CBSE CLASS X

Science (086)

ANSWER KEY

From previous CBSE Board Exam questions

Code: F3UU6C **Questions: 7** **Maximum Marks: 18** **Generated: 2026-06-15 13:05**

SELECTIONS USED

Source	Previous-year board
Subject	Science
Lessons	Periodic Classification of Elements [2022 syllabus - removed in 2023 CBSE rationalisation; retained for pre-2023 board questions]
Year	2022-2026
Questions selected	7

Composition — Types: 7 Short

Q1. **[3]**

⚠ Periodic Classification of Elements [2022 syllabus - removed in 2023 CBSE rationalisation; retained for pre-2023 board questions] — Formative only — not assessed in the Board exam (per CBSE 2026-27 curriculum) Included in the syllabus but assessed only formatively; not in the year-end Board exam. [source: Course Structure, Unit I + Note for Teachers pt.1]

Name the elements whose compounds formed the basis of classification in Mendeleev's periodic table. Why did Mendeleev choose these elements ? How the formulae of these compounds had helped Mendeleev in deciding the position of an element in his periodic table ?

Previously asked in: 2022 31/4/1 Q8

◆ **Periodic Classification of Elements [2022 syllabus - removed in 2023 CBSE rationalisation; retained for pre-2023 board questions]**

Mendeleev's Periodic Table – basis of classification using hydrides and oxides

Generated by claude-sonnet-4-6 · 2026-06-15 06:52 · grounding rag

Model Answer

Mendeleev chose **hydrogen (H) and oxygen (O)** as the basis for classification because these two elements form compounds (hydrides and oxides) with most other elements.

He selected them because they are the most widely combining elements — hydrogen is the lightest and oxygen is the most abundant reactive element.

The formulae of hydrides and oxides helped Mendeleev decide the **group** of an element. For example, if an element X formed an oxide XO and a hydride XH_4, it was placed in the group whose general formula matched. The valency of the element, shown by these formulae, determined its position in the periodic table.

Source: Chapter 5 (Periodic Classification of Elements), Mendeleev's Periodic Table section

---

Explanation

- **1 mark** each for: naming the two elements (H and O), reason for choosing them, and how formulae determined position — three clear points needed.
- Examiners look for: naming both elements correctly, stating that oxides and hydrides were used, and linking the formula (valency) to group placement.
- Avoid vague statements — be specific that it was the **formulae of oxides and hydrides** that revealed valency and thus group number.
- Note: The source passages provided are from Chemistry Chapter 4 (Carbon), which does **not** cover Mendeleev. This answer is based on the correct CBSE Chapter 5 content. Always match your answer to the right chapter.

Q2. **[2]**

⚠ Periodic Classification of Elements [2022 syllabus - removed in 2023 CBSE rationalisation; retained for pre-2023 board questions] — Formative only — not assessed in the Board exam (per CBSE 2026-27 curriculum) Included in the syllabus but assessed only formatively; not in the year-end Board exam. [source: Course Structure, Unit I + Note for Teachers pt.1]

Explain giving reason why although the nuclear charge in atoms increases in moving from left to right in a period as well as in moving from top to bottom in a group in the Modern periodic table, but the size of the atoms does not vary similarly in both situations.

Previously asked in: 2022 31/4/1 Q1

◆ **Periodic Classification of Elements [2022 syllabus - removed in 2023 CBSE rationalisation; retained for pre-2023 board questions]**

Effect of Nuclear Charge and Number of Shells on Atomic Size | Trends in Atomic Size (Atomic Radius) across a Period and down a Group

Generated by claude-sonnet-4-6 · 2026-06-15 06:52 · grounding rag

Model Answer

In a period (left to right): Nuclear charge increases but electrons are added to the **same shell**. The increased nuclear pull acts on electrons in the same energy level, pulling them closer. So atomic size **decreases** across a period.

In a group (top to bottom): Nuclear charge increases, but a **new shell** is added with each element. The outermost electrons are farther from the nucleus and are also **shielded** by inner shells. So atomic size **increases** down a group.

Thus, the opposing effect of addition of new shells in a group overrides the increased nuclear charge, causing different trends in the two cases.

Explanation

The examiner expects two separate, reasoned explanations — one for period and one for group. The key contrast is: **same shell vs. new shell added**. Mentioning "shielding effect" for the group trend is a bonus but expected at this level. Do not just state the trend — always link it to the reason (nuclear charge vs. shell addition/shielding).

Q3. [3]

⚠ Periodic Classification of Elements [2022 syllabus - removed in 2023 CBSE rationalisation; retained for pre-2023 board questions] — Formative only — not assessed in the Board exam (per CBSE 2026-27 curriculum) Included in the syllabus but assessed only formatively; not in the year-end Board exam. [source: Course Structure, Unit I + Note for Teachers pt.1]

Answer the following: (1+1+½+½ = 3)

(a) State Newland Law of Octaves.

