CHEMISTRY YEAR 11 - MODULE 1 - LESSON 14

Isotopes and Relative Atomic Mass

Use this worksheet after reading the lesson to practise the key ideas and prove you can meet the success criteria.

Name _____

Date _____

Class _____

1. Key Ideas

Carbon dating tells archaeologists whether a bone is 500 years old or 50,000 years old. It works because carbon has isotopes — atoms of carbon with different numbers of neutrons. ^{14}C is slightly unstable and decays at a known rate; ^{12}C is stable. The ratio of ^{14}C to ^{12}C in organic material decreases predictably over time. Without isotopes, there would be no carbon dating, no nuclear medicine, no PET scans. Understanding isotopes is also the key to understanding why chlorine's atomic mass is 35.5 — not a whole number.

- Definition of isotope and how isotopes differ
- Why isotopes of the same element have identical chemical properties

2. Success Criteria

By the end, you should be able to:

- Definition of isotope and how isotopes differ
- How to write nuclide notation for isotopes
- Definition and meaning of relative atomic mass (Ar)

3. Key Terms

Key idea
The central concept from Isotopes and Relative Atomic Mass.

Evidence
Information, observations or calculations used to support an answer.

Explain
Give a reasoned answer that links cause and effect.

Apply
Use a learned idea in a new example, problem or scenario.

4. Activity: Build the Lesson Map

Use the lesson to complete the table. Keep answers brief but specific.

Prompt	Your answer
Main concept	
Important example	
Common mistake to avoid	
How this links to the next lesson	

5. Short Answer Questions

1. 6. Carbon-12 (^{12}C) and carbon-14 (^{14}C) are isotopes of carbon. (a) State one similarity and two differences between these isotopes. (b) Explain why both isotopes react identically with oxygen to form CO_2.

BAND 3 4 MARKS

2. 7. The Ar of neon is 20.18. Neon has three isotopes: ^{20}Ne (90.48%), ^{21}Ne (0.27%), and ^{22}Ne (9.25%). Using the Ar formula, verify that these abundances are consistent with Ar = 20.18. Show full working.

BAND 4 3 MARKS

6. Extend: Apply the Idea

BAND 5/6 5 MARKS

A student gives a memorised answer about Isotopes and Relative Atomic Mass but does not use evidence or reasoning.

Improve the answer by writing a stronger response that uses accurate terminology, a relevant example and a clear explanation.

7. Multiple Choice

1. What is the best first step when answering a question about Isotopes and Relative Atomic Mass?

☐ A. Identify the key concept being tested

☐ B. Write every fact from memory

☐ C. Ignore the command word

☐ D. Skip examples and evidence

2. Which answer would show stronger understanding of Isotopes and Relative Atomic Mass?

☐ A. An answer with accurate terms and reasoning

☐ B. A copied definition only

☐ C. A single-word response

☐ D. An answer with no example

3. What should you do if a question asks you to explain?

☐ A. Link the idea to a reason or cause

☐ B. List unrelated facts

☐ C. Only draw a diagram

☐ D. Write the shortest possible answer

8. Success Criteria Proof

Finish with evidence that you can do each success criterion.

SUCCESS CRITERION 1

Prove that you can: Definition of isotope and how isotopes differ

BAND 3 2 MARKS

SUCCESS CRITERION 2

Prove that you can: How to write nuclide notation for isotopes

BAND 4 3 MARKS

SUCCESS CRITERION 3

Prove that you can: Definition and meaning of relative atomic mass (Ar)

BAND 5 4 MARKS

One thing I still need help with: