

# SCIENCE PRACTICE MOCK 01

Particle Nature of Matter | Lessons 11-14 |

|                      |                      |                                     |
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| <b>Name</b><br>_____ | <b>Date</b><br>_____ | <b>Suggested time</b><br>50 minutes |
|----------------------|----------------------|-------------------------------------|

**Purpose:** This is a writing-focused, source-aligned practice mock. It checks scientific understanding and the ability to explain ideas clearly in English. Review the Score-Saver once, then complete this mock without notes if possible.

## INSTRUCTIONS

- |                                                                                       |                                                                                                           |
|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| 1. Use complete English sentences unless a formula is requested.                      | 2. Show charge reasoning when writing ionic formulae.                                                     |
| 3. Use precise scientific words, not vague phrases.                                   | 4. When explaining cause and effect, use words such as <b>because</b> , <b>therefore</b> , or <b>so</b> . |
| 5. If you are unsure, write your best reasoning rather than leaving the answer blank. | 6. Re-read every response and check subject-verb agreement, plurals, and scientific terms.                |

## ASSESSMENT MAP

| Section | Focus                                         | Marks |
|---------|-----------------------------------------------|-------|
| A       | Core concepts and precise explanation         | 10    |
| B       | Ions, ionic compounds, naming and formulae    | 12    |
| C       | Shells, subshells, orbitals and filling rules | 12    |
| D       | Electron configurations and error analysis    | 8     |
| E       | Integrated scientific writing                 | 8     |
| Total   |                                               | 50    |

**Target:** Accurate science + clear causal writing

\_\_\_\_ / 50

Source basis: Lesson 11 - Nuclide Notation and Ions | Lesson 12-14 - Electron Orbitals and the Periodic Table

## SECTION A

### CORE CONCEPTS AND PRECISION

Answer in 2-4 complete sentences unless otherwise stated. Total: 10 marks.

- 1 Explain why elements in the same group of the periodic table often have similar chemical properties. [2]

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- 2 Explain why noble gases are described as very stable and relatively unreactive. Include the idea of the valence shell. [2]

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- 3 A student writes: *"Atoms gain or lose electrons because they want to become ions."* Rewrite this idea more scientifically using the words **valence shell** and **stability**. [2]

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- 4 Distinguish **electron transfer** from an **ionic bond**. Do not use the two phrases as if they mean the same thing. [2]

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- 5 According to the lesson model, why should an ionic compound such as sodium chloride not be described as one individual molecule? [2]

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## SECTION B

# IONS, IONIC COMPOUNDS AND FORMULAE

Show scientific reasoning, not only final answers. Total: 12 marks.

- 6 Complete the common ion charges using the group pattern learned in Lesson 11. [5]

| Element       | Common ion | Gain or lose electrons? |
|---------------|------------|-------------------------|
| Sodium, Na    | _____      | _____                   |
| Magnesium, Mg | _____      | _____                   |
| Aluminium, Al | _____      | _____                   |
| Oxygen, O     | _____      | _____                   |
| Chlorine, Cl  | _____      | _____                   |

- 7 Explain why magnesium chloride has the formula **MgCl<sub>2</sub>** rather than MgCl. Your answer must refer to ionic charges and overall charge. [3]

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- 8 Complete the formula or name. [4]

| Prompt               | Your answer |
|----------------------|-------------|
| a. aluminium oxide   | _____       |
| b. beryllium nitride | _____       |
| c. Li <sub>2</sub> S | _____       |
| d. NaBr              | _____       |

### Self-check before moving on

charge is not a subscript

total charge = 0

metal first

nonmetal ends in -ide

## SECTION C

# ELECTRON STRUCTURE AND FILLING RULES

Use the lesson vocabulary exactly. Total: 12 marks.

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Define **shell**, **subshell**, and **orbital**, then state how the three ideas are related. [4]

| Term     | Precise definition |
|----------|--------------------|
| Shell    | _____              |
| Subshell | _____              |
| Orbital  | _____              |

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Explain each electron-filling rule in one clear sentence. [6]

| Rule                      | Your explanation |
|---------------------------|------------------|
| Aufbau principle          | _____            |
| Pauli exclusion principle | _____            |
| Hund's rule               | _____            |

11

Describe the shape of an **s orbital** and a **p orbital**. State one reason orbital shape matters in the lesson. [2]

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## SECTION D

# ELECTRON CONFIGURATIONS AND ERROR ANALYSIS

Accuracy matters. Check electron totals and filling order. Total: 8 marks.

- 12 Potassium has the full electron configuration shown in the lesson. Write both its **full** and **abbreviated** electron configurations, then explain what the noble-gas symbol replaces. [4]

Full configuration

Abbreviated configuration

- 13 Write the full electron configuration of phosphorus. Then explain what the superscript numbers mean in an electron configuration. [2]

- 14 A student writes the final part of potassium's configuration as  $3d^1$  instead of  $4s^1$ . Identify the error, name the filling principle that helps you correct it, and write the correct full configuration. [2]

### Rapid error check

Pauli check:



Maximum two electrons in one orbital.

Hund check:



Occupy equal-energy orbitals singly before pairing.

## SECTION E

# INTEGRATED SCIENTIFIC WRITING

Write 120-160 words. Total: 8 marks.

**15. Extended response.** Explain how electron arrangement helps us understand why atoms form ions and ionic compounds. Build one connected explanation rather than a list of definitions. [8]

Your response must connect all six ideas

periodic position

valence electrons

stability

electron transfer

ionic charge

charge balance

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|------------------|------------------------------------------------------------------------------------------|
| Science accuracy | Correctly connects electron arrangement, ion formation, ionic charge and charge balance. |
| Reasoning        | Uses a clear cause-and-effect chain, not disconnected facts.                             |
| Academic English | Uses complete sentences and precise scientific vocabulary.                               |

## FINAL 90-SECOND CHECK

Did I write **an atom loses**, not *an atom lose*?

Did I distinguish **electron transfer** from **ionic bond**?

Did I keep **charge** separate from **subscript**?

Did I use plural forms correctly: electrons, ions, orbitals?