(b) With an example, explain Dobereiner's Triads.

(c) List one limitation each of both the attempts mentioned in 'a' & 'b'.

Previously asked in: 2022 31/2/1 Q8

◆ Periodic Classification of Elements [2022 syllabus - removed in 2023 CBSE rationalisation; retained for pre-2023 board questions]

Dobereiner's Triads | Limitations of Early Periodic Classifications (Newlands and Dobereiner) | Newlands' Law of Octaves

Generated by claude-sonnet-4-6 · 2026-06-15 06:52 · grounding rag

Model Answer

(a) Newland's Law of Octaves:
When elements are arranged in increasing order of their atomic masses, every eighth element has properties similar to the first element, just like the eighth note of a musical octave.

(b) Dobereiner's Triads:
Dobereiner grouped elements with similar properties into sets of three (triads), where the atomic mass of the middle element was approximately the arithmetic mean of the other two.
Example: In the triad Li (7), Na (23), K (39) — atomic mass of Na = (7+39)/2 = 23. ✓

(c) Limitations:

- **Newland's Law of Octaves:** It was applicable only up to calcium; elements discovered later did not fit the pattern.
- **Dobereiner's Triads:** Only a few elements could be grouped into triads; the law could not cover all known elements.

Explanation

- The question is from Chapter 5 (Periodic Classification of Elements), *not* the provided passages — answer is based on standard NCERT Class 10 Science content.
- For (b), always give a specific triad with atomic masses and show the mean calculation — examiners expect the numerical verification.
- For (c), one limitation each is enough (½ mark each); keep them distinct — one for Octaves, one for Triads.
- Do not mix up the two scientists' contributions.

Q4. [3]

⚠ Periodic Classification of Elements [2022 syllabus - removed in 2023 CBSE rationalisation; retained for pre-2023 board questions] — Formative only — not assessed in the Board exam (per CBSE 2026-27 curriculum) Included in the syllabus but assessed only formatively; not in the year-end Board exam. [source: Course Structure, Unit I + Note for Teachers pt.1]

In the following table, some elements have been arranged in a certain pattern. Identify the periodic law with which the given table is associated. List two important features and two anomalies of the above periodic law.

Previously asked in: 2022 31/3/1 Q10

◆ Periodic Classification of Elements [2022 syllabus - removed in 2023 CBSE rationalisation; retained for pre-2023 board questions]

Early attempts at classification of elements (Döbereiner, Newlands, Mendeleev) | Mendeleev's Periodic Law – features and anomalies | Newlands' Law of Octaves – features and anomalies

Generated by claude-sonnet-4-6 · 2026-06-15 06:52 · grounding rag

Model Answer

The table is associated with **Newlands' Law of Octaves**.

Two Important Features:

1. When elements are arranged in increasing order of atomic masses, every eighth element has properties similar to the first, like the eighth note of a musical scale (octave).
2. It was the first attempt to classify elements systematically, covering elements from hydrogen (H) to thorium (Th).

Two Anomalies:

1. It worked only up to calcium; after calcium, every eighth element did not possess properties similar to the first element.
2. Newlands adjusted two elements in one slot (e.g., Co and Ni, Ce and La) to fit the pattern, which was not justified.

Explanation

The musical note pattern in the table is the direct clue — Newlands compared element repetition to musical octaves. Examiners expect you to name the law clearly, then give exactly two features and two anomalies (each as a distinct point). Common mistakes: confusing this with Mendeleev's law, or giving only one anomaly. Stick to the points above for full marks.

Q5. **[2]**

⚠ Periodic Classification of Elements [2022 syllabus - removed in 2023 CBSE rationalisation; retained for pre-2023 board questions] — Formative only — not assessed in the Board exam (per CBSE 2026-27 curriculum) Included in the syllabus but assessed only formatively; not in the year-end Board exam. [source: Course Structure, Unit I + Note for Teachers pt.1]

State the criteria used by Mendeleev for creating his Periodic Table. Compare the position of isotopes in Mendeleev's Periodic Table and in the Modern Periodic Table.

Previously asked in: 2022 31/3/1 Q3

◆ **Periodic Classification of Elements [2022 syllabus - removed in 2023 CBSE rationalisation; retained for pre-2023 board questions]**

Mendeleev's Periodic Table – criteria and basis of classification | Position of isotopes in Mendeleev's Periodic Table vs. Modern Periodic Table

Generated by claude-sonnet-4-6 · 2026-06-15 06:52 · grounding rag

Model Answer

Criteria used by Mendeleev: Mendeleev arranged elements in increasing order of their **atomic masses** and grouped elements with similar chemical properties in the same vertical column (group).

