increase in nuclear charge
 - a decrease in shielding
 - greater effective nuclear charge
- Electron gain enthalpy is the enthalpy change when
 - an electron is added to a gaseous atom
 - an electron is removed
 - a proton is added
 - a molecule is formed
- Across a period, electronegativity generally

- (A) increases
 - (B) decreases
 - (C) remains constant
 - (D) becomes zero
8. The metallic character of elements generally
- (A) decreases across a period and increases down a group
 - (B) increases across a period
 - (C) is constant
 - (D) decreases down a group
9. What are representative elements?
10. Define electronegativity.

Section B — Short Answer I ($4 \times 2 = 8$ marks)

11. Write the general outer electronic configuration of the d-block elements.
12. Explain the diagonal relationship with one example.
13. Why is the electron gain enthalpy of chlorine more negative than that of fluorine?
14. Explain why the ionisation enthalpy of nitrogen is greater than that of oxygen.

Section C — Short Answer II ($4 \times 3 = 12$ marks)

15. State the modern periodic law and describe the structure of the modern periodic table.
16. Explain the variation of atomic radius across a period and down a group with reasons.
17. Define electron gain enthalpy and electronegativity and describe their periodic trends.
18. Explain the periodic trends in metallic character, non-metallic character and valency.

Section D — Long Answers ($2 \times 5 = 10$ marks)

19. Explain the periodic trends in atomic radius, ionisation enthalpy, electron gain enthalpy and electronegativity, giving reasons for each trend and one exception for each.
20. Compare the sizes of cations, anions and parent atoms. Arrange Na, Mg^{2+} , F^- and O^{2-} in order of size, giving reasons for the order.

Answer Key (Marking Scheme)

- Q1 — (A) the ambiguous position of hydrogen and isotopes. Q2 — (A) $ns^2 np^{1-6}$. Q3 — (A) the addition of new shells. Q4 — (A) smaller than its atom.
- Q5 — (A) an increase in atomic size. Q6 — (A) an electron is added to a gaseous atom. Q7 — (A) increases. Q8 — (A) decreases across a period and increases down a group.
- Q9 — Elements of the s- and p-blocks (Groups 1, 2, 13–18).
- Q10 — The tendency of an atom to attract a shared pair of electrons.
- Q11 — $(n-1)d^{1-10} ns^{1-2}$.
- Q12 — Li and Mg show similar properties due to similar size and electronegativity.
- Q13 — Chlorine is larger than fluorine, so the added electron experiences less repulsion.
- Q14 — Nitrogen has a stable half-filled $2p^3$ configuration.

Q15 — Modern periodic law and 18-group, 7-period structure as in notes.

Q16 — Decreases across a period and increases down a group.

Q17 — Definitions and trends as in notes.

Q18 — Metallic character decreases across, increases down; non-metallic opposite; valency rises then falls.

Q19 — Trends with reasons and exceptions as in notes.

Q20 — $\text{Mg}^{2+} < \text{Na}^+ < \text{F}^- < \text{O}^{2-}$ (isoelectronic; smaller nuclear charge $\rightarrow$ larger radius).