Isotopes — comparison:

- In **Mendeleev's Periodic Table**, isotopes of an element would have to be placed in *different positions* (as they have different atomic masses), which was a drawback.
- In the **Modern Periodic Table**, isotopes are placed in the *same position* (same group and period) since elements are arranged by **atomic number**, which is the same for all isotopes of an element.

Explanation

- The question has two parts — state the criterion AND compare isotope positions. Allocate roughly one line to Mendeleev's criterion and two lines to the comparison.
- Key terms examiners look for: *atomic mass* (Mendeleev), *similar properties*, *atomic number* (Modern), and the resolution of the isotope problem.
- A common mistake is forgetting to explicitly state that isotopes have the **same atomic number but different atomic masses** — this is the logical basis for the comparison.

Q6. **[3]**

⚠ Periodic Classification of Elements [2022 syllabus - removed in 2023 CBSE rationalisation; retained for pre-2023 board questions] — Formative only — not assessed in the Board exam (per CBSE 2026-27 curriculum) Included in the syllabus but assessed only formatively; not in the year-end Board exam. [source: Course Structure, Unit I + Note for Teachers pt.1]

Answer the following:

(a) List two advantages of adopting the atomic number of an element as the basis of classification of elements in the Modern Periodic Table.

(b) Write the electronic configurations of the elements X (atomic number 13) and Y (atomic number 20).

Previously asked in: 2022 31/1/1 Q8

◆ Periodic Classification of Elements [2022 syllabus - removed in 2023 CBSE rationalisation; retained for pre-2023 board questions]

Advantages of using atomic number as basis of Modern Periodic Table

Electronic configuration of elements and its relation to periodic classification

Generated by claude-sonnet-4-6 · 2026-06-15 06:52 · grounding rag

Model Answer

(a) Two advantages of using atomic number as the basis of classification:

1. Atomic number is a unique, fixed property of each element, leaving no ambiguity in an element's position in the table.
2. It removes anomalies of Mendeleev's table (e.g., cobalt and nickel are placed correctly based on atomic number, not atomic mass).

(b) Electronic configurations:

- Element **X** (atomic number 13): 2, 8, 3
- Element **Y** (atomic number 20): 2, 8, 8, 2

Explanation

- For part (a), examiners expect any two valid advantages — uniqueness of atomic number and removal of Mendeleev's anomalies are the most standard ones. Avoid vague answers.
- For part (b), simply fill shells in order (2, 8, 8, 2 for 20 electrons). These are straightforward but students often make errors with Y — remember the 3rd shell can hold up to 18, but it stabilises at 8 before the 4th shell begins filling.

Q7. **[2]**

⚠ Periodic Classification of Elements [2022 syllabus - removed in 2023 CBSE rationalisation; retained for pre-2023 board questions] — Formative only — not assessed in the Board exam (per CBSE 2026-27 curriculum) Included in the syllabus but assessed only formatively; not in the year-end Board exam. [source: Course Structure, Unit I + Note for Teachers pt.1]

The electrons in the atoms of two elements X and Y are distributed in three shells having 1 and 7 electrons respectively in their outermost shells.

(a) Write the group numbers of these elements in the Modern Periodic Table.

(b) Write the molecular formula of the compound formed when X and Y combine with each other.

(c) Which of the two is electropositive ?

Previously asked in: 2022 31/1/1 Q2

◆ **Periodic Classification of Elements [2022 syllabus - removed in 2023 CBSE rationalisation; retained for pre-2023 board questions]**

Compound formation and molecular formula based on valency | Electropositive and electronegative character of elements | Valence electrons and group numbers in the Modern Periodic Table

Generated by claude-sonnet-4-6 · 2026-06-15 06:51 · grounding rag

Model Answer

(a) Element X has 1 electron in its outermost shell → **Group 1**. Element Y has 7 electrons in its outermost shell → **Group 17**.

(b) X donates 1 electron and Y accepts 1 electron. The molecular formula is **XY** (e.g., NaCl type). *(Formula: XY)*

(c) Element **X** is electropositive, as it tends to lose electrons and form a positive ion.

Source: Chapter 3, Section 3.3

Explanation

- Elements with 1 valence electron are in Group 1 (alkali metals); elements with 7 are in Group 17 (halogens).
- Since X needs to lose 1 electron and Y needs to gain 1, they combine in a 1:1 ratio → formula XY.
- Electropositive elements are those that lose electrons easily (metals/Group 1), so X is electropositive. Examiners expect you to justify briefly — "loses electrons" is the key phrase.

Available for free from:
https://cbsegrade10studyguide.com
https://github.com/orgs/cbse-free-resources/repositories